SOPHIA GIRLS' COLLEGE (AUTONOMOUS), AJMER

SESSION 2023-24

Criterion 3: Research Innovation and Extension

3.4.3 - Number of research papers per teacher in CARE Journals notified on UGC website during the year

Change Management: An International Journal
ISSN: 2327-798X (Print) ISSN: 2327-9176 (Online)
Volume 23 No. 2, 2023

An Empirical Study on Demographic Elements of Work Life Balance with Reference to Women Academicians in Higher Education in Rajasthan

Professor Sister Pearl[1], Dr. Surbhi Mehra[2]

[1]Principal, Sophia Girls' College (Autonomous)

Ajmer, Rajasthan, India

[2]Assistant Professor, Department of Management, Sophia Girls' College (Autonomous)

Ajmer, Rajasthan, India

Abstract

Our lives revolve around work. It gives us a sense of success, recognition, and most importantly, a way to get money to meet our basic necessities. Work can interfere with family life and family can interfere with work, causing conflict and making work-life balance difficult. The line separating family life from work is becoming increasingly hazy. Combining family obligations with paid work presents major difficulties, according to research on work-life balance (WLB). The purpose of this study is to examine the demographic components of academicians' work-life balance (WLB) in higher education sector. This study aims to determine how work-life balance is affected by several factors, like Age Group, Marital status, Employment of Spouse, Spouse's highest qualification, Nature of Spouse's work, working hours of spouse, No. of children, Age group of children, Nature of respondent's employment, Income group, Nature of organization, Designation, Tenure of working in the current organization, Overtime working, paid for overtime working etc.

This study uses an explanatory research approach and collects primary data from 500 respondents via questionnaires. This study identified that demographic factors affecting work-life balance have immense impact on academicians working in the higher education sector.

[1]First Author

[2]Corresponding Author, email: mehra.Surbhi115@gmail.com

Acceptance: 07July2023, Publication: 10July2023

DOI: https://doi.org/10.5281/zenodo.8130853

Keywords

Work-life balance, Demographic factors, Tenure of working, Overtime working, Employment of Spouse, paid for overtime working, etc.

Introduction

During the past ten years, India underwent wide statistical, social, economic and technological changes. These developments have had a significant impact on Indian delegates' ability to manage their work and personal lives, especially for female academicians. In India, today there are essentially more working couples than ever before. Their numbers are constantly rising because both young men and women expect that the potential life partner must be well-off. They understand that keeping the family on one paycheck is not enough. Together, work and family take on a crucial role in their life, and maintaining them both is a challenge. If a person has children or other dependent family members, their personal life may be even more difficult. In the home, women are more heavily involved in the work. Women are the primary caterers for both domestic and childcare duties everywhere in the world, regardless of family structure or culture. As they work to advance their careers, they realize the responsibilities associated with having and raising children. But today, no working, educated woman wants to give up her job for child rearing.

In India, mothers or other relatives help women take care of their infants while they are at work. Sometimes they are forced to enlist the assistance of certain employees, such as Aya or the caretaker. But the mothers keep their minds are occupied at home. Every now and again, they contact through phone calls to check on their infants and provide important directions. When a child is ill or requires their mother's attention, they withdraw from their jobs and stay at home. The stress of job and parenthood might occasionally turn into their worst nightmare. They do not, however, dare quit their jobs. In the Indian market, employment is scarce. They make every effort to keep up with both of their obligations. Careerists either avoid getting married or put off becoming mothers. The major change in family structure can be attributed to economical factors. The majority of India's urban communities now have their roots in the concept of a single child or tiny family. The result is that many more women are enrolling in colleges and institutions. In every facet of their lives, they are in conflict with their relationships. The Indian society is becoming less and less conservative. Female entries are now being accepted by Indian associations, which was previously impossible. Among Indian women, teaching is their preferred profession.

Specific resources like land, labour, capital, and business enterprise can help an association function properly but employees are a company's most valuable asset out of all the production-related factors. At the moment, the employees find it extremely difficult to balance work and family. Work-life balance is becoming more important in today's changing workplace because it can have a huge impact on an association's revenue and performance. A healthy work-life balance helps employees create better relationships with management, reduce workplace anxiety, and increase morale and productivity for the organisation as a whole. Many businesses are attempting to provide favourable working circumstances so that employees can perform better at work. Work and family are the two major contending areas for employees. When there is conflict between work and family, it has an adverse effect on both the employees and the company. Work-life balance can be defined as the absence of conflict between work and family, or between an individual's various roles. Contrarily, work-life conflicts arise when involvement in one area, such as job or personal life, intrudes on the other. Work-life balance creates a link between a person's professional life and personal obligations. Working women simultaneously balance their emotional, behavioural, and time demands in both spheres of life. Work-life balance has become more difficult in today's reality for those who work as educators. Along with verifying students' assignments, maintaining their records, and attending to many organization-related servicing needs, the significant responsibility of an instructor also extends to their homes, where they must prepare for the next day.

Research Objectives

The research examines the demographic variables affecting work life balance in the Higher Education Sector. This would assist organisations in the higher education sector in creating strategies for the efficient growth of academics, improving performance, ensuring the retention of talented employees and lowering total expenditure.

Literature Review

Adame C (2018) revealed that contention among employees' family and work obligations is related with pressure and poor prosperity, which have negative outcomes for firms and their representatives. The study breaks down the job of two inward and two outer drivers that energize organisations to embrace and actualize work-life balance approaches. The job of outer monetary help and particular laws, together with budgetary arrangement for work-life balance approaches and administrators' observations with regard to issues due to work-life strife (inside drivers), are analysed. Assessment of information recommends that financial issues (outer

monetary help or potentially a specific budget inside the organization) are key components for the execution or absence of usage of work-life balance approaches. In addition, to execute these approaches, managers not really perceive issues due to work-life struggle. At last, work- life balance legislation appears not to assume an explicit job in the connections examined.

Anuradha et al. (2015) explained that work-life balance has turned into a vital issue in the twenty first century. Work and family life are two sides of an indistinguishable coin for both are interconnected and meddle with each other. Expanded work requests meddle with family life, and then again, family requests meddle with the work-life of representatives. In this way, clashes happen, which adversely influence a representative's execution at job and home. Taking a step towards this trend, organisations have progressively begun to take a functioning enthusiasm for introducing practices that empower representatives to adapt to the work-life balance issues. The investigation endeavoured to investigate the work-life adjust practices of chosen open area endeavours and their effect on authoritative execution. The finding recommended that open part organisations in India have understood that work-life adjust rehearses are critical for hierarchical execution.

Hilbrecht M et al. (2014) identified how independently employed people who have children living at home build their work-life balance. Work-life balance was portrayed regarding time, action or experience. Most members agree that self-employment work contributes, yet some doubt regardless of whether work-life balance is conceivable or not. Parents generally pursued customary job designs. A few opposed this course of action and perceived self-employed work as an approach to take an interest all the more effectively in family life.

Maiya S and Bagali MM (2014) provided a deep insight of work-life balance of working mothers in public and private sector. An experimental survey of equal number of public and private sector employees were carried out. Both the sectors were evaluated on 6 sub scales viz. personal factors, balancing factors, organizational support, motivational factors, career advancement and psychological factors. The results revealed the picture of difficulties faced in balancing the work demand and the life (family) responsibility. There was high correlation between the difficulties faced and the balancing act to be performed significantly in the areas of career advancement factors, organizational support and psychological factors.

Sundaresan Shobha et al. (2014) demonstrated that a large number of working females are experiencing inconvenience in adjusting work and family in view of too less time for themselves, the need to fulfil others necessities and superfluous work pressures. Due to long work hours high proportion of the female workforce comes across work overflow into the

home. Elevated amounts of stress and apprehension, friction at home, experiencing work burnout and inability to utilise maximum capacity are all outcomes of poor work-life balance. They often feel peevish and furious because of their helplessness to balance work and family life. This study explored the components influencing work-life balance among women workforce and the outcomes of poor-work life balance. The study provides suggestions for working women for keeping up sound work-life balance. The literature review identified with the subject has revealed that working females experience more noticeable issue than men in balancing family and work pressures. Correspondingly they experience conflict as there is more inundation of work in personal life, than inundation of home life into work. Also, working women are regularly called upon to make forfeits in another as every other situation make diverse requests on them and have distinctive standards to follow.

Tajlili MH et al (2014) revealed a noteworthy issue of work-life integration for the present working females, as the requests of today's work strife with the social components of family life. Females feel they need to settle on troublesome choices that forfeit their career or family, with little comprehension of the impacts that influence basic decision-making. Career instructors may not be talking about the strain of work- life joining with female college students, leading them to think "having everything" is feasible.

Trehan R. et al. (2014) investigated nature of working life differentials among urban and rural teachers; to think about the urban and rural instructing condition based on occupation performance criterion like educating and welfare offices. Performance is a central point influencing conduct. The examination uncovered that in the event of urban instructors, the components distinguished as critical in nature of working life incorporate brilliance and fulfillment at work, intra-institutional fulfillment, peer pressures, bring down confidence, institutional and social pressures, in general hierarchical fulfillment and socio-authoritative conduct. Then again, on account of country instructors, seven components have been recognized as elements deciding of nature of work, which not the same elements are as identified on account of urban educators. This study suggested that the education foundations which centre on variables deciding the nature of work life will have more chances to rise as effective organisations.

Thomas KJ (2014) clarified how work-life balance and working environment technology connect to influence the lives of employees. The article prescribes that thoughtfulness regarding work-life balance move towards becoming some part of training when human resource development experts outline virtual learning or help create working environment

technologies and policies. Noteworthy, advances in technology and the expanding ways by which employees utilize it in their work and individual lives have prompted a domain in which employees can work about whenever and wherever. Although virtual human resource development (VHRD) carries with it helpful efficiencies and expanded opportunities for learning, the possibility of day in and day out learning i.e. 24/7 learning can deleteriously affect work- life balance for workers.

Poulose S et al. (2014) uncovered that individual view of high work-life balance and feeling of prosperity among employees has turned out to be basic for any organisation keeping in mind the end goal to guarantee improved execution productivity, especially in this period of profoundly aggressive business condition. It is no big surprise that the work-life balance has pulled in various commitments from specialists and human resource experts that endeavour to explore on different variables impacting work-life balance, their interrelationship and conceivable results of various levels of work life balance, winning among representatives, predominantly because of regularly expanding requests of work alongside expanded family requests inferable from the need of life partners to be utilized and mission for individual accomplishments in individual life.

Methodology

The questionnaire used to study that Demographic characteristics influence the work life balance of women academicians in higher education in the present research was included various factors like:

Demographic Variables	
1	Age Group
2	Marital status
3	Employment of Spouse
4	Spouse's highest qualification
5	Nature of Spouse's work
6	Working hours of spouse
7	No. of children
8	Age group of children
9	Nature of respondents employment
10	Income group
11	Nature of organization

12	Designation
13	Tenure of working in the current organization
14	Overtime working
15	Paid for overtime working

To examine whether work life balance of female academics in higher education are affected by demographic variables. Respondents were asked to tick the most appropriate option. Data were collected from female academics in the higher education sector. Some female academicians go to public universities, others go to private colleges and universities. The sample size for the current study is 500.Statistical tools were used to measure the effect of demographic variables on female academicians' work-life balance.

Analysis and Interpretation

Demographic Characteristics and Work Life Balance of Women Academicians

Ho₁: *Demographic characteristics do not influence the work life balance of women academicians in higher education.*

Ha₁: *Demographic characteristics influence the work life balance of women academicians in higher education.*

The relationship of demographic characteristics and work life balance of women academicians in higher education is measured by separate scores based on various dimensions stated and grouped in the questionnaire. The relationship is analyzed with different statistical tools hereunder:

- **Descriptive Statistics and Correlation**

Table 5.3.1: Descriptive Statistics

	Mean	Std. Deviation	N
Score-WLB	2.85	.169	500
Score-Demo	2.11	.288	500

The Work Life Balance (Score-WLB) is depicting the mean of 2.85 and standard deviation is 0.169. Demographic variables (Score-Demo) compositely have mean of 2.11 and standard deviation of 0.288.

Table 5.3.2: Correlations

		Score-WLB	Score-Demo
Pearson Correlation	Score-WLB	1.000	.095
	Score-Demo	.095	1.000
Sig. (1-tailed)	Score-WLB	.	.017
	Score-Demo	.017	.
N	Score-WLB	500	500
	Score-Demo	500	500

The correlation between Work Life Balance (Score-WLB) and Demographic variables (Score-Demo) was 0.095 which was significant at 0.01 level of significance with the p-value of 0.017.

Table 5.3.3: Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Score-Demo[b]	-	Enter

a. Dependent Variable: Score-WLB

b. All requested variables entered.

There is only one model with Work Life Balance (Score-WLB) as dependent variable and Demographic variables (Score-Demo)as independent variable and for the duration of fitting the regression line no variable was removed and the method was Enter.

Table 5.3.4: Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics	
					R Square Change	F Change
1	.095[a]	.009	.007	.168	.009	4.548

Model	Change Statistics		
	df1	df2	Sig. F Change
1	1[a]	498	.033

a. Predictors: (Constant), Score-Demo

b. Dependent Variable: Score-WLB

The above Table 5.3.4 of Model Summary is providing the information such as R, R^2, adjusted R^2, and the standard error of the estimate while fitting the regression line between Work Life Balance (Score-WLB) and Demographic variables (Score-Demo). As demonstrated in the table, 0.9% of the total variance in the Work Life Balance (Score-WLB) is explained by the regression model. Here, R explains the association between the experiential and expected values of Demographic variables (Score-Demo). The standard error of the estimate measures the scattering of the Demographic variables (Score-Demo) around its means which is 0.168. This is the standard deviation of the inaccuracy and it is the square root of the Mean Square Residual stated in the ANOVA table which is given below:

Table 5.3.5: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	0.129	1	.129	4.548	.033[b]
	Residual	14.175	498	.028		
	Total	14.304	499			

a. Dependent Variable: Score-WLB

b. Predictors: (Constant), Score-Demo

The ANOVA is given in the Table 5.3.5 and the significance value is 0.033 which is less than critical value of 0.05, therefore the Work Life Balance (Score-WLB) has significantly different mean than Demographic variables (Score-Demo), and consequently, null hypothesis that Demographic characteristics do not influence the work life balance of women academicians in higher education, is rejected. The Sum of Squares associated with the three causes of variation, Total, Regression and Residual which are possibly explained by the Demographic variables (Score-Demo) (Regression) i.e. 0.129 and the variance which is not explained by the Demographic variables (Score-Demo) (Residual) i.e. 14.175.

Table 5.3.6: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.736	.056		48.930	.000
	Score-Demo	.056	.026	.095	2.133	.033

The beta value in the unstandardized column for Constant is quite higher than the Demographic variables (Score-Demo) that means the constant makes the strong unique contribution in explaining the dependent variable. The t values for both Demographic variables (Score-Demo) and constant is statistically significant being less than 0.05 represents the change in the mean response for one unit of change in Work Life Balance (Score-WLB), while the supplementary terms in the model are remain invariable. The relationship between Demographic Variables (Score-Demo) and Work Life Balance (Score-WLB) can be expressed in the equation form as:

Work Life Balance (Score-WLB) = **2.736** + **0.056** Demographic Variables (Score-Demo)…….....…… (1)

Where, in equation (1), Work Life Balance (Score-WLB) is representing the value or Magnitude of Work Life Balance, when Demographic Variables (Score-Demo) are measured on ordinal Scale.

Model		Correlations			Collinearity Statistics	
		Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)					
	Score-Demo	.095	.095	.095	1.000	1.000

a. Dependent Variable: Score-WLB

The variance inflation factor (VIF) indicates the magnitude of variation of a coefficient is overstated due to the correlations among the predictors in the model. Furthermore, the Tolerance value is presenting the changeability of the Dependent Variable: Score-WLB. If this value is very low (less than 0.10), it specify that the multiple correlation with other variables is high, suggesting the possibility of Multicollinearity. A VIF of greater than 5 is generally considered evidence of multicollinearity.

In Table 5.3.6, in the tolerance column, values are not less than 0.10 i.e. 1.000 which is indicating that the multiple correlation with other variables is low or absent and the VIF is also 1.000 which is showing absence of multicollinearity (correlation among predictors). The Part Correlation Coefficient is representing the quantum of the total variance in the Work Life Balance (Score-WLB) which is uniquely explained by the Demographic variables (Score-Demo) i.e. 0.095.

The Histogram and Normal P-P Plot of Regression Standardized Residual ensures normality in the Work Life Balance (Score-WLB) and the dotted points of dependent variable are following the straight line as shown below. The scatter-plot of standardized residuals against predicted values is an arbitrary pattern concentrated around the approximate line of zero standard residual value. Moreover, the scatter-plot depicts no clear relationship between the residuals and the predicted values which is steady with the assumption of linearity.

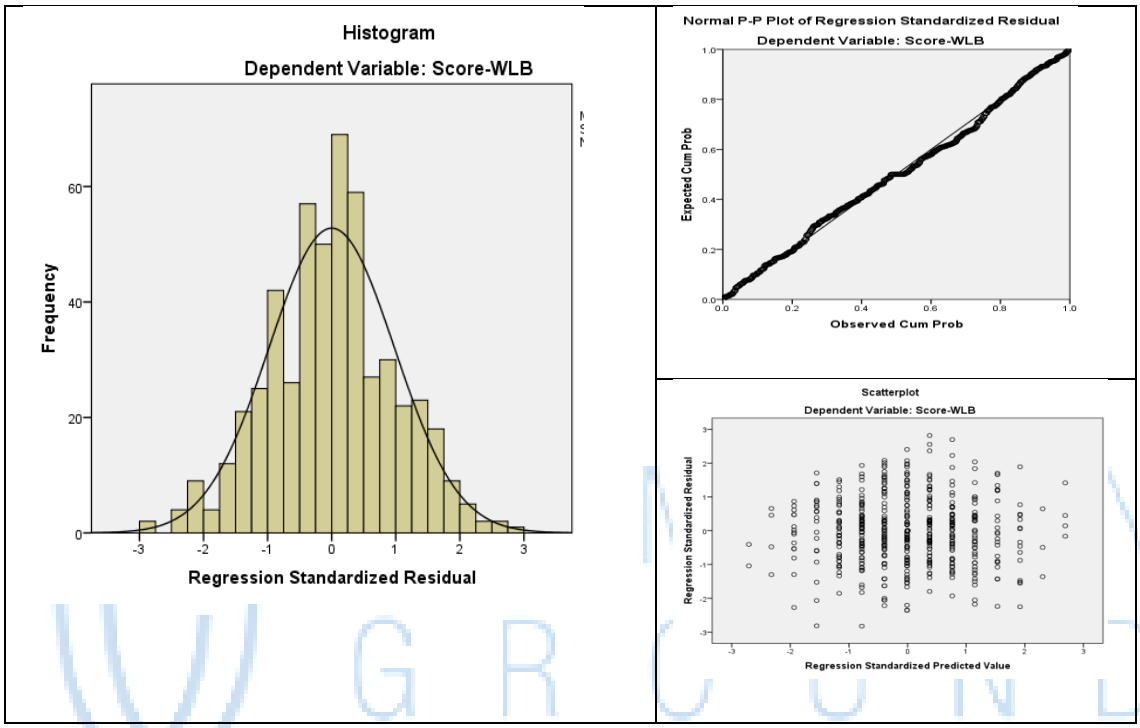


Figure 5.3.1: Histogram, Normal Residual Plot and Scatter Plot

Conclusion

On the professional front, women are growing: organizations and in institutions. This study has looked at some of the issues that women face at home and at work, as well as how they manage to balance work and family life. The research's findings are based on actual responses from the women, and the following inferences can be made from them: In terms of work orientation, a distinct new pattern has emerged. The organization attracts more female members from financially stable families. They are focused on their jobs and enjoy positions with a lot of responsibility, but they struggle with mobility and moderate promotions because they have to work long hours and have family responsibilities. They also have problems with their male subordinates. The study demonstrates that female liberation is being influenced in part by a shift away from organized relationships and toward inter-caste and inter-religious marriages as a result of this shift. The age of marriage is shifting from 22 to 26 to 30. In any case, society

and married women have to accept that their jobs are subordinate to "spouse," "home," and "youngsters" as they have lot of responsibilities. Females who are not married have fewer problems, but their ability to hang out with friends and other people is limited. Although there hasn't been a lot of change in Indian culture, females have definitely started moving in the right direction for social change by bravely moving away from the norms of society and towards advancement. Women juggle work and family life with the help of a "mother" or other relatives, accepting the idea of having one child and considering having a child subsequent to settle in job. They prioritize spending quality time with their children over career advancement. Women who are not married can grow because they do not have to take care of the house. It goes without saying that women are taught by their parents that "her home" is the most important responsibility of a woman and that it is difficult for them to perform their jobs as housewives or mothers. In India, men are barred this duty. In India, it will take a long time to achieve sexual equality. Additionally, all of this intensifies the issue of women's work-life balance. Work-life balance is an important factor in an organization's success because it helps employees become more productive, motivated, and committed. The employee will not be satisfied in his position unless he can maintain a healthy work-life balance. In today's competitive business environment, an organization can only survive if its employees have a healthy work-life balance.

Bibliography

1. Adame-Sánchez, C., Caplliure, E. and Miquel-Romero, M. (2018). Paving the way for coopetition: drivers for work–life balance policy implementation. [online] Available at: https://link.springer.com/article/10.1007/s11846-017-0271-y [Accessed 10 Jan. 2023].
2. KshirsagarSonali (2018); ‘Work-Life Balance of Women Employees in Service Sector’, International Journals of Advanced Research in Computer Science and Software Engineering, Vol-8 (1)
3. Nizam Ismail and KamChrystinne(2018); ‘The Determinants of Work-Life Balance in the Event Industry of Malaysia’,International Journal of Management, Accounting and EconomicsVol. 5(3)
4. Amal Krishna Saha, Sumita Chaudhuri &SharadSoumyaMazumdar (2016); ‘Work-Life Balance of Women Teachers in West Bengal’, The Indian Journal of Industrial Relations, Vol. 52 (2) : 217-230

5. Anuradha, Mrinalini Pandey (2015); 'A Review of Work-Life Balance Practices Prevalent in Public Sector Undertakings in India', Prabhandan: Indian Journal of Management, Vol. 8 (2): 0-0
6. Maiya S and Bagali MM (2014); 'An Empirical Investigation on Work - Life Balance Among Working Mothers: Emerging HRM Interventions', International Journal of Business and Administration Research Review, Vol. 1 (5).
7. Shobha Sundaresan (2014); 'Work-life balance–implications for working women', International Conference on Sustainable Development, At Ontario, Canada. Vol. 07.
8. Shobitha Poulose, Sudarsan N (2014); 'Work Life Balance: A Conceptual Review', International Journal of Advances in Management and Economics, Vol. 3 (2)
9. Theresa J. Brown and Christine Clark (2017); 'Employed Parents of Children with Disabilities and Work Family Life Balance: A Literature Review', Child Youth Care Forum, Vol. 46 : 857–876.
10. Tracey Warren (2004); 'Working part-time: achieving a successful 'work-life' balance, The British Journal of Sociology, Vol. 55 (1) : 99-122.
11. Tracey Warren, Elizabeth Fox and Gillian Pascall (2009); 'Innovative Social Policies : Implications for Work–life Balance among Low-waged Women in England', Gender, Work and Organization, Vol. 16 (1) : 126-150.

STATUS OF WOMEN DURING MEDIEVAL INDIA: A GEOGRAPHICAL PERSPECTIVE

Monika Kannan

Professor, Sophia Girls' College (Autonomous), Ajmer (Rajasthan)

Abstract

The status of women in India has been subject to many great alterations over the past few millenniums. From a largely unknown status in ancient times through the low points of the medieval period, to the promotion of equal rights by many reformers, the history of women in India has thoroughly been lively. The aim of this paper is to examine the status of women in Medieval India. The broad narrative it sketches and seeks to explore in women's position in different sphere as in education, religion, social, economic and political. The study is conducted through analysis of previous studies and reports. Critically evaluation has been done on the basis of available literature.

Key Words: Status, Women, Medieval, Reformers

Introduction:

Women play a key role in strengthening the dynamism of human civilization. According to Altekar (1938), "one of the best ways to understand the spirit of a civilization and to appreciate its excellences and realize its limitations is to study the position and status of women in it." Women constituted the keystone in the arch of Indian civilization which is based on the spirit that women's cause is men; they rise or sink together, dwarfed or godlike, bond or free. Thus, the status of women has been subject to many great alterations over the past few millenniums. Disappointingly, women, in this world, belong to a class or group of society, who is in a disadvantaged situation on account of several social barriers and impediment. Though we admire and preach them in the name of Durga, Saraswati, Parvati and Kali, we also abuse her in the form of Child-marriage, Female infanticide, Sati, Sexual harassment, Dowry and so on. Crimes against women have been committed since antiquity. Giving freedom to woman was thought of doom. Conservatism, superstition and belief in magic, sorcery and witch craft were part of Women's existence. In the Medieval period these are exhibited the pitiable position of Women in Society (Radha, 2019) Since early times, societal structure has played an active role in stimulating change in women's roles and positions, but with time has also hindered the progress in this direction. In this context, this study has made an attempt to assess women's status and to highlight the structural framework of gender relations in medieval Indian civilization.

Objectives:

To assess women's status and to highlight the structural framework of gender relations in medieval Indian civilization.

Methodology:

The study is conducted through analysis of previous studies and reports. The article is descriptive and analytical in nature. It has made an attempt to assess women's roles and positions in ancient Indian civilization. According to the need of the article the data utilised are secondary in nature, which are collected from books, journals, magazines, research articles as well as Govt. documents.

Scope:

The scope of the study is limited to status of women in family & society during Medieval period.

Results and Discussion

Medieval India was not women's age rather it was supposed to be the 'dark age' for most of them. The influx of foreign invaders on the one hand and the brahmanical laws on the other were main causes for such degradation. The position of women after 8th century takes a turn towards greater orthodoxy and control of women as possessions which led to several gender inequalities in the society. Muslim invasion of India changed the direction of Indian history. Although deterioration in the status of women begins from later Vedic Period, the worst phase started when Mohd. Gazanvi (11th Century) attacked India ruthlessly. The period proved to be highly disappointing for the Indian women as their status plummeted all time low and this period witnessed enhanced dependency of women on men. Purdah (veiling of women) forced the public world to be separated from the private world, with women confined to the latter. In other words 'Purdah' system resulted in seclusion of women. The education of women was already under a setback from later Vedic Period. The opportunity of seeking education to enrich her intellectual and spiritual life during this period was completely withdrawn. Most girls, were deprived of an education, their freedom was curtailed, knowledge of not only the scriptures but even letters were denied to them and their status was reduced to that of an appendage on man. Only those girls who happened to be members of the royal or well-to-do families, or were born into the entertainment professions had access to education. This has led to a sharp increase in early marriage, stemming from the desire to protect girl children being coveted by the foreign invaders. The early marriage custom first manifested itself among the lower classes members of which charged bride-price and therefore sought to marry off their daughters at a very young age. Girls were married off at the age of 8-10 and were treated as the material being. The plight of women can be imagined by one of the shloka of Tulsidas where he writes "Dhol, gawar, shudra,

pashu, nari, ye sab tadan ke adhikari" meaning that animals, illiterates, lower castes and women should be subjected to beating and were compared with animals. The child marriage along with it brought some more problems such as increased birth rate, poor health of women due to repeated child bearing and high mortality rate of women and children. European travelers Manucci and Tavernier penned the dark side of this custom during their India visit. Akbar issued a fiat that no marriage should be performed before puberty. It was, however, normal for girls to be married off at an age of between nine to twelve, i.e., before they attained puberty, right up to the early twentieth century. The question of marriage by choice did not arise. In marriage, the obligation of fidelity was enjoined on both the parties along with love, care, and mutual maintenance. Polygamy, though known earlier, becomes common among the ruling classes. The custom of female infanticide crept into some sections of the society during this period, but it was confined largely to the lower and very poor classes. Although, Islam was one of the first religion which recognized the independent existence of women. However, as Islam spread outside Arab territories, feudal traditions and practices got better of Islam and the feudal elites justified the old feudal practices as Islamic. Oppressive traditions were product of certain socio-economic system. Feudal system always considered wives as slave and women considered their husbands as face of god. In many Muslim families, women were restricted to Zanana areas only. Infact, muslim women were amongst the most oppressed and subjugated among all. There seems to be a basic fallacy in the argument that backward traditions in one community are due to influence of other community. Women across religion, caste and ethnic origins have been found severely oppressed during this period.

The custom of dowry remained, as hitherto, of the bride's parents voluntarily gifting ornaments and cash to their daughters at the time of marriage. The concept of *stridhan* becomes very conspicuous, and it was supposed to consist not only of the gifts received by woman at the time of her marriage but whatever was given to her by her maternal and other relatives during her married life. Many historians opined that the husband's gifts of landed property to the wife also formed part of her *stridhan.* During the medieval period and later, both in the north and south, women of the royal and aristocratic classes had a certain degree of economic independence through their large estates (*jagirs*) bestowed on them by their husbands. Both Maharaja Man Singh of Jodhpur and Maharana Bhim Singh of Udaipur gifted estates (*jagirs*) to their wives. Maharaja Pratap Singh of Jaipur gifted estate to his daughter Chandra Kunwar. These are few examples known to historians because these cases were from royal families and not much is known about women belonged to middle or low income classes. Some historian are of the view that bride price was common among lower castes, while dowry among the higher castes. There were many *rishis* like Vishnu and Yajnavalkya, who recognized the right of a widow to her husband's property. This was occasionally practiced in the south but rarely in the north.

The right to divorce and widow remarriage seems to have almost disappeared in the second millennia, though, occasionally such cases were known to have occurred, especially among the lower castes. Widows, especially Hindu widows had very hard and miserable life in the absence of freedom, social contacts and worldly pleasure. The widow was required to observe a life of

celibacy and simplicity. Their condition was very pathetic. Society had no good idea about the woman who go for remarriage in Hindus. This cruelty on widows was one of the main reasons for the large number of women committing *Sati*. The practice of widow burning or sati became fairly common all over India by the eleventh century among the widows of rulers, nobles and warriors. Bengal had the highest incidence of Sati during the later Mughal period. Historians observed that Most of the *Satis* in Bengal and UP were from the Brahmana caste. They attributed the prevalence of Sati in Bengal to eliminating the widow's heirship of property. For there who cannot go through this self-sacrifice, a rigorous life of vows and facts were prescribed and enforced. The condition of Muslim women could be said to be slightly better than their Hindu counterparts since Islam allows widow remarriage. Similarly, practices like *sati* and widow repression remained alien to Muslim custom, much like the case of 'lower caste' communities. To save the glory and honour from the enemies, jauhar pratha was followed by the upper caste women, especially in Rajputs. When people of Rajput clan became sure that they were going to die at the hands of their enemy then all the women arrange a large pyre and set themselves afire, while their husband used to fight the last decisive battle known as "Shaka", with the enemy. Thus protecting the sanctity of the women and the whole clan. Rani Padmavati is the example of this pratha who are known to place a high premium on honour for protecting the sanctity of the women and the whole clan. The practice had also spread to the warrior classes of the Southern peninsula, though to a much lesser degree than their northern counterparts. While Maratha ruling families by this time claimed Rajput descent and therefore could not remain immune to Sati as a practice, the frequency was still not as high as compared to Rajputana.

Enslavement of the infidels went on as long as Muslims were ruling with authority. Women and children were special targets for enslavement throughout during Muslim invasions and Muslim rule. Captive children of both sexes grew up as Muslims and served the sultans, nobles and men of means in various captives. Enslavement of young women was also due to many reasons; their being sex objects was the primary consideration and hence concentration on their captivity. The consolidation of power by the British mercenaries in the nineteenth century eventually ended enslavement practice.

History of Medieval India has some women with heroic deeds. Coming out of the dark side of women's position, a few women exceeded expectations in the fields of administration, bureaucracy, literature and religion. Tara Bai, Mangammal and Ahalya Bai Holkar, Samyukta, Rani, Rudrama Devi and Abbakka Rani left their great imprints for their ruling capabilities. Tara Bai who resist the onslaught of Aurangzeb, Mangammal , the green memory of South India, Ahalya Bai Holkar, the genious administrator are the some examples of their bravery. Among Muslim, Razia Sultan was an excellent administrator, brave and a warrior like her father Iltutmish. In spite of the fact that her rule was only between 1236-1240, her deeds have been saved in the pages of history. Jehangir's 20th wife Nur Jahan viably employed royal power and was perceived as the genuine power behind the Mughal position of authority. A strong,

charismatic, and well-educated woman, was the most powerful and influential woman at court during a period when the Mughal Empire was at the peak of its power and glory. In many princely families, both Muslim and Hindu women were highly educated and often took part in governing their States during the minority of their children, and this has happened frequently in the Jaipur State. Women took interest in the defence of their husbands' States. There is an example of Tara, wife of Prithviraj, an heir-apparent to the throne of Chittor, who lost her life in a battle with a Muslim ruler. The Gond ruler Durgavati ruled for a long time, before she lost her life in a fight with Mughal head Akbar's general Asaf Khan in 1564. Chand Bibi shielded Ahmednagar against the strong Mughal powers of Akbar in 1590s Shivaji's mother, Jijabai was deputed as ruler official, on account of her capacity as a warrior and an executive. The Mughal princesses Jahanara and Zebunnissa were notable artists, and furthermore affected the decision in the organization. In South India, numerous women directed villages, towns, divisions and proclaimed social and religious institutions. The Mughul princesses like Jahanarah, Roshanara, Zebunnissa who were poetess, played their active role in supporting their brothers Dara Shikoh and Aurangzeb in the administration. Most of the princesses or daughters of high officials were skilled in art, paintings and poetry. History says that Rajput princesses were given proper knowledge of administration, art, archery, poetry, politics etc. Rani Padmavati, Jodha Bai, are some famous names in this regard. The daughter of Shahjahan, Jahanaara was an excellent in poetry. Sanchi Honamma was a poetess in the court of Chikkadeva Raya of Mysore (reigned 1672-1704) who protested against women being considered as inferior to men. Upper class women occasionally exercised their right to choice in the selection of their husbands. In the seventeenth century, there was a famous case of Charumati of Kishangarh in Rajasthan who was betrothed to Aurangzeb by her brother but who refused to marry him and instead sent a message to Maharana Raj Singh of Udaipur to rescue and marry her. There were evidence of women scholars like the famous poetess Mira of Chittor, and Andal in the South. Gulbadan Begum passed the poetic talent, which can be seen in Humayun-Nama, which she wrote. The queens of Udaipur, Jodhpur, and Kota, from their own resources constructed temples, gardens, and *bawris* to provide drinking water whereas among Muslims, Nur Jahan, Mumtaz Mahal, Jahanara Begum, and Roshanara Begum took a great interest in charitable works, in the construction of rest houses (*sarais*) by the roadsides, in feeding the poor, and in constructing mosques, mausoleums, and gardens.

During the 14th and 15th centuries, the social situation had undergone some change. The Bhakti movements endeavored to re-establish women's status and scrutinized a portion of the types of mistreatment meted out to them. The great saints like chaitanya, Nanak, Kabir, Ramdas, Tulsi, Tukaram and others fought for the rights of women to religious worship. Mira Bai, a female holy person artist, was a standout amongst the most essential Bhakti movement figures. Some other female holy person writers from this period were Akkamahadevi, also known as Akka or Mahadevi from the southern, Rami Janabai and LalDed. Shortly after the Bhakti movement, Guru Nanak, the primary Guru of Sikhs additionally lectured the message of balance amongst

men and women. He upheld that women be permitted to lead religious gatherings; to perform and lead congregational psalm singing called Kirtan or Bhajan; become individuals from religious management councils; to lead armed forces on the combat zone; have balance in marriage, and balance in Amrit (Baptism). Other Sikh Gurus likewise lectured against the oppression against women. Due to their support, women achieved religious freedom and to some extent, social freedom. On the economic status, women were completely dependent on the male members of the family. The system "Grihashram" of Bhakti Movement did not permit saints to take to renunciation (sanyas) without the consent of wife (Sharma, 2014). Such conditions gave important right to women. The saints of the Bhakti Movement encouraged women to read religious books and to educate themselves. The purdah system was abolished so that women could go out of their families to attend social and religious functions. Chaitanya, Nanak, Kabir, Meera, Ramdas, Tulsidas, and Tukaram advocated women's rights for religious worship, as a result women secured certain social freedom too.

Conclusion: The dignified role and position of women in the Vedic period was completely reduced to one of virtual subservience during the age in medieval times. Patriarchy was deeply entrenched. Strict restrictions were placed on the bodies, movements, and legal and economic rights of women. The deterioration in women's roles and position can be attributed to brahmanical austerity and foreign (Muslim) invasions which started from the 8th century. The gender discrimination thereafter continued for thousand years. This led to general decline in the social institute dismantling political structure, socio-economic-cultural depression in India. Practices like *purdahpratha, sati pratha, Jauhar*, child marriage, polygamy, female feticide, sexual harassment, dowry etc. were the biggest social evils. However, status of women had undergone some positive change due to efforts made during Bhakti movement in later part of Medieval India which endeavored to re-establish women's status and scrutinized a portion of the types of mistreatment meted out to them.

References:

Nandal, V and Rajnish, M 2014, 'Status of women through ages in India', *International Research Journal of Social Sciences* vol. 3, no. 1, pp. 21-26.

Sharma, A 2014, 'Status of women: A socio-historical analysis in different ages of Indian society', *Research Journal of Language, Literature and Humanities* vol. 1, pp. 10-14.

Tharakan, SM & Tharakan, M 1975, 'Status of women in India: A historical perspective', *Social Scientist* vol. 4, no. 4/5, pp. 115-123.

Thakur, P 2017, 'A journey of Hindu women from Shakti to Sati in ancient India', *International Journal of Engineering, Technology, Science and Research* vol. 4, no. 6, pp. 383-385.

Halli, CS & Mullal, SM 2016, 'Status of women in India' - Status of ancient, medieval and modern', *Imperial Journal of Interdisciplinary Research* vol. 2, no. 2, pp. 297-300.

Altekar, AS 1938, *The position of women in Hindu civilization: From prehistoric times to the present day* Benares Hindu University Press, India.

Altekar AS 1938 The position of women in Hindu civilization: From prehistoric times to the present day Benares Hindu University Press India.

A GEOSPATIAL ANALYSIS OF SOCIO-ECONOMIC DEVELOPMENT OF WOMEN IN PUSHKAR (AJMER)

Monika Kannan[1] Monika Sharma[2]

Department of Geography, Sophia Girls' College (Autonomous), Ajmer (Rajasthan)
kannanmonika@gmail.com

Abstract: *Socio-economic development and Empowerment of the individual leads to the development and well-being of an individual in all spheres of life. Improved education system is the need of the hour. Development of education and literacy skills would help the people to gain employment opportunity. Employment opportunity help them generate source of income and raising their standard of living. The study "Analysis of Socio-Economic Development of Women in Pushkar (Ajmer) (2011)", a base of which is data collection through Census of India and also through official websites. Different indicators like sex ratio, literacy rate, working participation are taken for socio economic development of women. In Socio-economic development of society, many factors plays significant role in which educational attainment is considered as an important one. Education creates power to think rationally about every element in human beings including females. With education women can perform their various family roles that are daughter, wife, mother with perfection as well as can become economically self-reliant and consequently achieve the proper status in society equivalent to men. But still inequalities can be find in male and female literacy. Females are lagging behind in literacy than males. Active participation of women in economic activities is essential for the overall development of any economy. The study presents correlation between female literacy rate and women work participation rate. Karl Pearson method has been adopted to find out correlation between female literacy rate and women work participation rate in the study area. The correlation matrix between female literacy rate and women work participation rate shows strong and negative correlation.*

Keywords: Empowerment, Literacy, Sex Ratio, Work participation, Karl Pearson Correlation.

Introduction

The word women is a symbol of an idea, knowledge, moral, sacrifice, affection and cooperation. A country is said to be developed only when there is no discrimination between man and woman, they enjoy equal status and they work together. A great woman, Eleanor Roosevelt, once said**,** "A woman is like a tea bag- you can't tell how strong she is until she steps into hot water". Woman has many qualities that allow them to think and act rationally when men strike at first sign of doubt. Women have ability to create life and create beauty. Every woman has ability to achieve anything through hard work, dedication, love, trust andfaith.The position of women deteriorated during late Vedic Age. Women were made victims of social issues like child marriage and dowry system. Indian women are facing many social problems regarding gender inequality, low mobility, illiteracy, female infanticide, high family responsibility and so on. Economic growth of India is hindered because women did not have much freedom to make choices and decision of their own. Though, of late, Government of India and State Governments adopted various schemes in order to create space for the development of women. According to Global Human Development Report, 2013, India ranked 132nd among 148 countries all over the world in terms of gender inequalities. It may be propounded that both gender equality and women empowerment constitute the vital force to bring about transfiguration revolution for achieving desired socio economic progress of India. Women are an important part of today's life as they participate in various social and cultural functions. Woman has proved themselves in every field, whether in the past, in the present and has the mindset to do so in the future.Under the given circumstances, we need to deeply consider and discuss how our cultural, traditional social rules affect women empowerment so that the same can be changed.

Objectives

The major objectives of the study are,

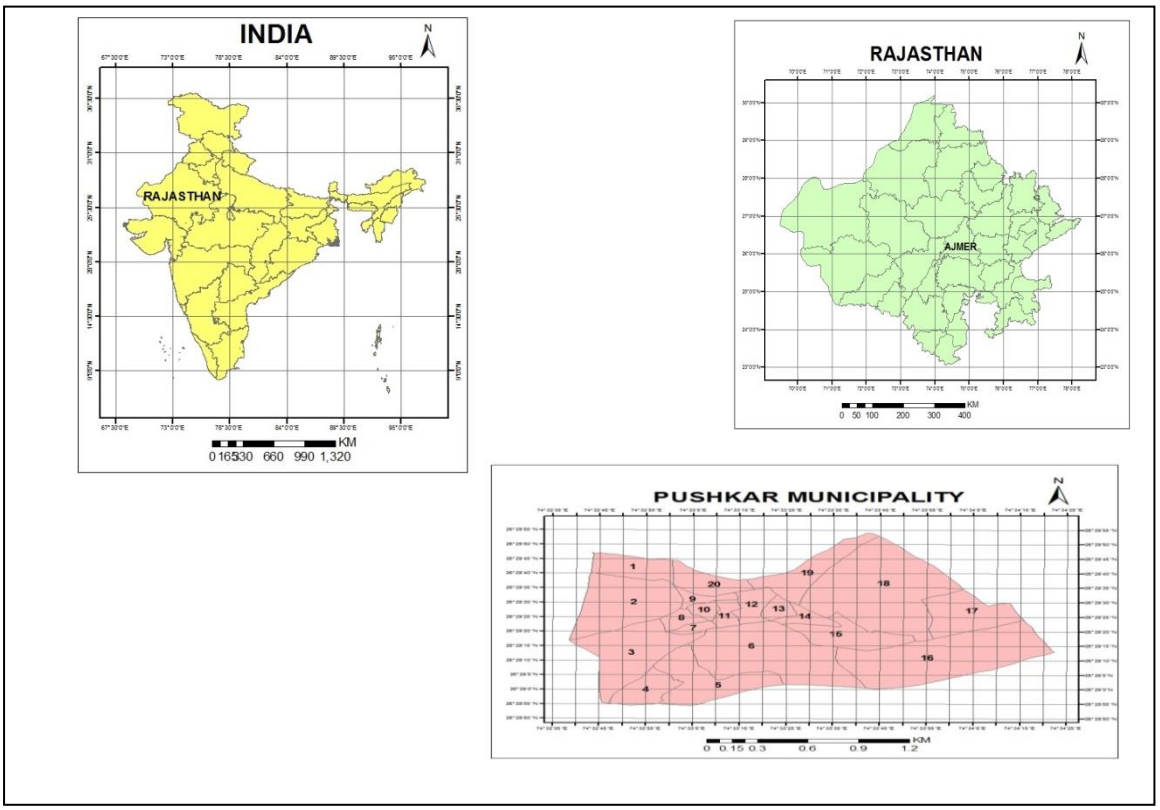
- To study spatial patterns of female literacy rate and sex ratio in Pushkar.
- To present a women work participation scenario of Pushkar (2011).

- To examine correlation between female literacy rate and women work participation rate in the study area.
- To contribute in creating public awareness to invoke women participation in community and society more effectively; and to prepare them to be good women leaders.

Study Area

Pushkar is a town in the district of Ajmer which lies in the state of Rajasthan in India. It is about 10 km from Ajmer. Aravalli separates Pushkar from Ajmer. It is situated at the latitude of 26.5^0 North and the longitude of 74.55^0 East. Like most of the desert towns, Pushkar experiences semi-arid with extremes of dry and hot summers and cold and freezing winters. May and June are the hottest months with temperature of 45^0C while January is the coldest month with 7^0-8^0C of temperature. According to census 2011, 21,626 people lives in Pushkar out of which 11,335 were males and 10,291 were females. Population has increased by 46.2% in last 10 years. It recorded literacy of 79.11% of which male has literacy of 88.24% and female literacy is 69.07%. 34.9% of total population of the city constitutes the working population of which main workers comprises 84% of population whereas marginal workers comprise 16% of population. Tourism and cattle fair is the main economic source. Garment manufacturing is an important industrial activity. Traditional handicrafts, Gulkand, Rose oil, Rose water etc. The production of handmade materials like clothes, bags, carpets etc. for sale and export has bloomed. Its main festivals and landmarks are Pushkar Fair, Sikh Gurudwara, Pushkar Lake, Brahma Temple Savitri Temple, Tejaji Fair.

Figure 01: Location Map of Study Region



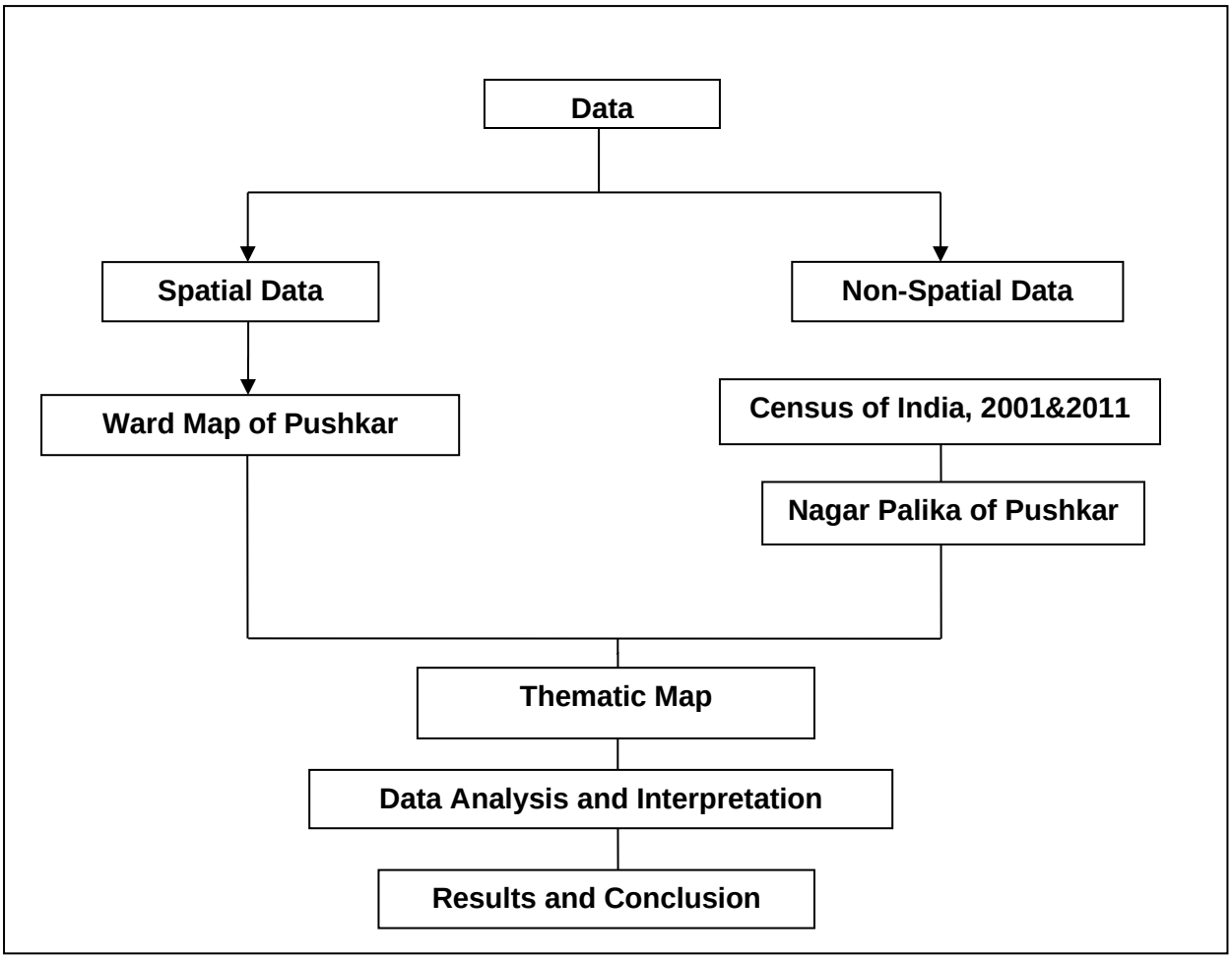
Methodology

The main source to obtain necessary data for present study is secondary data. The present study is based on secondary data collected by Census of India 2011. Census of India is the main source of information on population tables provided in the A & B series. Karl Pearson Correlation method has been used to analyze the data. This method is used in calculating the correlation between the two variables; which are female literacy rate and women work participation rate in Pushkar. This method is useful in the calculation of correlation between female literacy rate and women work participation rate in Pushkar.

$$r = \frac{\Sigma xy}{\sqrt{x^2 * y^2}}$$

The spatial as well non spatial data was taken consideration to prepare thematic maps and data tabulation. The Pushkar ward boundary was digitized and analytical maps were made.

Figure 02: Sources of Data Collection



Result and discussion

The demographic data was analyzed to understand which wards in Pushkar had more sex ration, where the literacy rate was high and whether there exists a relationship between literacy levels and work participation rates amongst woman in the region. According to census 2011, Pushkar has a population of 21,626 of which 11,335 were males and 10,291 were females. The following table shows the Sex Ratio and Literacy levels in Pushkar in the year 2011, to monitor the decadal changes in the population (Table 1).

Table 01: **Ward Wise Sex Ratio and Literacy Rate of Females (2011)**

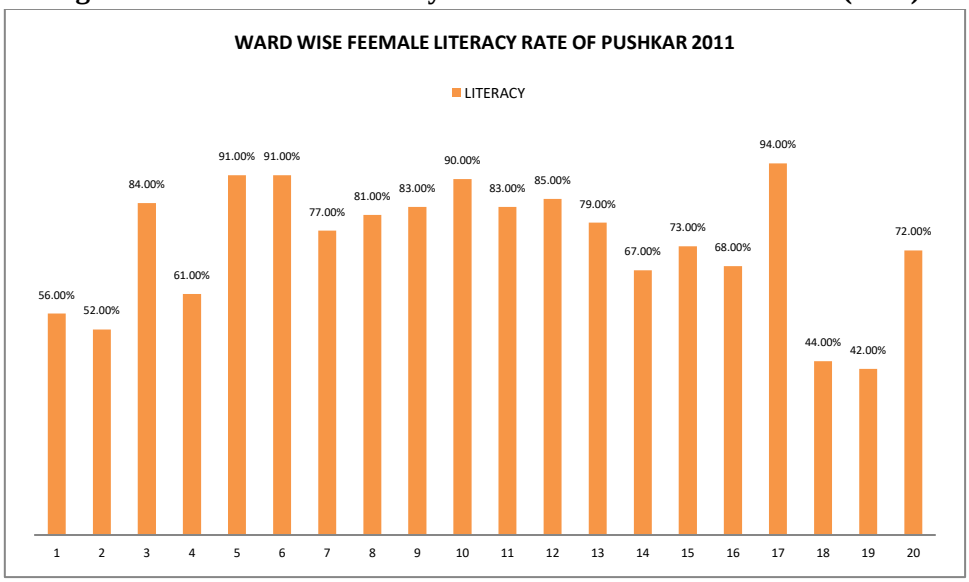
Wards of Pushkar	Sex Ratio	Literacy Rate (%)
1	969	56.00
2	919	52.00
3	868	84.00
4	839	61.00
5	822	91.00
6	948	91.00
7	978	77.00
8	1066	81.00

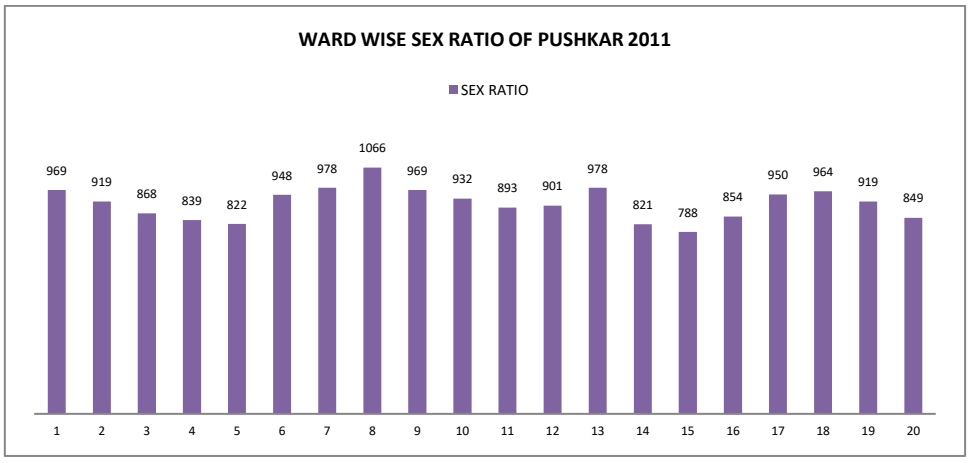
9	969	83.00
10	932	90.00
11	893	83.00
12	901	85.00
13	978	79.00
14	821	67.00
15	788	73.00
16	854	68.00
17	950	34.00
18	964	44.00
19	919	42.00
20	849	72.00
Total	908	69.10

Source: Census of India, 2011, (www.indikosh.com)

Total about 15 thousand people in the city are literate, among them 6123 are female. As India is a patriarchal society, it is an important factor of low female literacy rate. W-(6) has highest female literacy rate (91%) while W-(17) has recorded the lowest female literacy rate. Total 829 people in the ward no.6 are literate, among them 389 are female. 91% of female population are literate here. As of 2011 census there are 908 females per 1000 male in the city. Overall sex ratio in the city has increased by 49 females per 1000 male during the years from 2001 to 2011 (Table 1).

Figure 03: Ward Wise Literacy Rate and Sex Ratio of Pushkar (2011)

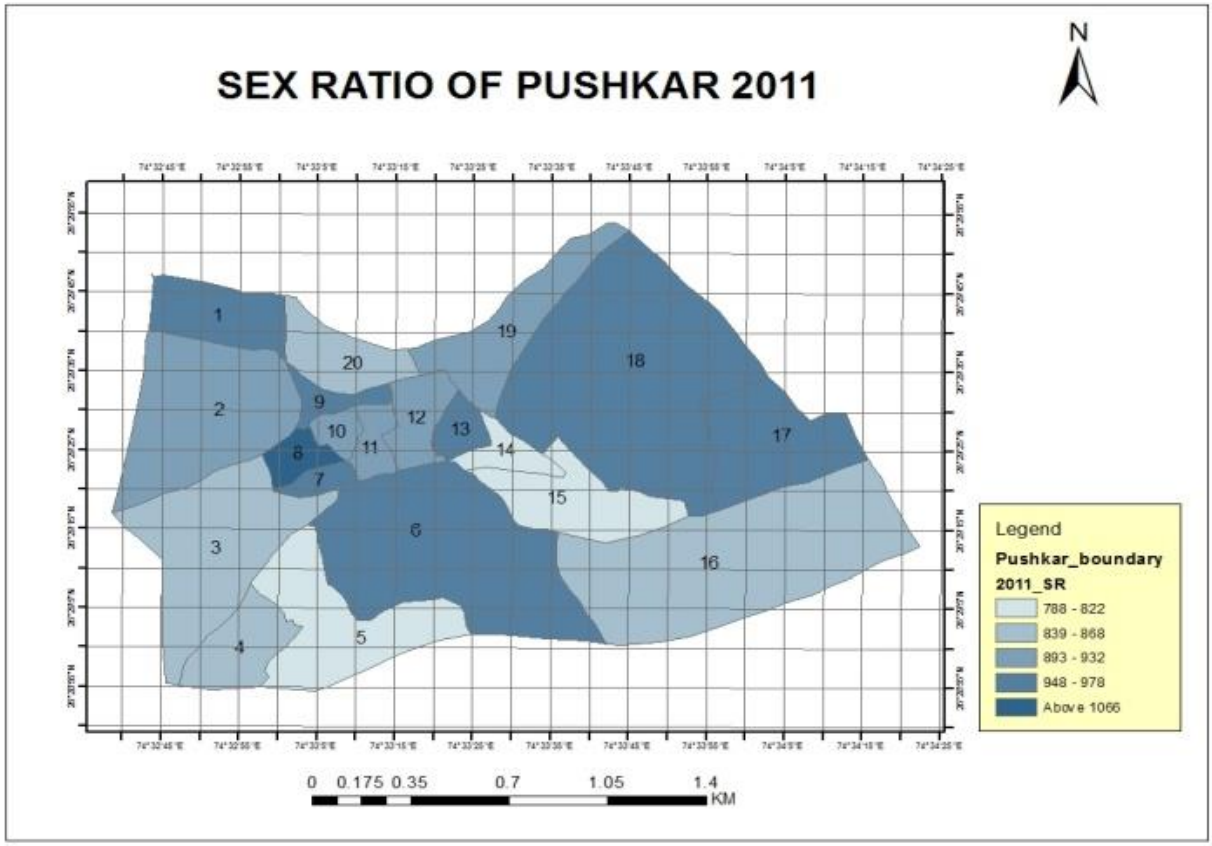




Spatial Pattern of Female Literacy Rate

Fig.3 indicates Female literacy rate are high in some wards while low in the others. Ward 5 has highest female literacy rate (91%) followed by ward 6 (91%) and ward 10 (90%) while ward 17 (34%) has lowest female literacy rate followed by W-19 (42%) and W-8 (44%).There are many reasons for low literacy rate - As India is a patriarchal society, it is an important factor of low female literacy rate. Parents do not want to send their girls to long distance. Lack of proper school facility also becomes an obstacle.

Figure 04: Ward Wise Sex Ratio of Pushkar 2011



Spatial Pattern of Sex Ratio

- **Wards with High Sex Ratio**
  W- 8 (1066) has highest sex ratio followed by W-7 & 13 (978), W-1&9 (969), W-18 (964), W-17 (950) indicating high sex ratio (Fig.4).

- **Wards with Moderate Sex Ratio**
  W-10 (932), W-12 (901), W-19 (919), W-11 (893), W-3 (868), W-6 (854), W-20 (849), W-4 (839) indicating moderate sex ratio (Fig.4).

- **Wards with Low Sex Ratio**
  W-5 (822), W-14 (821), W-15 (788) indicating low sex ratio (Fig.4).

There are many reasons for low sex ratio – Dowry and young couple's busy schedule leads to decreasing sex ratio. Many couples do not prefer second child. Many people seek female birth as financial, social, emotional and mental a burden on family.

The following table presents the women work participation scenerio of Pushkar 2011 (Table 2.)

Table 02: Ward Wise Work Participation of Women 2011

Wards	Workers(Among Total Population) %	Main Worker (Among Workers) %	Marginal Worker (Among Workers) %	Non Worker (Among Total Population) %

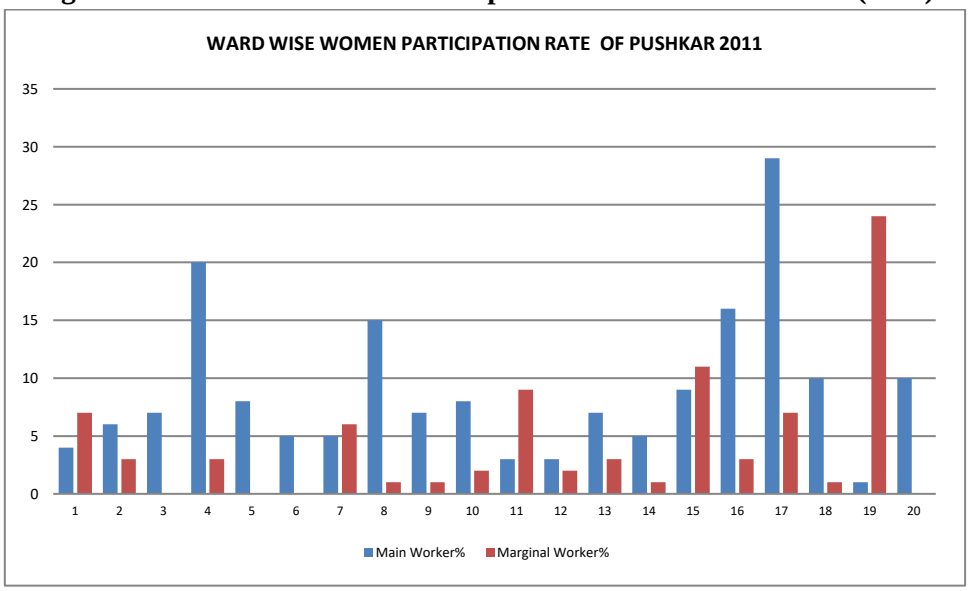
1	11.00	4.00	7.00	89.00
2	9.00	6.00	3.00	91.00
3	7.00	7.00	00	93.00
4	23.00	20.00	3.00	77.00
5	8.00	8.00	00	92.00
6	5.00	5.00	00	95.00
7	11.00	5.00	6.00	89.00
8	16.00	15.00	1.00	84.00
9	8.00	7.00	1.00	92.00
10	10.00	8.00	2.00	90.00
11	13.00	3.00	9.00	87.00
12	5.00	3.00	2.00	95.00
13	10.00	7.00	3.00	90.00
14	6.00	5.00	1.00	94.00
15	20.00	9.00	11.00	80.00
16	20.00	16.00	3.00	80.00
17	36.00	29.00	7.00	64.00
18	11.00	10.00	1.00	89.00
19	25.00	1.00	24.00	75.00
20	11.00	10.00	00	89.00
Total	14.30	9.90	4.40	85.70

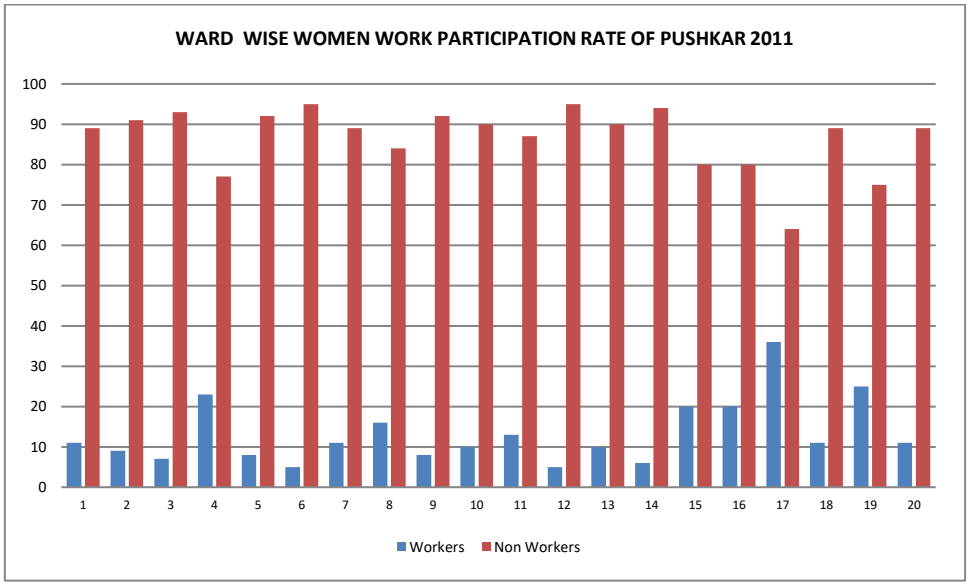
Source: Census of India, 2011, (www.indikosh.com)

It clearly show from Table 2 that women work participation is very low in Pushkar as per census 2011. There are more female non workers as compared to workers in Pushkar. Only 14.3% are working women, among them 9.9% are main and 4.4% are marginal workers. 85.50% are non-workers (Table 2).

There are many reasons for low working participation of women. Lack of equal economic opportunity. Women drop out of their jobs due to the lack of sufficient and quality jobs in the market, Only males have access to the limited job opportunities. Poor working conditions force women to leave their jobs. For example, safety and adequate facilities at the work place is of major concern .

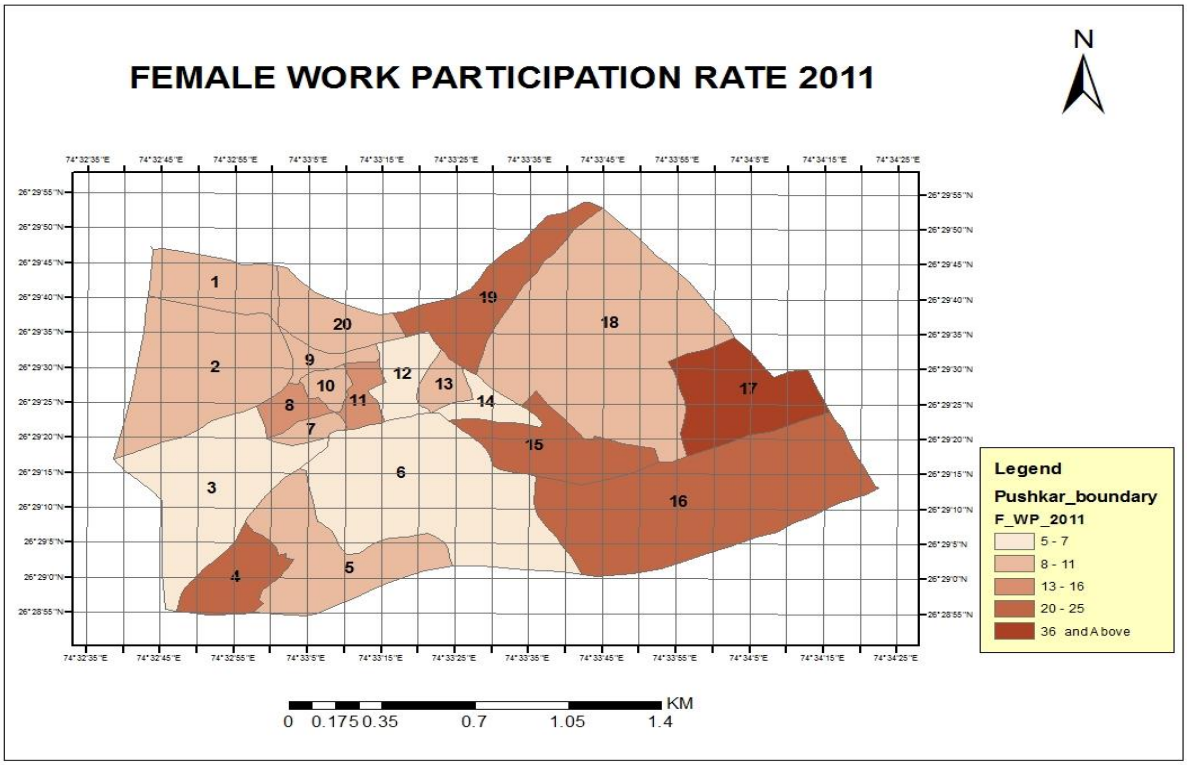
Figure 05: Ward Wise Work Participation of Women in Pushkar (2011)





Pushkar has 35% (7554) population engaged in either main or marginal works. 14% female population is working population.10% of total female population are main and 4% are marginal workers. W-17 has highest female workers (36%), of which 29% are main and 7% are marginal workers. W-6 & 12 has lowest female workers (5%). W-19 is the only ward which has more female workers engaged in marginal work (24%) (Fig.5)

Figure 06: Ward Wise Female Work Participation Rate of Pushkar (2011)



W-17 (36%) has more working women followed by W-19 (25%), W-4 (23%), W-16 (20%), W-15 (20%). There are 10 wards which have women working participation rate from 8% to 16% only. W-6 (5%) has lowest rate of working women followed by Ward12 (5%), W-14 (6%), W-3 (7%) Fig.5)

$$r = \frac{\Sigma xy}{\sqrt{x^2 * y^2}} = -0.64$$

Table 03: Correlation between Female Literacy Rate and Women Work Participation Rate (2011)

Wards	Literacy Rate	Workers	$x=X-\bar{X}$	$y=Y-\bar{Y}$	x^2	y^2	xy
1	56.00%	11.00%	-14.65	-2.25	214.62	5.06	32.96
2	52.00%	9.00%	-18.65	-4.25	347.82	18.06	79.26
3	84.00%	7.00%	13.35	-6.25	178.22	39.06	-83.43
4	61.00%	23.00%	-9.65	9.75	93.12	95.06	-94.08
5	91.00%	8.00%	20.35	-5.25	414.12	27.56	-106.83
6	91.00%	5.00%	20.35	-8.25	414.12	68.06	-167.88
7	77.00%	11.00%	6.35	-2.25	40.32	5.06	-14.28
8	81.00%	16.00%	10.35	2.75	107.12	7.56	28.46
9	83.00%	8.00%	12.35	-5.25	152.52	27.56	-64.83
10	90.00%	10.00%	19.35	-3.25	374.42	10.56	-62.88
11	83.00%	13.00%	12.35	0.25	152.52	0.06	3.08
12	85.00%	5.00%	14.35	-8.25	205.92	68.06	-118.38
13	79.00%	10.00%	8.35	-3.25	69.72	10.56	-27.13
14	67.00%	6.00%	-3.65	-7.25	13.32	52.56	26.46
15	73.00%	20.00%	2.35	6.75	5.52	45.56	15.86
16	68.00%	20.00%	-2.65	6.75	7.02	45.56	-17.88
17	34.00%	36.00%	-36.65	22.75	1343.22	517.56	-833.78
18	44.00%	11.00%	-26.65	-2.25	710.22	5.06	59.96
19	42.00%	25.00%	-28.65	11.75	820.82	138.06	-336.63
20	72.00%	11.00%	1.35	-2.25	1.82	5.06	-3.03
	$\bar{X}$ =70.65	**$\bar{Y}$ =13.25**			**$\sum x^2$=5666.5**	**$\sum y^2$=1191.7**	**$\sum xy$=-1685**

Source: Census of India, 2011

Karl Pearson Correlation method has been used to analyze the data.This method is used in calculating the correlation between the two variables; which are female literacy rate and women work participation rate in Pushkar. It is observed that there is a strong and negative correlation between female literacy rate and women work participation rate i.e. r =-0.64. It shows that as literacy increases, the tendency of work decreases and vice versa.

Conclusion

Literacy and work participation are basic indicators of the level of development achieved by a society. Literacy forms an important input in overall development of individuals enabling them to comprehend their social, political and cultural environment better and respond to it appropriately. Work participation and literacy lead to a greater awareness and also contributes in improvement of economic and social conditions.The average sex ratio of the region is low. The literacy level is also lower than their male counterpart. The participation of women in the tertiary sector such as medical, teaching, administrative and other official services is lower than the male population.

Result of study shows that there is strong and negative correlation between female literacy rate and women work participation i.e. r =-0.64.

It is very important for government to take initiatives towards girl's education. Many awareness programmes and literacy campaigns should be organized in rural areas for spreading awareness in the matter of girl's education.

Empowering women with focus on financial literacy is also important. Providing maternity leave also help women return to their work.

Government should take steps towards digital literacy and in creating financial channels, establishing training centres for women increase their work participation.

References

1. Census of India, (2011.) and Nagar Palika, Pushkar
2. Final Report- Preparation of development and management plan for Historic Temple Complex and Settlements of Rajasthan (prepared for Devasthan Dept., Govt. of Rajasthan, Udaipur
3. GoelAruna (2004). Education and Socio-economic Perspectives of Women Development and Empowerment, Deep and Deep Publications, pp349.
4. Jumani Usha, (1991). Self employment for poor rural women, Sage Publication, New Delhi.
5. Khanka S. S., (1998) Entrepreneurship Development, S Chand & Company Ltd., New Delhi.
6. Kumar Hajira, Jaimon Varghese (2005). Women's Empowerment, Issues, Challenges, and Strategies: A Source Book, Daya Books, Feminism - 578 pages
7. Leela, P. (2000). "Women and the Changing Development Scenario", in ChanduSubba Rao and Francis D. "Development of Weaker Sections", Ravat Publications, Jaipur and New Delhi, pp–53–66.
8. Ṣiddiqui M. Idris (2004). Women Workers, Anamika Pub & Distributors, pp.76.
9. https://edupediapublications.org/journals/index.php/IJR/
10. www.censusindia.gov.in
11. www.researchgate.net
12. www.travelogyindia.com
13. www.indikosh.com

iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 **Issue:** IX **Month of publication:** September 2023

DOI: https://doi.org/10.22214/ijraset.2023.55516

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue IX Sep 2023- Available at www.ijraset.com

Global Publication Output of *Tinospora cordifolia* (Medicinal Plant) Research: A Scientometric Study

Dr. Satish Kumar[1], Dr. Subhash Chand[2], Dr. Deepmala[3], Dr. Asha Masih[4]
[1]*Associate Professor & Head, Dept. of Library and Information Science, Sophia Girls' College (Autonomous), Ajmer, Rajasthan, India.*
[2]*Head, Dept. of Geography, SGSG Government College, Nasirabad, Ajmer (Rajasthan), India.*
[3]*Associate Professor & Head, Dept. of Physics, Sophia Girls' College (Autonomous), Ajmer, Rajasthan, India.*
[4]*Assistant Professor & Head, Dept. of Botany, Dayanand College, Ajmer, Rajasthan, India.*

Abstract: ***Scientometrics is described as a technique for analysing a researcher's quantitative research output. This study examines scientometric analysis on Tinospora cordifolia, medicinal plant by measuring the year-wise distribution of articles, annual growth rate, authorship pattern, author productivity, relative growth rates, article doubling time, degree of author collaboration, ranked list of authors, and distribution of publications output by broad topic areas. By observing the output, we found that a maximum of 166 articles (25.75%) were published in 2021. According to the authorship pattern, 40 publications out of 1054 were written by a single author. There are 227 two-author papers, 216 three-author papers, and 206 four-author papers. Author productivity is 0.238. This indicates that production per author is just 23.80% on average, while the average number of authors per manuscript is 4.20. The average doubling time is 0.969 and the relative growth rate (RGR) is 0.68. The overall cooperation rate is 0.96. India ranks first, having published 900 articles (0.85%) out of a total of 1054 articles. By publishing 22 publications, Maharishi Dayanand University and Banaras Hindu University have taken the lead. The University Grants Commission funded 52 articles, with Dabur, R ranking first with 12 papers published.***
Keyword: Tinospora cordifolia, Relative Growth Rate, Degree of Collaborations. DoublingTime, Global Publication Output, Medicinal plant.

I. INTRODUCTION

Medicinal plants have long been important and are used as primary sources healing from diseases. A long history of medicinal plants has been used to treat ailments by humans based on instinct, taste, and experience. And hence the research on medicinal plants has attracted many researchers to analyse medicinal plants. Recently, during the Covid-19, it was used tremendously. Among many different medicinal plants, *Tinospora cordifolia (Giloy),* has proved to be effective medicinal plant.

Tinospora cordifolia is a wide evergreen climbing vine with several branches. It has simple, roundish leaves. It has reddish-colored fruits. This medicinal plant's fruits grow in bunches. This herb is used in Ayurveda to cure a variety of ailments. *Tinospora cordifolia* is commonly known as heart leaved Moonseed Plant (English), Amrita Guduchi (Sanskrit), Giloy (Hindi), Gulancha (Bengali), Galo (Gujrati) and Teppatige (Telugu), It is found throughout India, and also in Sri Lanka, Bangladesh and China. Mittal, Sharma and Batra [1] described the importance of *Tinospora cordifolia* in the treatment of various diseases such as viral infections, cancer, diabetes, inflammation, leukemia neurological, immunomodulatory and psychiatric conditions it relaxes norepinephrine induced contractions. It is anti-microbial, anti-hypertensive and anti-viral Sangeetha et al. [2] assessed oxidative stress and distorted carbohydrate metabolism activities in rats related to type 2 diabetes. The stem of *Tinospora cordifolia* is widely used in regulating the blood glucose (by promoting insulin secretion and inhibitor for gluconeogenesis and glycogenosis). Zinjarde, Bhargava and Kumar [3] explained that in *Tinospora cordifolia* major phytoconstituents are Alkaloids, tannins, cardiac glycosides, flavonoids, saponins, and steroids. Uma Maheswari and Prince [4] performed research on the root extract of *Tinospora cordifolia* and concluded that the root extract of this plant can decrease the levels of glycosylated hemoglobin, plasma thiobarbituricacid, hydroperoxides, ceruloplasmin and vitamin E in diabetic rats. Sinha et al. [5] reviewed that *Tinospora cordifolia* has been used in indigenous medical systems as described in various classical texts of the Ayurvedic system of medicine. Charak, Sushrut, Ashtang Hridaya and other ancient treaties. It is also specifically mentioned for its use in tribal and folk medicine in various parts of India.

Scientometrics, a field of information science concerned with the use of bibliometrics, is necessary to investigate the scientific concepts found in the published literature in all of its forms.

According to the Glossary of Thompson Scientific Terminology [6], "Scientometric is the quantitative study of the disciplines of science based on published literature and communication. Scientometric can identify innovative and emerging areas of scientific research; examine their development over the time and over the geographical location. According to Dobrov and Korennoi [7], 'Scientometrics' and bibliometrics, both carry the same meaning.

Merton and Garfield [8], stated that scientometric as 'the field of enquiry given over to the quantitative analysis of science and scientific field'.

II. REVIEW OF LITERATURE

García-Ávila, F. et al.[9] analysed Application of ornamental plants in constructed wetlands for wastewater treatment using Scientometric technique from 2002 to 2022 using Scopus database. Mexico, Brazil, USA, China and India have the highest number of publications in the field of ornamental plants in the CWs and the most used ornamental plants are Canna, Iris, Heliconia and Zantedeschia.

Chaman Sab M. et al.[10] assessed Ethnopharmacology Research: A Scientometric Assessment of Indian Publications During 2011 to 2020 Web of Science (WoS) database Total 7,159 papers were retrieved , consisting of 84.24% journal articles and 14.23% review articles. The Council of Scientific Industrial Research (CSIR) India collaborates with the Indian Council of Agricultural Research (ICAR) and Central Institute of Medicinal Aromatic Plants (CIMAP) in terms of domestic collaboration.

Haungm Z. et al.[11] studied and analysed Medicinal and Edible Plant *Coptis* a total of 367 documents were analyzed. China (214) is at top position followed by Japan (57) and South Korea (52). The anti-oxidative stress, pharmacokinetics, and Alzheimer's disease treatment of *Coptis* are new hotspots in this field.

Atlasi et al. [12] carried out a scientometric analysis on herbal medicines used in the treatment of COVID-19. Data is retrieved from Web of Science (WOS) and Scopus database published till 26 October 2020. A total of 3185 records were analysed. Original and review articles have been the two predominant varieties of papers in each database. Major subject areas are drugs and medicine, respectively in WOS and Scopus databases.

The top three productive countries are China, US and India. "Journal of Biomolecular Structure Dynamics" in WOS and "Chinese Traditional and Herbal Drugs" in Scopus have been the top journals. Top keywords are "COVID-19″ and "Traditional Chinese Medicine". US is at top in collaboration with different authors.

Sivankalai and Sivasekaran [13] analyses the global level outlook of research publications on Mucormycosis output between the period of 1923 to 2021 (May). 4451 publications downloaded from core collection of Web of Science database. First publication was in 1923. 3798 institutions and 8562 different disciplines contributed and 2808 publications were in Articles. 4451 publications were published by 17320 authors and 23552 collaborations, documents per author is 0.257, authors per document are 3.89. First article published in 1923 was in German language. Total records published in 1161 journals, eleven languages, ninety-five countries and 1504 are open access and 12 articles are highly cited in this field.

Kumari, Amsaveni and Surulinathi [14] performed scientometrics analysis in the field of Occupational Therapy research output during the period of 1989 to 2015. The data is retrieved from the Web of Science. A total of 8095 publications were found the highest number of publications were published in 2013. In 2007, 386 publications were published with highest Global Citation Score of 6525. In Global Citation Scores, University of Queensland tops followed by the University of Toronto. India is at 25th position in the global ranking.

Jeyshankar and Babu [15] have assessed scientometric analysis of leukemia research on Indian contributions between 1960 to 2011. The data is retrieved from Scopus database. Out of 29 states in India, only 20 states contributed 2120 records. New Delhi ranked first, followed by Chandigarh, Maharashtra.

Surulinathi, Balasubramani and Kalidhasa [16] analysed the growth and development of Green Computing. A total of 3324 records are found in Web of Science from the period 1956-2011. Germany is at top by publishing 270 (16.24 %) articles followed by France and Italy, UK and Spain contributed more than 100 articles. India is also a leading country by publishing 128 Articles.

Gupta and Bala [17] have analysed the research output of India (Citation analysis of theoretical population genetics literature). The ten years of data was retrieved from Scopus using the keyword alzheimer disease. USA is at top with 25% publications followed by UK (16.20 %). India with 900 publications is on 16th position among top 20 countries. All India Institute of Medical Sciences (AIIMS), New Delhi have highest publications but University Institute of Pharmaceutical Sciences, Punjab Chandigarh got highest h-index (26) with 35 publications.

III. OBJECTIVES OF THE STUDY

This study has the following objectives:

1) To study year-wise distribution of the articles published during 2011 to 2021.
2) To find annual growth rate of articles.
3) To reveal authorship pattern and author productivity.
4) To check the co-authorship network.
5) To examine Relative Growth Rates and Doubling Time of articles.
6) To classify the Degree of authors collaboration
7) To studycountry wise and subject -wise distribution of articles.
8) To identify and prepare the ranked list of authors.
9) To study the distribution publications output by broad subject areas.

IV. RESEARCH METHODOLOGY AND LIMITATION OF THE STUDY

The required data was collected from Scopus database for the period 2011to 2021. It can be seen that 1054 research articles retrieved from this database on *Tinospora cordifolia* medicinal plant. The researcher downloaded the data and analysed the data with the help of MS Excel software as per the objectives of the study and the VOSviewer software was used for visualization of Co-authorship network. Various statistical methods are used to calculate AGR, RGR, Doubling Time, Author productivity and degree of authors collaboration.

V. RESULT AND DISCUSSIONS

1) Year-Wise Distribution of Articles

Table 1: Year-Wise Distribution of Articles & Annual Growth Rate

S. No.	Year	No. of Articles	%	Cumulative No. of Articles	AGR (%)
1	2011	91	8.64	91	-
2	2012	109	10.35	200	19.70
3	2013	105	9.97	305	-3.66
4	2014	91	8.64	406	-13.30
5	2015	78	7.40	484	-14.20
6	2016	66	6.26	550	-15.30
7	2017	67	6.36	617	1.51
8	2018	75	7.12	682	11.94
9	2019	73	6.93	755	-2.66
10	2020	133	12.53	887	80.00
11	2021	166	15.76	1053	25.75
Total		1054	100		

Table 1 shows total ‘1054’ articles have been published in these eleven years. Maximum 166 articles are published in 2021.Trend is oscillatory it first increases for one year then decreases from 2012(109) to 2016(66). Minimum publications are in 2016. After 2016 publications increased.
The year-wise distribution of articles is displayed in Figure 1. The figure shows the growth of articles with respect to the Year. It is clear from the Figure that maximum number of articles was published in 2021.

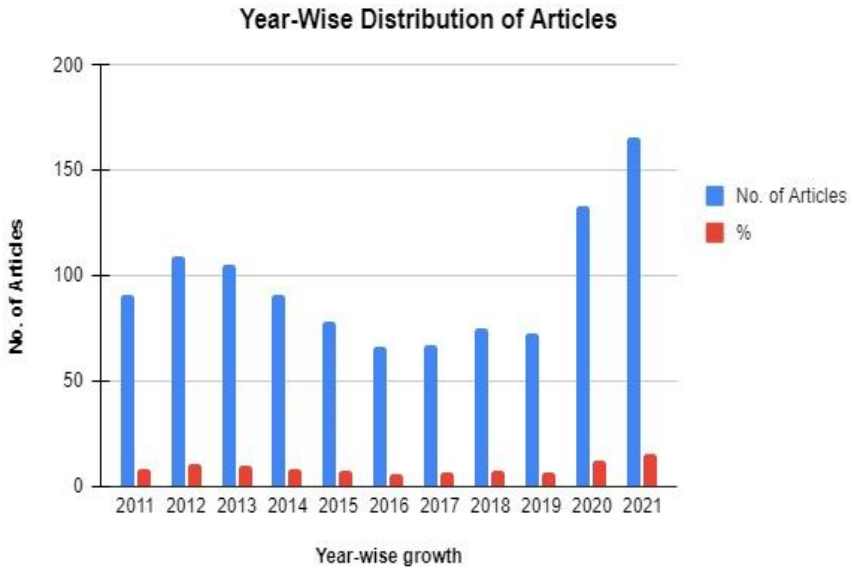


Figure 1: Year-Wise Distribution of Articles

2) Annual Growth Rate

The *annual growth rate* (AGR) reflects the rate of growth over a single year. It is calculated by the following formula (1).

$$Annual\ Growth\ Rate = \frac{(Suceeding\ Value - Previous\ Value)}{Previous\ Value} \quad (1)$$

The figure 2 demonstrates the annual growth rate of articles. It is observed that the year 2020 has the highest and positive AGR while the years 2013-2016 and 2019 shows negative AGR.

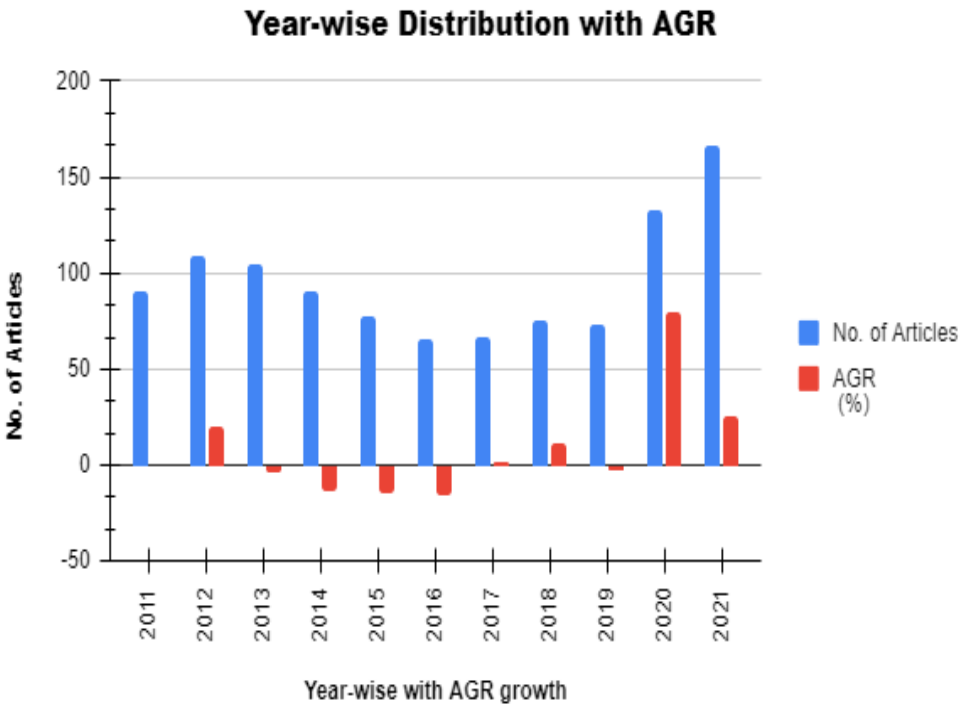


Figure 2: Year-Wise Distribution with AGR

A. Authorship Pattern

Table 2: Authorship Pattern

Year	Single Author	Two Authors	Three Authors	Four Authors	Five Authors	Six Authors	More than Six Authors	No. of Publications
2011	3	29	17	22	8	1	11	91
2012	5	26	24	19	10	12	13	109
2013	4	22	35	25	6	8	5	105
2014	5	27	15	16	17	6	5	91
2015	5	25	15	16	9	3	5	78
2016	2	13	15	15	5	6	10	66
2017	1	16	10	13	11	7	9	67
2018	2	10	15	14	14	6	14	75
2019	3	9	12	13	15	8	13	73
2020	1	32	21	24	19	8	28	133
2021	9	18	37	29	27	13	33	166
Total	40	227	216	206	141	78	146	1054
Percentage	3.79	21.53	20.49	19.54	13.66	7.40	13.85	100

Table 2 describes the authorship pattern of articles during the period 2011 to 2021. The total number of publications are 1054, in which 40(3.79%) single author publications, 227 (21.53%) two authors publications, 216 (20.49%) three authors publications, 206 (19.54%) four authors publications, and so on. It shows that article publication trend was towards the multiple author approach. 60% publication work is published by double, triple and four author's collaborations.

The following Figure 3 demonstrate the authorship pattern between the No. of publication and years. From this figure, it is found that the category of three authors has the largest community.

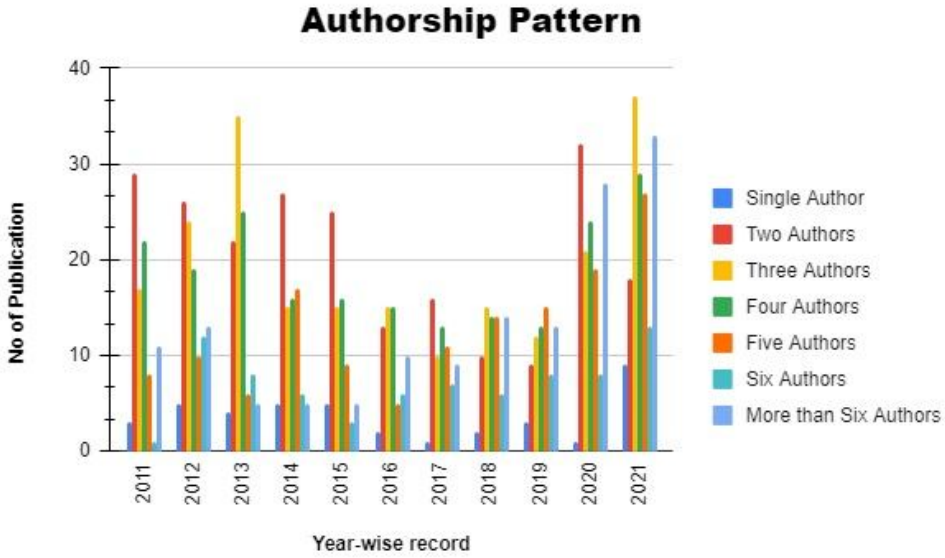


Figure 3: Authorship Pattern

B. Author Productivity

Table 3: Author Productivity

Year	Number of Authors	Number of Articles	APA	AAPP
2011	345	91	0.26	3.84
2012	440	109	0.247	4.05
2013	372	105	0.282	3.55
2014	327	91	0.278	3.59
2015	291	78	0.268	3.73
2016	274	66	0.241	4.15
2017	288	67	0.233	4.29
2018	340	75	0.220	4.54
2019	362	73	0.201	4.97
2020	602	133	0.220	4.54
2021	786	166	0.211	4.74
Total	4427	1054	0.238	4.20

Table 3 reveals author productivity. The productivity per author and average authors per paper are calculated by the following formulae (2) and (3).

$$Productivity\ per\ author = \frac{Number\ of\ Articles}{Number\ of\ Authors} = 0.238 \qquad (2)$$

The *Productivity per author* is less than one which means on an average *Productivity per author* is only 23.80%.

$$Average\ Authors\ Per\ Paper = \frac{Number\ of\ Authors}{Number\ of\ Articles} = 4.20 \qquad (3)$$

The average number of authors per paper is obtained by dividing the total number of articles by the total number of authors (papers). This may be a very useful indicator for determining a journal's or author's average effect.

The figure 4 represents the year wise productivity per author and average author per paper. From the figure 4, it is clear that in year 2021, the AAPP of articles as well as authors are highest and APA is lowest.

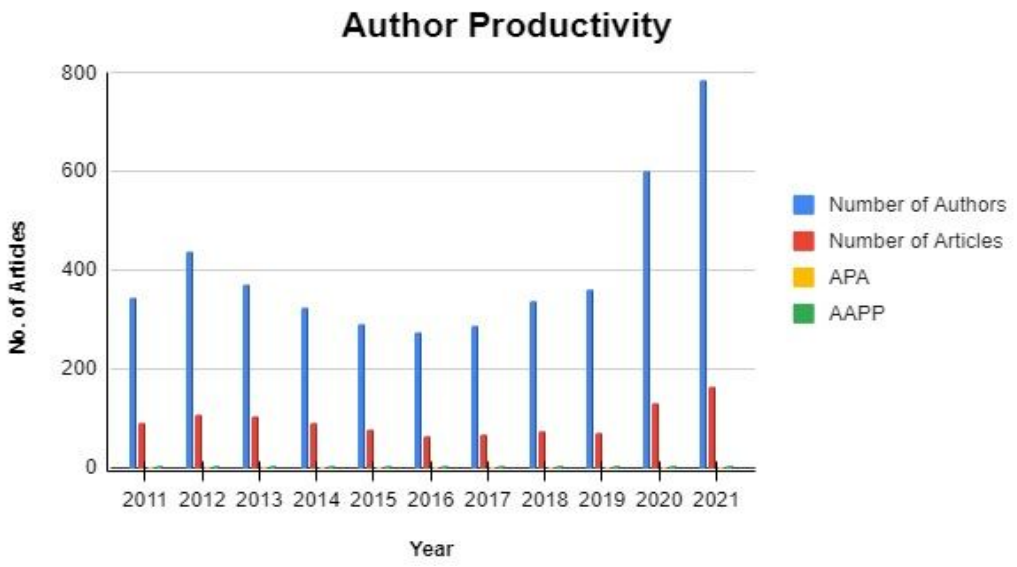


Figure 4: Author Productivity

C. Co-authorship Network

Figure 5 displays the visualisation of the co-authorship network. Networks were created using the VOS viewer Software (https://www.vosviewer.com/), which was used to evaluate data obtained from Scopus. The figure's node symbol stands in for the author, while the size of the node denotes the author's activity and the curving line connecting the two authors denotes their relationship of collaboration. The co-authorship network is analysed with respect to the highest document-wise, citation-wise and total link strength-wise.

1) *Document-wise Co-authorship Network:* With 19 documents in collaboration, each in collaboration, *Kumar a., Kumar s., and Singh a.* have equal but highest contributions and have the first rank. Subsequently, *Sharma p. and Sharma* **a**. had 17 documents each and got the second rank. Additionally, *Singh s. (14), Singh s., and Sharma s. (13) are* in the rank list.
2) *Citation-wise Network:* Considering the highest citation-wise, *Dhama k., Latheef s. k., and Samad h. a.*, achieved the top (419) citations equally. Subsequently, *Tiwari r. (381), Sharma p. (365), and Kumar a. (364)* have achieved the good citation score.
3) *Total Link Strength:* For the link-wise analysis, we have found that *Kumar a.* has the strongest connection among others, with 29 links. *Patwardhan b.* comes in second with 25 connections, followed by *Chopra a.* with 24 connections and *Bichie l.* with 23 connections.

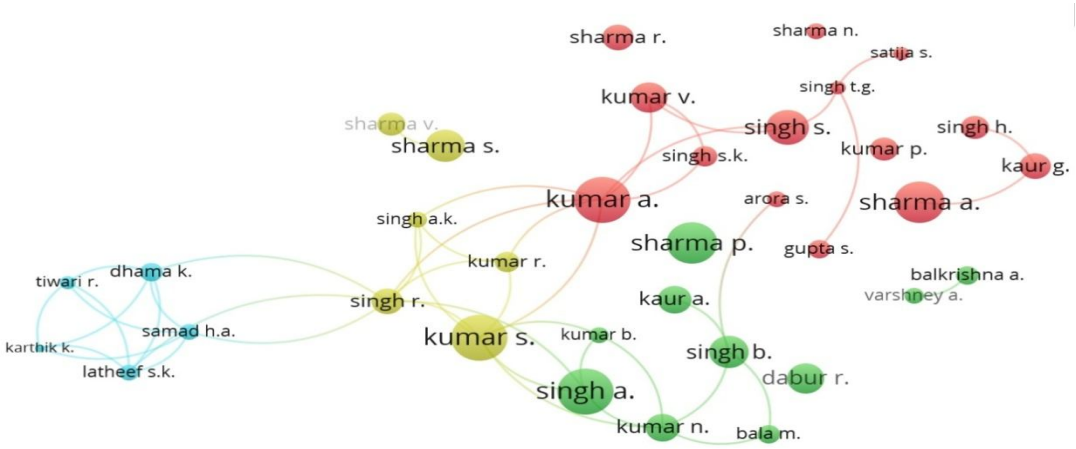


Figure 5: Co-authorship Network

D. Relative Growth Rate of Articles& Doubling Time

Relative Growth Rate (RGR) is a measure to study the growth of number of articles over the period whereas Doubling Time (DT) is defined as the time when records become doubles values. The relative growth rate of articles and doubling time statics are mentioned in the following Table 4.

Table 4: Relative Growth Rate of Articles & Doubling Time

Year	No. of Articles	Cumulative Total	$LogW_1$	$LogW_2$	RGR	Doubling Time (DT=0.693/RGR)	Mean RGR= ΣR/N	Mean ΣDt/N
2011	91	91	1.959	1.959	-	-	0.69	0.969
2012	109	200	2.037	2.301	0.264	2.62		
2013	105	305	2.02	2.484	0.464	1.49		
2014	91	396	1.959	2.597	0.638	1.08		
2015	78	474	1.89	2.675	0.785	0.882		
2016	66	540	1.819	2.732	0.913	0.759		
2017	67	607	1.826	2.783	0.957	0.724		
2018	75	682	1.875	2.833	0.958	0.723		
2019	73	755	1.86	2.877	1.017	0.681		
2020	133	888	2.123	2.948	0.825	0.84		
2021	166	1054	2.22	3.022	0.802	0.864		
Total	1054					10.66		

According to Table 4, RGR rises and reaches its peak in 2019, when it is 1.017. The year with the fastest doubling time was 2012. The RGR and DT model developed by Mahapatra (1985) and calculated by the following formula (4) and (5).

$$RGR = \frac{\log W_1 - \log W_1}{(T_2 - T_1)} \qquad (4)$$

where, T_1 and T_2 represent initial and final Time respectively. $T_2 - T_1$ shows the time interval.

$$Doubling\ Time = \frac{0.693}{R} \qquad (5)$$

The figure 6 represents the graph of RGR and DT. From this figure, it is clear that year 2012 has the highest RGR. And year 2019 was calculated as the highest doubling time.

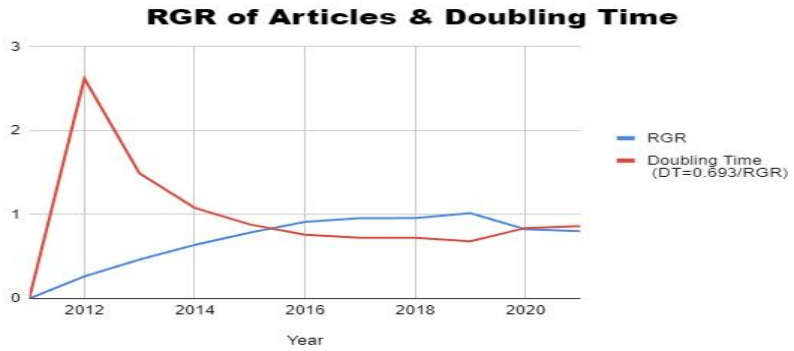


Figure 6: AGR Growth and DT of Articles

E. Degree of Collaboration

The degree of collaboration is defined as the ratio of collaborative research publications to total research papers in the subject during a certain time period. Subramanyam (1983) proposed a formula for the degree of collaboration as-

$$Degree\ of\ Collaboration\ (DC) = \frac{N_m}{(N_m + N_s)} \qquad (6)$$

Where N_m and N_s represent multiple author publications and single author publications respectively.

Table 5 figures out the degree of collaboration. From this table, it is observed that years (2017) and (2020) have the highest (0.99) degree of collaboration. Subsequently, years 2016 and 2018 (0.97) each, and years 2011, and 2013 have the same degree of collaboration with 0.96. From this table, we have also observed the average degree of collaboration was achieved at a rate of 0.96, which is nearly equal to one. This implies that multiple authors contributed more than single authors.

Table 5: Degree of Collaboration

Year	Single Author Articles (Ns)	Multiple Author Articles (Nm)	Nm+Ns	Degree of Collaboration DC=Nm/(Nm+Ns)
2011	3	88	91	0.96
2012	5	104	109	0.95
2013	4	101	105	0.96
2014	5	86	91	0.94
2015	5	73	78	0.94
2016	2	64	66	0.97
2017	1	66	67	0.99
2018	2	73	75	0.97
2019	3	70	73	0.95
2020	1	132	133	0.99
2021	9	157	166	0.95
Total	40	1014	1054	0.96

F. Country–Wise Distribution of Articles (Top 10)

Table 6 and figure 7 displays the country-wise contribution of 1054 published articles. It is found that the highest number of publications are from India (900), followed by the United States (40), Pakistan (23), Saudi Arabia (22), Malaysia (18) and Bangladesh (17).

Table 6: Country-Wise Distribution of Articles (Top 10)

Rank	Name of Country	Number of Articles
1	India	900
2	United States	40
3	Pakistan	23
4	Saudi Arabia	22
5	Malaysia	18
6	Bangladesh	17
7	Iran	12
8	China	11
9	Australia	10
9	Indonesia	10
9	Sri Lanka	10
10	Italy	9

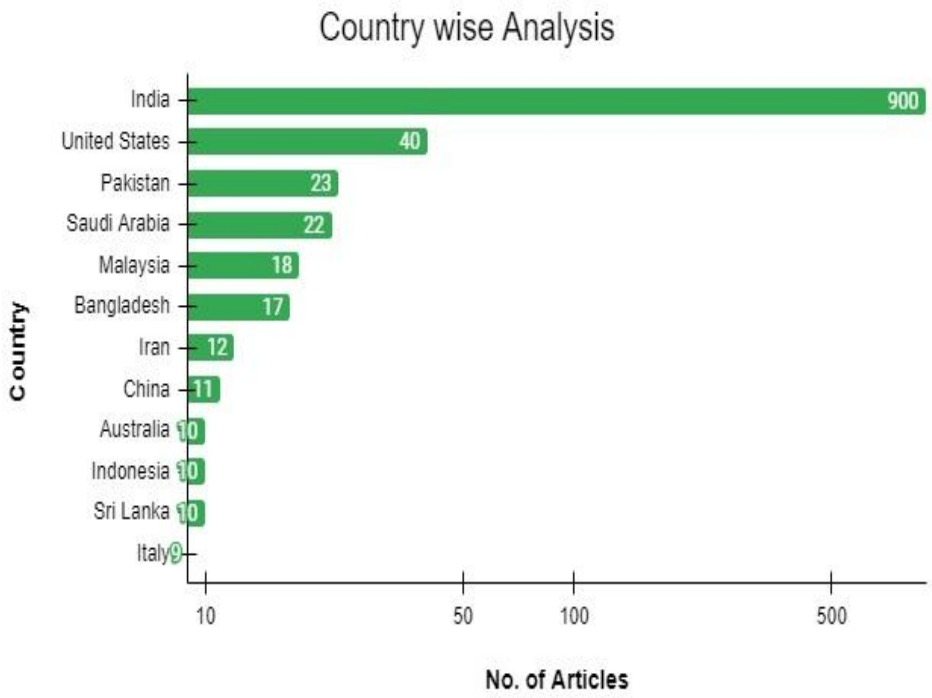


Figure 7: Country-Wise Distribution of Articles

G. Institution Wise Distribution of Articles

Table 7 displays the contribution of 1054 published articles from different Institution (Top 5). Maharishi Dayanand University and Banaras Hindu University are at I rank by publishing 22 articles each. Lovely Professional University is at II rank by publishing 20 articles. Guru Nanak Dev University and Savitribai Phule Pune University are at III rank by publishing 18 articles each.

Table 7: Institution Wise Distribution of Articles (Top 5)

Name of Institution	Number of Articles	Rank
MaharshiDayanand University	22	1
Banaras Hindu University	22	1
Lovely Professional University	20	2
Guru Nanak Dev University	18	3
SavitribaiPhule Pune University	18	3
Gujarat Ayurved University	17	4
Indian Veterinary Research Institute	14	5
King Saud University	14	5
Manipal Academy of Higher Education	14	5

H. Funding Sponsor Wise Distribution of Articles (Top 10)

Table 8 displays about the funding agencies statistics that sponsored articles University Grants Commission had sponsored 52 Articles and at rank I, Indian Council of Medical Research had sponsored 27 articles, second highest, Department of Science and Technology, Ministry of Science and Technology, India had sponsored 25 Articles third highest.

Table 8: Funding Sponsor Wise Distribution of Articles (Top 10)

Rank	Name of Funding Sponsor	Number of Articles
1	University Grants Commission	52
2	Indian Council of Medical Research	27
3	Department of Science and Technology, Ministry of Science and Technology, India	25
4	Council of Scientific and Industrial Research, India	24
5	Department of Biotechnology, Ministry of Science and Technology, India	23
6	University Grants Committee	15
7	Department of Science and Technology, Government of Kerala	10
8	Department of Biotechnology, Government of West Bengal	9
9	Science and Engineering Research Board	8
10	Bangladesh Council of Scientific and Industrial Research	6

I. Subjects-Area Wise Distribution of Articles

Table 9 represents a list of subject area that have maximum contribution in research publication of *Tinospora cordifolia***.** Pharmacology, Toxicology and Pharmaceutics had published about 50% articles followed by Medicine.

Table-9: Subject-Area WiseDistribution of Articles

S. No.	Subject-Area	Total Number of Articles
1	Pharmacology, Toxicology and Pharmaceutics	525
2	Medicine	343
3	Biochemistry, Genetics and Molecular Biology	256
4	Agricultural and Biological Sciences	191
5	Chemistry	78
6	Immunology and Microbiology	55
7	Environmental Science	48
8	Veterinary	44
9	Chemical Engineering	34
10	Engineering	34

J. Ranked List of Source Title (Top 10)

Table 10 represents list of those Journals who have maximum contribution in research publication of *Tinospora cordifolia***.** International Journal of Pharma and Bio Sciences is at top position by publishing 30 articles followed by Research Journal of Pharmacy and Technology, 29 articles, International Journal of Research In Pharmaceutical Sciences, 27 articles, Journal of Ethnopharmacology 26 articles. International Journal of Research in Ayurveda and Pharmacy is at 10th rank by publishing 15 research articles.Pharmacy and Pharmaceutical Journals are the major publishers on this medicinal plant

Table-10: Ranked List of Source Title (Top 10)

Rank	Name of Source Title	Total Number of Articles
1	International Journal of Pharma And Bio Sciences	30
2	Research Journal of Pharmacy And Technology	29
3	International Journal of Research In Pharmaceutical Sciences	27
4	International Journal of Pharmacy And Pharmaceutical Sciences	26
5	Journal of Ethnopharmacology	24
6	Journal of Ayurveda And Integrative Medicine	22
7	Asian Journal of Pharmaceutical And Clinical Research	18
8	Medicinal Plants	18
9	International Journal of Green Pharmacy	17
10	International Journal of Research In Ayurveda And Pharmacy	15

K. Ranked List of Prolific Authors

Table 11 represents list of those authors who have published more than 6 papers and are at top 5 ranks. Dabur, R is at top by publishing 12 papers followed by Kaur, G Patwardhan, B. published nine papers, Rahmatullah, M. is at 3rd rank, Dhama, K. and Balkrishna, A are at 4th rank and have published seven papers. Most of the fifth ranked authors have published six papers.

Table 11: Ranked List of Prolific Authors (Top 5)

Rank	Name of Author	Number of Articles
1	Dabur, R.	12
2	Kaur, G.	9
2	Patwardhan, B.	9
3	Rahmatullah, M.	8
4	Balkrishna, A.	7
4	Dhama, K.	7
5	Akram, M.	6
5	Kaur, A.	6
5	Latheef, S.K.	6
5	Samad, H.A.	6
5	Tillu, G.	6
5	Varshney, A.	6

VI. FINDINGS AND CONCLUSIONS

For studying *Tinospora cordifolia* (Medicinal Plant), we fetched '1054' articles from the year of 2011 to 2021 using the Scopus database. We have examined such articles based on different scientometric parameters.

1) It is found that in year 2021 maximum no. of articles 166 (25.75%) were published. In year 2016, lowest no. of articles were published.

2) It is analyzed by authorship pattern that 40 articles out of 1054 are of single author. 227 of two authors, 216 of three authors and 206 of four authors.

3) Productivity per author is 0. 238. This is less than one. It means on an average Productivity per author is only 23.80% and Average authors per-paper is 4.20.

4) Relative Growth Rate (RGR) of publication of articles related to *Tinospora cordifolia* is 0.68 and average of Doubling time is 0.969.

5) The overall degree of collaboration was 0.96. And 40 articles are of single authored publications and 1014 articles are multi authored.

6) India is a top position by publishing 900 articles (0.85%) out of 1054 articles.

7) Maharishi Dayanand University & Banaras Hindu University are at I rank by publishing 22 articles.

8) University Grants Commission had Sponsored 52 articles and is at rank I, whereas Indian Council of Medical Research had Sponsored 27 article and is at rank II.

9) In research publication of *Tinospora cordifolia* **.** Pharmacology, Toxicology and Pharmaceutics had published 50% articles followed by Medicine.

10) International Journal of Pharma and Bio Sciences is at top position by publishing 30 articles followed by Research Journal of Pharmacy and Technology, 29 articles.

11) Dabur, R is at top by publishing 12 papers.

REFERENCES

[1] Mittal, J., Sharma, M. M., & Batra, A. (2014). Tinospora cordifolia: A Multipurpose Medicinal Plant-A Review. Journal of Medicinal Plants Studies, 2(2),32-47.

[2] Sangeetha, M. K., Balaji Raghavendran, H. R., Gayathri, V., & Vasanthi, H. R. (2011). Tinospora cordifolia attenuates oxidative stress and distorted carbohydrate metabolism in experimentally induced type 2 diabetes in rats. Journal of natural medicines, 65, 544-550. DOI: https://doi.org/10.1007/s11418-011-0538-6

[3] Zinjarde, S. S., Bhargava, S. Y., & Kumar, A. R. (2011). Potent α-amylase inhibitory activity of Indian Ayurvedic medicinal plants. BMC complementary and alternative medicine, 11(1), 1-10.

[4] Umamaheswari, S. E. L. V. A. R. A. J., & Prince, P. S. M. (2007). Antihyperglycaemic effect of ëilogen-excelí, an ayurvedic herbal formulation in streptozotocin-induced diabetes mellitus. Acta Poloniae Pharmaceutica ñ Drug Research, 64(1), 53-61.

[5] Sinha, K., Mishra, N. P., Singh, J., & Khanuja, S. P. S. (2004). Tinospora cordifolia (Guduchi), a reservoir plant for therapeutic applications: A Review. . Indian Journal of Traditional Knowledge. 3(3), 257-270.

[6] Scientometrics (2008). Glossary of Thompson Scientific Terminology online. Retrieved from http://science.thomsonreuters.com/support/patents/patinf/terms/>

[7] Dobrov, G. M., & Karennoi, A. A. (1969). The informational basis of scientometrics. On theoretical problems of informatics. Moscou: VINITI. FID, 435, 165-191.

[8] Merton, R. K., & Garfield, E. (1963). Forward to Little Science, Big science and Beyond by DJ de solla Price. New York: Columbia University press.

[9] García-Ávila, F., Avilés-Añazco, A., Cabello-Torres, R., Guanuchi-Quito, A., Cadme-Galabay, M., Gutiérrez-Ortega, H., ... & Zhindón-Arévalo, C. (2023). Application of ornamental plants in constructed wetlands for wastewater treatment: A scientometric analysis. Case Studies in Chemical and Environmental Engineering, 7, 100307.

[10] Chaman Sab, M., Kappi, M., & Ahmed, K. M. (2022). Ethnopharmacology Research: A Scientometric Assessment of Indian Publications During 2011 to 2020. Journal of Pharmacology and Pharmacotherapeutics. https://doi. org/10.1177/0976500X221082839.

[11] Huang, Z., Hou, Z., Liu, F., Zhang, M., Hu, W., & Xu, S. (2021). Scientometric analysis of medicinal and edible plant coptis. Frontiers in Pharmacology, 12, 725162.

[12] Atlasi, R., Ramezani, A., Tabatabaei-Malazy, O., Alatab, S., Oveissi, V., & Larijani, B. (2022). Scientometric assessment of scientific documents published in 2020 on herbal medicines used for COVID-19. Journal of Herbal Medicine, 35, 100588. DOI: https://doi.org/10.1016/j.hermed.2022.100588

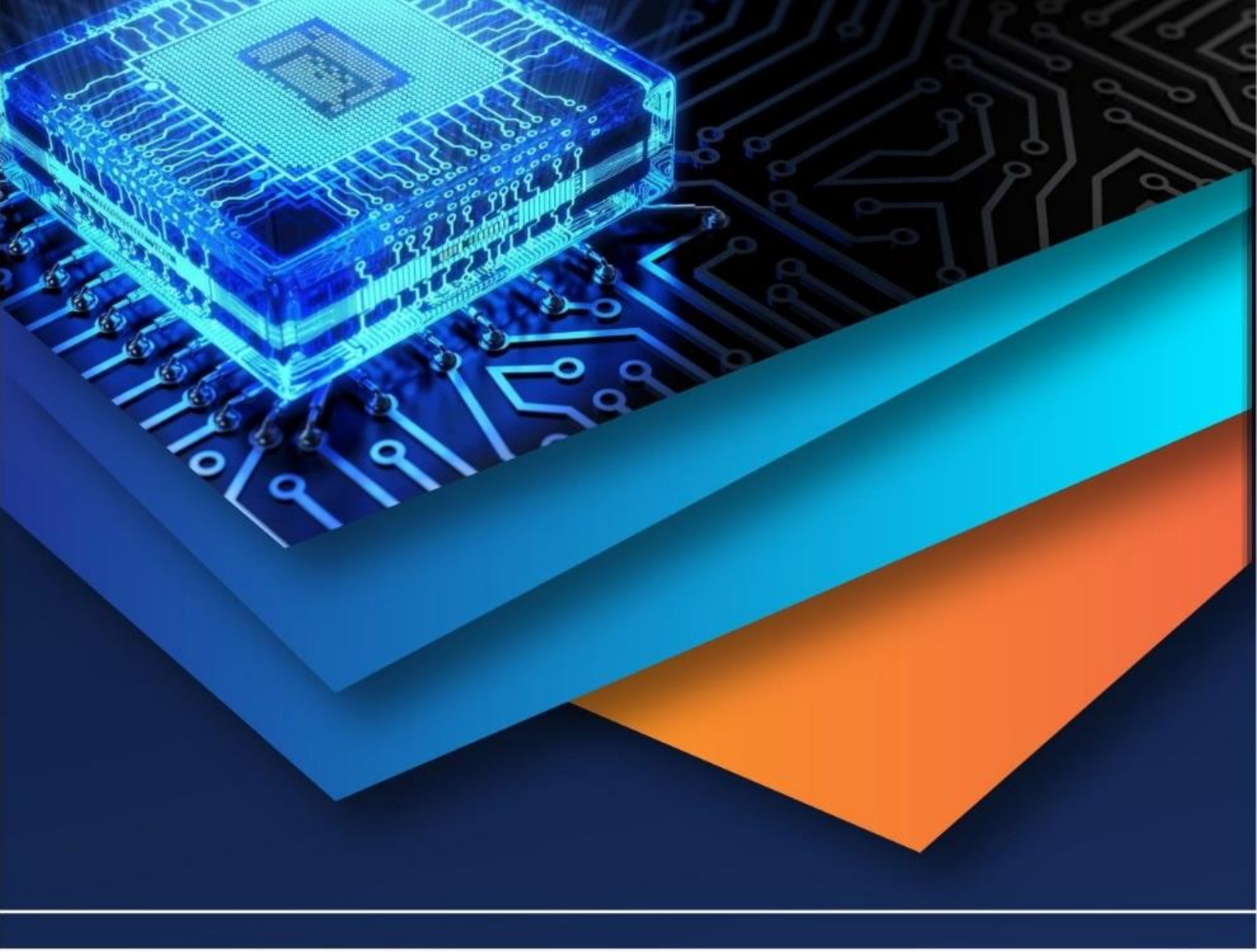
[13] Sivankalai, S., & Sivasekaran, K. (2021). Mucormycosis (black fungus) maiming Covid patients: Scientometrics analysis through prism of Biblioshiny. Libr Philos Pract, 5546. https://digitalcommons.unl.edu/libphilprac/5546

[14] Prasanna Kumari, N., Amsaveni, N., & Surulinathi, M. (2015). Scientometrics Analysis in the field of Occupational Therapy: a global level perspective. International Journal of Next Generation Library and Technologies, 1(2), 1-7.

[15] Jeyshankar, R., & Babu, B. R. (2013). Scientometric analysis of leukemia research output (1960-2011): An Indian perspective. Asia Pacific Journal of Library and Information Science, 3(2).

[16] Surulinathi, M., Balasubramani, R., & Kalisdha, A. (2013). Continent wise Analysis of Green Computing Research: a scientometric study. Journal of Advances in Library and Information Science, 2(1), 39-44.

[17] Gupta, B. M., & Bala, A. (2013). Alzheimer's disease research in India: A scientometric analysis of publications output during 2002-11. Research in Neurology: An International Journal, 2013, 204542. DOI: 10.5171/2013.204542



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Species

To Cite:
Choudhary R, Sharma V, Upadhyay M, Dutta S, Mathur P, Sahu H, Jangir DK. Additions to the avifauna of Todgarh-Raoli Wildlife Sanctuary, Rajasthan. *Species* 2024; 25: e19s1657
doi: https://doi.org/10.54905/disssi.v25i75.e19s1657

Author Affiliation:
[1]Department of Environmental Science (Centre for Excellence), Maharshi Dayanand Saraswati University, Ajmer, Rajasthan, India
[2]Department of Zoology, Maharshi Dayanand Saraswati University, Ajmer, Rajasthan, India
[3]Department of Zoology, Sophia Girls' College (Autonomous), Ajmer, Rajasthan, India

***Corresponding Author**
Department of Environmental Science (Centre for Excellence), Maharshi Dayanand Saraswati University, Ajmer, Rajasthan, India
Email: rounakchoudhary17@gmail.com

Peer-Review History
Received: 17 February 2024
Reviewed & Revised: 21/February/2024 to 26/April/2024
Accepted: 30 April 2024
Published: 04 May 2024

Peer-Review Model
External peer-review was done through double-blind method.

Species
pISSN 2319–5746; eISSN 2319–5754

Additions to the avifauna of Todgarh-Raoli Wildlife Sanctuary, Rajasthan

Rounak Choudhary[1*], Vivek Sharma[2], Mriganka Upadhyay[3], Subroto Dutta[1], Praveen Mathur[1], Harish Sahu[1], Dipesh Kumar Jangir[2]

ABSTRACT

Conservation of species in a specific habitat and landscape including protected areas begins with a better understanding of the species available within their geographical stretch. The knowledge on species richness of any area enhances understanding of the distribution of species and their habitat preferences, hence bridging research gaps in geographical occurrences of species. Earlier 142 species were recorded in pioneering study while 9 species were added to the checklist by various published literatures. This article presents an addition of Twenty-Two species to the avian diversity of the Todgarh-Raoli Wildlife Sanctuary (T-RWLS), Rajasthan.

Keywords: Avifauna, Forest, Aravalli, Todgarh-Raoli, Rajasthan.

iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 **Issue:** IX **Month of publication:** September 2023

DOI: https://doi.org/10.22214/ijraset.2023.55516

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue IX Sep 2023- Available at www.ijraset.com

Global Publication Output of *Tinospora cordifolia* (Medicinal Plant) Research: A Scientometric Study

Dr. Satish Kumar[1], Dr. Subhash Chand[2], Dr. Deepmala[3], Dr. Asha Masih[4]
[1]*Associate Professor & Head, Dept. of Library and Information Science, Sophia Girls' College (Autonomous), Ajmer, Rajasthan, India.*
[2]*Head, Dept. of Geography, SGSG Government College, Nasirabad, Ajmer (Rajasthan), India.*
[3]*Associate Professor & Head, Dept. of Physics, Sophia Girls' College (Autonomous), Ajmer, Rajasthan, India.*
[4]*Assistant Professor & Head, Dept. of Botany, Dayanand College, Ajmer, Rajasthan, India.*

Abstract: ***Scientometrics is described as a technique for analysing a researcher's quantitative research output. This study examines scientometric analysis on Tinospora cordifolia, medicinal plant by measuring the year-wise distribution of articles, annual growth rate, authorship pattern, author productivity, relative growth rates, article doubling time, degree of author collaboration, ranked list of authors, and distribution of publications output by broad topic areas. By observing the output, we found that a maximum of 166 articles (25.75%) were published in 2021. According to the authorship pattern, 40 publications out of 1054 were written by a single author. There are 227 two-author papers, 216 three-author papers, and 206 four-author papers. Author productivity is 0.238. This indicates that production per author is just 23.80% on average, while the average number of authors per manuscript is 4.20. The average doubling time is 0.969 and the relative growth rate (RGR) is 0.68. The overall cooperation rate is 0.96. India ranks first, having published 900 articles (0.85%) out of a total of 1054 articles. By publishing 22 publications, Maharishi Dayanand University and Banaras Hindu University have taken the lead. The University Grants Commission funded 52 articles, with Dabur, R ranking first with 12 papers published.***
Keyword: Tinospora cordifolia, Relative Growth Rate, Degree of Collaborations. DoublingTime, Global Publication Output, Medicinal plant.

I. INTRODUCTION

Medicinal plants have long been important and are used as primary sources healing from diseases. A long history of medicinal plants has been used to treat ailments by humans based on instinct, taste, and experience. And hence the research on medicinal plants has attracted many researchers to analyse medicinal plants. Recently, during the Covid-19, it was used tremendously. Among many different medicinal plants, *Tinospora cordifolia (Giloy),* has proved to be effective medicinal plant.

Tinospora cordifolia is a wide evergreen climbing vine with several branches. It has simple, roundish leaves. It has reddish-colored fruits. This medicinal plant's fruits grow in bunches. This herb is used in Ayurveda to cure a variety of ailments. *Tinospora cordifolia* is commonly known as heart leaved Moonseed Plant (English), Amrita Guduchi (Sanskrit), Giloy (Hindi), Gulancha (Bengali), Galo (Gujrati) and Teppatige (Telugu), It is found throughout India, and also in Sri Lanka, Bangladesh and China. Mittal, Sharma and Batra [1] described the importance of *Tinospora cordifolia* in the treatment of various diseases such as viral infections, cancer, diabetes, inflammation, leukemia neurological, immunomodulatory and psychiatric conditions it relaxes norepinephrine induced contractions. It is anti-microbial, anti-hypertensive and anti-viral Sangeetha et al. [2] assessed oxidative stress and distorted carbohydrate metabolism activities in rats related to type 2 diabetes. The stem of *Tinospora cordifolia* is widely used in regulating the blood glucose (by promoting insulin secretion and inhibitor for gluconeogenesis and glycogenosis). Zinjarde, Bhargava and Kumar [3] explained that in *Tinospora cordifolia* major phytoconstituents are Alkaloids, tannins, cardiac glycosides, flavonoids, saponins, and steroids. Uma Maheswari and Prince [4] performed research on the root extract of *Tinospora cordifolia* and concluded that the root extract of this plant can decrease the levels of glycosylated hemoglobin, plasma thiobarbituricacid, hydroperoxides, ceruloplasmin and vitamin E in diabetic rats. Sinha et al. [5] reviewed that *Tinospora cordifolia* has been used in indigenous medical systems as described in various classical texts of the Ayurvedic system of medicine. Charak, Sushrut, Ashtang Hridaya and other ancient treaties. It is also specifically mentioned for its use in tribal and folk medicine in various parts of India.

Scientometrics, a field of information science concerned with the use of bibliometrics, is necessary to investigate the scientific concepts found in the published literature in all of its forms.

According to the Glossary of Thompson Scientific Terminology [6], "Scientometric is the quantitative study of the disciplines of science based on published literature and communication. Scientometric can identify innovative and emerging areas of scientific research; examine their development over the time and over the geographical location. According to Dobrov and Korennoi [7], 'Scientometrics' and bibliometrics, both carry the same meaning.

Merton and Garfield [8], stated that scientometric as 'the field of enquiry given over to the quantitative analysis of science and scientific field'.

II. REVIEW OF LITERATURE

García-Ávila, F. et al.[9] analysed Application of ornamental plants in constructed wetlands for wastewater treatment using Scientometric technique from 2002 to 2022 using Scopus database. Mexico, Brazil, USA, China and India have the highest number of publications in the field of ornamental plants in the CWs and the most used ornamental plants are Canna, Iris, Heliconia and Zantedeschia.

Chaman Sab M. et al.[10] assessed Ethnopharmacology Research: A Scientometric Assessment of Indian Publications During 2011 to 2020 Web of Science (WoS) database Total 7,159 papers were retrieved , consisting of 84.24% journal articles and 14.23% review articles. The Council of Scientific Industrial Research (CSIR) India collaborates with the Indian Council of Agricultural Research (ICAR) and Central Institute of Medicinal Aromatic Plants (CIMAP) in terms of domestic collaboration.

Haungm Z. et al.[11] studied and analysed Medicinal and Edible Plant *Coptis* a total of 367 documents were analyzed. China (214) is at top position followed by Japan (57) and South Korea (52). The anti-oxidative stress, pharmacokinetics, and Alzheimer's disease treatment of *Coptis* are new hotspots in this field.

Atlasi et al. [12] carried out a scientometric analysis on herbal medicines used in the treatment of COVID-19. Data is retrieved from Web of Science (WOS) and Scopus database published till 26 October 2020. A total of 3185 records were analysed. Original and review articles have been the two predominant varieties of papers in each database. Major subject areas are drugs and medicine, respectively in WOS and Scopus databases.

The top three productive countries are China, US and India. "Journal of Biomolecular Structure Dynamics" in WOS and "Chinese Traditional and Herbal Drugs" in Scopus have been the top journals. Top keywords are "COVID-19″ and "Traditional Chinese Medicine". US is at top in collaboration with different authors.

Sivankalai and Sivasekaran [13] analyses the global level outlook of research publications on Mucormycosis output between the period of 1923 to 2021 (May). 4451 publications downloaded from core collection of Web of Science database. First publication was in 1923. 3798 institutions and 8562 different disciplines contributed and 2808 publications were in Articles. 4451 publications were published by 17320 authors and 23552 collaborations, documents per author is 0.257, authors per document are 3.89. First article published in 1923 was in German language. Total records published in 1161 journals, eleven languages, ninety-five countries and 1504 are open access and 12 articles are highly cited in this field.

Kumari, Amsaveni and Surulinathi [14] performed scientometrics analysis in the field of Occupational Therapy research output during the period of 1989 to 2015. The data is retrieved from the Web of Science. A total of 8095 publications were found the highest number of publications were published in 2013. In 2007, 386 publications were published with highest Global Citation Score of 6525. In Global Citation Scores, University of Queensland tops followed by the University of Toronto. India is at 25th position in the global ranking.

Jeyshankar and Babu [15] have assessed scientometric analysis of leukemia research on Indian contributions between 1960 to 2011. The data is retrieved from Scopus database. Out of 29 states in India, only 20 states contributed 2120 records. New Delhi ranked first, followed by Chandigarh, Maharashtra.

Surulinathi, Balasubramani and Kalidhasa [16] analysed the growth and development of Green Computing. A total of 3324 records are found in Web of Science from the period 1956-2011. Germany is at top by publishing 270 (16.24 %) articles followed by France and Italy, UK and Spain contributed more than 100 articles. India is also a leading country by publishing 128 Articles.

Gupta and Bala [17] have analysed the research output of India (Citation analysis of theoretical population genetics literature). The ten years of data was retrieved from Scopus using the keyword alzheimer disease. USA is at top with 25% publications followed by UK (16.20 %). India with 900 publications is on 16th position among top 20 countries. All India Institute of Medical Sciences (AIIMS), New Delhi have highest publications but University Institute of Pharmaceutical Sciences, Punjab Chandigarh got highest h-index (26) with 35 publications.

III. OBJECTIVES OF THE STUDY

This study has the following objectives:

1) To study year-wise distribution of the articles published during 2011 to 2021.
2) To find annual growth rate of articles.
3) To reveal authorship pattern and author productivity.
4) To check the co-authorship network.
5) To examine Relative Growth Rates and Doubling Time of articles.
6) To classify the Degree of authors collaboration
7) To studycountry wise and subject -wise distribution of articles.
8) To identify and prepare the ranked list of authors.
9) To study the distribution publications output by broad subject areas.

IV. RESEARCH METHODOLOGY AND LIMITATION OF THE STUDY

The required data was collected from Scopus database for the period 2011to 2021. It can be seen that 1054 research articles retrieved from this database on *Tinospora cordifolia* medicinal plant. The researcher downloaded the data and analysed the data with the help of MS Excel software as per the objectives of the study and the VOSviewer software was used for visualization of Co-authorship network. Various statistical methods are used to calculate AGR, RGR, Doubling Time, Author productivity and degree of authors collaboration.

V. RESULT AND DISCUSSIONS

1) Year-Wise Distribution of Articles

Table 1: Year-Wise Distribution of Articles & Annual Growth Rate

S. No.	Year	No. of Articles	%	Cumulative No. of Articles	AGR (%)
1	2011	91	8.64	91	-
2	2012	109	10.35	200	19.70
3	2013	105	9.97	305	-3.66
4	2014	91	8.64	406	-13.30
5	2015	78	7.40	484	-14.20
6	2016	66	6.26	550	-15.30
7	2017	67	6.36	617	1.51
8	2018	75	7.12	682	11.94
9	2019	73	6.93	755	-2.66
10	2020	133	12.53	887	80.00
11	2021	166	15.76	1053	25.75
Total		1054	100		

Table 1 shows total ‘1054’ articles have been published in these eleven years. Maximum 166 articles are published in 2021.Trend is oscillatory it first increases for one year then decreases from 2012(109) to 2016(66). Minimum publications are in 2016. After 2016 publications increased.
The year-wise distribution of articles is displayed in Figure 1. The figure shows the growth of articles with respect to the Year. It is clear from the Figure that maximum number of articles was published in 2021.

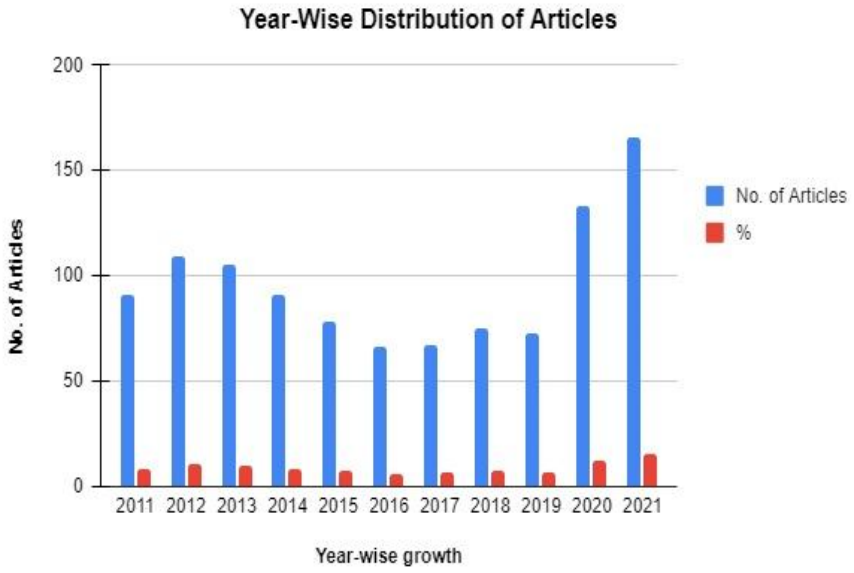


Figure 1: Year-Wise Distribution of Articles

2) Annual Growth Rate

The *annual growth rate* (AGR) reflects the rate of growth over a single year. It is calculated by the following formula (1).

$$Annual\ Growth\ Rate = \frac{(Suceeding\ Value - Previous\ Value)}{Previous\ Value} \quad (1)$$

The figure 2 demonstrates the annual growth rate of articles. It is observed that the year 2020 has the highest and positive AGR while the years 2013-2016 and 2019 shows negative AGR.

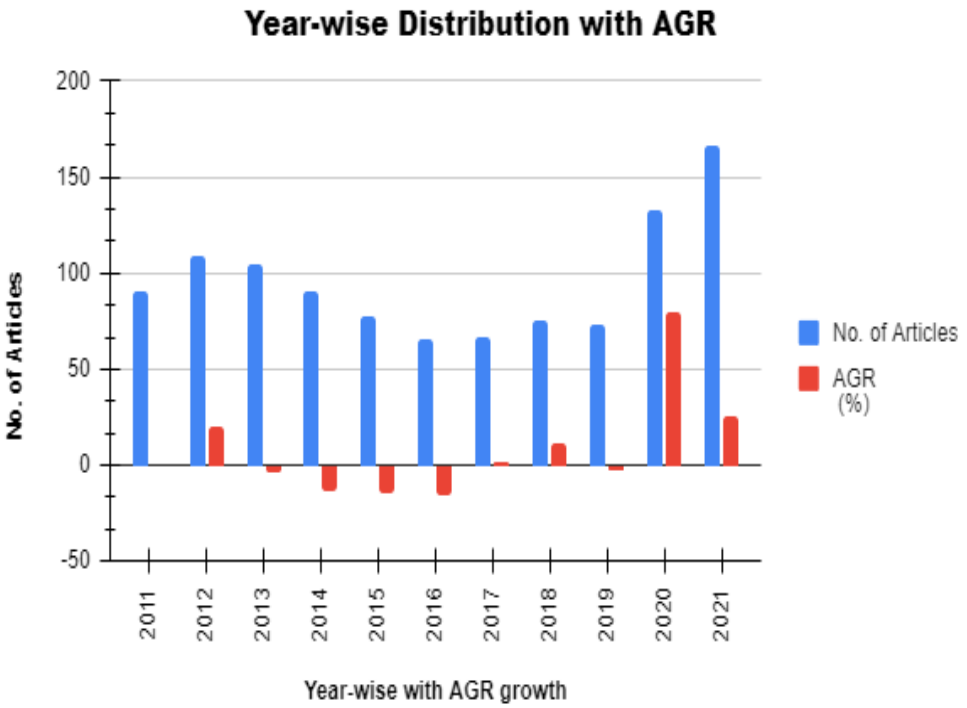


Figure 2: Year-Wise Distribution with AGR

A. Authorship Pattern

Table 2: Authorship Pattern

Year	Single Author	Two Authors	Three Authors	Four Authors	Five Authors	Six Authors	More than Six Authors	No. of Publications
2011	3	29	17	22	8	1	11	91
2012	5	26	24	19	10	12	13	109
2013	4	22	35	25	6	8	5	105
2014	5	27	15	16	17	6	5	91
2015	5	25	15	16	9	3	5	78
2016	2	13	15	15	5	6	10	66
2017	1	16	10	13	11	7	9	67
2018	2	10	15	14	14	6	14	75
2019	3	9	12	13	15	8	13	73
2020	1	32	21	24	19	8	28	133
2021	9	18	37	29	27	13	33	166
Total	40	227	216	206	141	78	146	1054
Percentage	3.79	21.53	20.49	19.54	13.66	7.40	13.85	100

Table 2 describes the authorship pattern of articles during the period 2011 to 2021. The total number of publications are 1054, in which 40(3.79%) single author publications, 227 (21.53%) two authors publications, 216 (20.49%) three authors publications, 206 (19.54%) four authors publications, and so on. It shows that article publication trend was towards the multiple author approach. 60% publication work is published by double, triple and four author's collaborations.

The following Figure 3 demonstrate the authorship pattern between the No. of publication and years. From this figure, it is found that the category of three authors has the largest community.

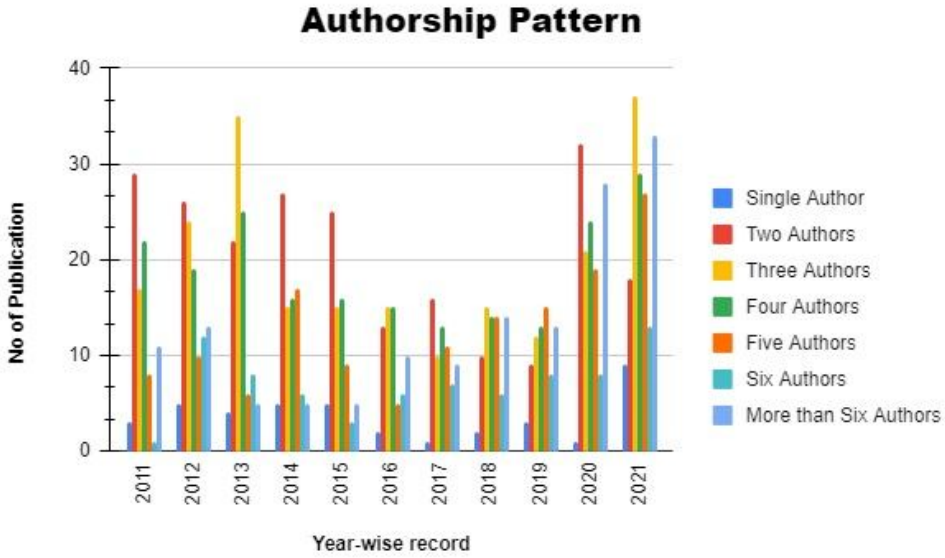


Figure 3: Authorship Pattern

B. Author Productivity

Table 3: Author Productivity

Year	Number of Authors	Number of Articles	APA	AAPP
2011	345	91	0.26	3.84
2012	440	109	0.247	4.05
2013	372	105	0.282	3.55
2014	327	91	0.278	3.59
2015	291	78	0.268	3.73
2016	274	66	0.241	4.15
2017	288	67	0.233	4.29
2018	340	75	0.220	4.54
2019	362	73	0.201	4.97
2020	602	133	0.220	4.54
2021	786	166	0.211	4.74
Total	4427	1054	0.238	4.20

Table 3 reveals author productivity. The productivity per author and average authors per paper are calculated by the following formulae (2) and (3).

$$Productivity\ per\ author = \frac{Number\ of\ Articles}{Number\ of\ Authors} = 0.238 \qquad (2)$$

The *Productivity per author* is less than one which means on an average *Productivity per author* is only 23.80%.

$$Average\ Authors\ Per\ Paper = \frac{Number\ of\ Authors}{Number\ of\ Articles} = 4.20 \qquad (3)$$

The average number of authors per paper is obtained by dividing the total number of articles by the total number of authors (papers). This may be a very useful indicator for determining a journal's or author's average effect.

The figure 4 represents the year wise productivity per author and average author per paper. From the figure 4, it is clear that in year 2021, the AAPP of articles as well as authors are highest and APA is lowest.

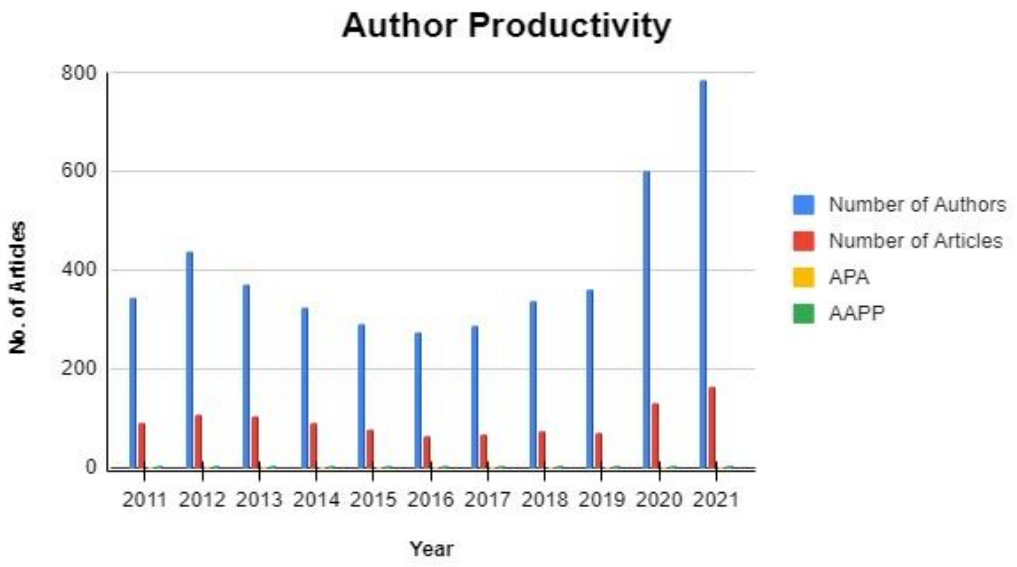


Figure 4: Author Productivity

C. Co-authorship Network

Figure 5 displays the visualisation of the co-authorship network. Networks were created using the VOS viewer Software (https://www.vosviewer.com/), which was used to evaluate data obtained from Scopus. The figure's node symbol stands in for the author, while the size of the node denotes the author's activity and the curving line connecting the two authors denotes their relationship of collaboration. The co-authorship network is analysed with respect to the highest document-wise, citation-wise and total link strength-wise.

1) *Document-wise Co-authorship Network:* With 19 documents in collaboration, each in collaboration, *Kumar a., Kumar s., and Singh a.* have equal but highest contributions and have the first rank. Subsequently, *Sharma p. and Sharma* **a**. had 17 documents each and got the second rank. Additionally, *Singh s. (14), Singh s., and Sharma s. (13) are* in the rank list.
2) *Citation-wise Network:* Considering the highest citation-wise, *Dhama k., Latheef s. k., and Samad h. a.*, achieved the top (419) citations equally. Subsequently, *Tiwari r. (381), Sharma p. (365), and Kumar a. (364)* have achieved the good citation score.
3) *Total Link Strength:* For the link-wise analysis, we have found that *Kumar a.* has the strongest connection among others, with 29 links. *Patwardhan b.* comes in second with 25 connections, followed by *Chopra a.* with 24 connections and *Bichie l.* with 23 connections.

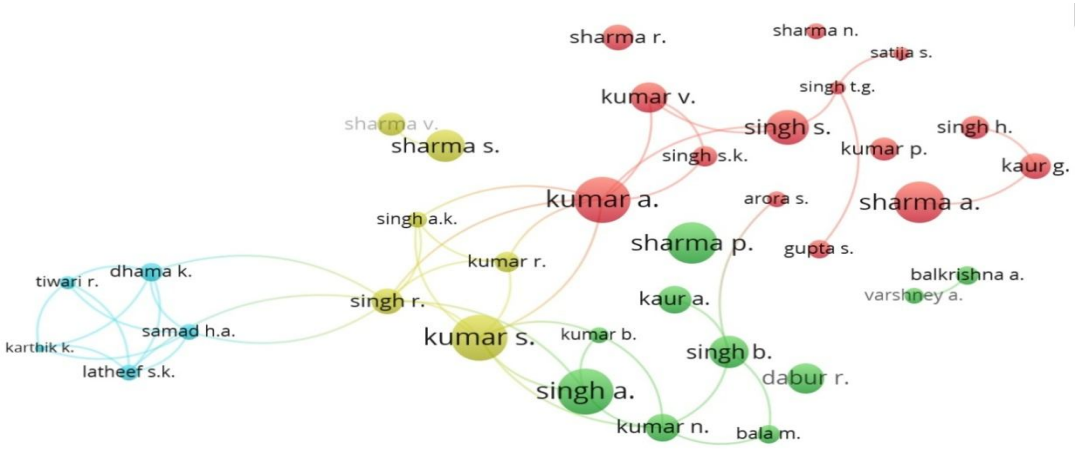


Figure 5: Co-authorship Network

D. Relative Growth Rate of Articles& Doubling Time

Relative Growth Rate (RGR) is a measure to study the growth of number of articles over the period whereas Doubling Time (DT) is defined as the time when records become doubles values. The relative growth rate of articles and doubling time statics are mentioned in the following Table 4.

Table 4: Relative Growth Rate of Articles & Doubling Time

Year	No. of Articles	Cumulative Total	$LogW_1$	$LogW_2$	RGR	Doubling Time (DT=0.693/RGR)	Mean RGR= ΣR/N	Mean ΣDt/N
2011	91	91	1.959	1.959	-	-	0.69	0.969
2012	109	200	2.037	2.301	0.264	2.62		
2013	105	305	2.02	2.484	0.464	1.49		
2014	91	396	1.959	2.597	0.638	1.08		
2015	78	474	1.89	2.675	0.785	0.882		
2016	66	540	1.819	2.732	0.913	0.759		
2017	67	607	1.826	2.783	0.957	0.724		
2018	75	682	1.875	2.833	0.958	0.723		
2019	73	755	1.86	2.877	1.017	0.681		
2020	133	888	2.123	2.948	0.825	0.84		
2021	166	1054	2.22	3.022	0.802	0.864		
Total	1054					10.66		

According to Table 4, RGR rises and reaches its peak in 2019, when it is 1.017. The year with the fastest doubling time was 2012. The RGR and DT model developed by Mahapatra (1985) and calculated by the following formula (4) and (5).

$$RGR = \frac{\log W_1 - \log W_1}{(T_2 - T_1)} \qquad (4)$$

where, T_1 and T_2 represent initial and final Time respectively. $T_2 - T_1$ shows the time interval.

$$Doubling\ Time = \frac{0.693}{R} \qquad (5)$$

The figure 6 represents the graph of RGR and DT. From this figure, it is clear that year 2012 has the highest RGR. And year 2019 was calculated as the highest doubling time.

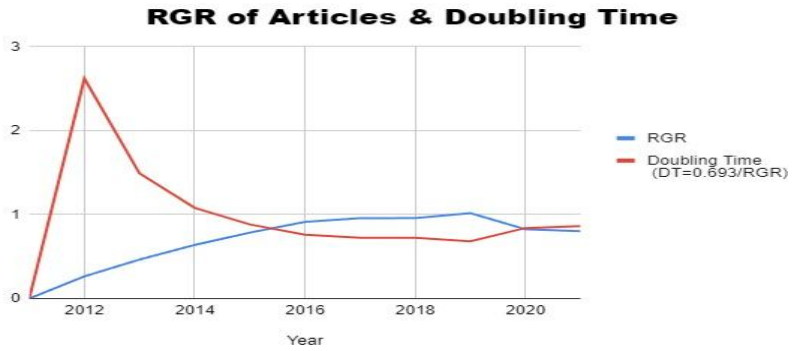


Figure 6: AGR Growth and DT of Articles

E. Degree of Collaboration

The degree of collaboration is defined as the ratio of collaborative research publications to total research papers in the subject during a certain time period. Subramanyam (1983) proposed a formula for the degree of collaboration as-

$$Degree\ of\ Collaboration\ (DC) = \frac{N_m}{(N_m + N_s)} \qquad (6)$$

Where N_m and N_s represent multiple author publications and single author publications respectively.

Table 5 figures out the degree of collaboration. From this table, it is observed that years (2017) and (2020) have the highest (0.99) degree of collaboration. Subsequently, years 2016 and 2018 (0.97) each, and years 2011, and 2013 have the same degree of collaboration with 0.96. From this table, we have also observed the average degree of collaboration was achieved at a rate of 0.96, which is nearly equal to one. This implies that multiple authors contributed more than single authors.

Table 5: Degree of Collaboration

Year	Single Author Articles (Ns)	Multiple Author Articles (Nm)	Nm+Ns	Degree of Collaboration DC=Nm/(Nm+Ns)
2011	3	88	91	0.96
2012	5	104	109	0.95
2013	4	101	105	0.96
2014	5	86	91	0.94
2015	5	73	78	0.94
2016	2	64	66	0.97
2017	1	66	67	0.99
2018	2	73	75	0.97
2019	3	70	73	0.95
2020	1	132	133	0.99
2021	9	157	166	0.95
Total	40	1014	1054	0.96

F. Country–Wise Distribution of Articles (Top 10)

Table 6 and figure 7 displays the country-wise contribution of 1054 published articles. It is found that the highest number of publications are from India (900), followed by the United States (40), Pakistan (23), Saudi Arabia (22), Malaysia (18) and Bangladesh (17).

Table 6: Country-Wise Distribution of Articles (Top 10)

Rank	Name of Country	Number of Articles
1	India	900
2	United States	40
3	Pakistan	23
4	Saudi Arabia	22
5	Malaysia	18
6	Bangladesh	17
7	Iran	12
8	China	11
9	Australia	10
9	Indonesia	10
9	Sri Lanka	10
10	Italy	9

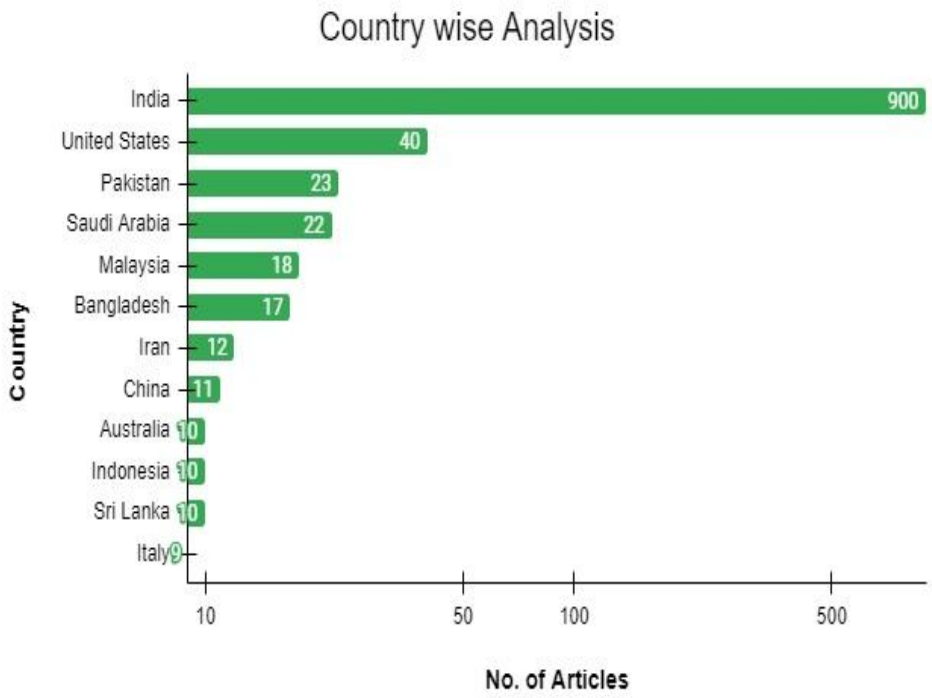


Figure 7: Country-Wise Distribution of Articles

G. Institution Wise Distribution of Articles

Table 7 displays the contribution of 1054 published articles from different Institution (Top 5). Maharishi Dayanand University and Banaras Hindu University are at I rank by publishing 22 articles each. Lovely Professional University is at II rank by publishing 20 articles. Guru Nanak Dev University and Savitribai Phule Pune University are at III rank by publishing 18 articles each.

Table 7: Institution Wise Distribution of Articles (Top 5)

Name of Institution	Number of Articles	Rank
MaharshiDayanand University	22	1
Banaras Hindu University	22	1
Lovely Professional University	20	2
Guru Nanak Dev University	18	3
SavitribaiPhule Pune University	18	3
Gujarat Ayurved University	17	4
Indian Veterinary Research Institute	14	5
King Saud University	14	5
Manipal Academy of Higher Education	14	5

H. Funding Sponsor Wise Distribution of Articles (Top 10)

Table 8 displays about the funding agencies statistics that sponsored articles University Grants Commission had sponsored 52 Articles and at rank I, Indian Council of Medical Research had sponsored 27 articles, second highest, Department of Science and Technology, Ministry of Science and Technology, India had sponsored 25 Articles third highest.

Table 8: Funding Sponsor Wise Distribution of Articles (Top 10)

Rank	Name of Funding Sponsor	Number of Articles
1	University Grants Commission	52
2	Indian Council of Medical Research	27
3	Department of Science and Technology, Ministry of Science and Technology, India	25
4	Council of Scientific and Industrial Research, India	24
5	Department of Biotechnology, Ministry of Science and Technology, India	23
6	University Grants Committee	15
7	Department of Science and Technology, Government of Kerala	10
8	Department of Biotechnology, Government of West Bengal	9
9	Science and Engineering Research Board	8
10	Bangladesh Council of Scientific and Industrial Research	6

I. Subjects-Area Wise Distribution of Articles

Table 9 represents a list of subject area that have maximum contribution in research publication of *Tinospora cordifolia***.** Pharmacology, Toxicology and Pharmaceutics had published about 50% articles followed by Medicine.

Table-9: Subject-Area WiseDistribution of Articles

S. No.	Subject-Area	Total Number of Articles
1	Pharmacology, Toxicology and Pharmaceutics	525
2	Medicine	343
3	Biochemistry, Genetics and Molecular Biology	256
4	Agricultural and Biological Sciences	191
5	Chemistry	78
6	Immunology and Microbiology	55
7	Environmental Science	48
8	Veterinary	44
9	Chemical Engineering	34
10	Engineering	34

J. Ranked List of Source Title (Top 10)

Table 10 represents list of those Journals who have maximum contribution in research publication of *Tinospora cordifolia***.** International Journal of Pharma and Bio Sciences is at top position by publishing 30 articles followed by Research Journal of Pharmacy and Technology, 29 articles, International Journal of Research In Pharmaceutical Sciences, 27 articles, Journal of Ethnopharmacology 26 articles. International Journal of Research in Ayurveda and Pharmacy is at 10th rank by publishing 15 research articles.Pharmacy and Pharmaceutical Journals are the major publishers on this medicinal plant

Table-10: Ranked List of Source Title (Top 10)

Rank	Name of Source Title	Total Number of Articles
1	International Journal of Pharma And Bio Sciences	30
2	Research Journal of Pharmacy And Technology	29
3	International Journal of Research In Pharmaceutical Sciences	27
4	International Journal of Pharmacy And Pharmaceutical Sciences	26
5	Journal of Ethnopharmacology	24
6	Journal of Ayurveda And Integrative Medicine	22
7	Asian Journal of Pharmaceutical And Clinical Research	18
8	Medicinal Plants	18
9	International Journal of Green Pharmacy	17
10	International Journal of Research In Ayurveda And Pharmacy	15

K. Ranked List of Prolific Authors

Table 11 represents list of those authors who have published more than 6 papers and are at top 5 ranks. Dabur, R is at top by publishing 12 papers followed by Kaur, G Patwardhan, B. published nine papers, Rahmatullah, M. is at 3rd rank, Dhama, K. and Balkrishna, A are at 4th rank and have published seven papers. Most of the fifth ranked authors have published six papers.

Table 11: Ranked List of Prolific Authors (Top 5)

Rank	Name of Author	Number of Articles
1	Dabur, R.	12
2	Kaur, G.	9
2	Patwardhan, B.	9
3	Rahmatullah, M.	8
4	Balkrishna, A.	7
4	Dhama, K.	7
5	Akram, M.	6
5	Kaur, A.	6
5	Latheef, S.K.	6
5	Samad, H.A.	6
5	Tillu, G.	6
5	Varshney, A.	6

VI. FINDINGS AND CONCLUSIONS

For studying *Tinospora cordifolia* (Medicinal Plant), we fetched '1054' articles from the year of 2011 to 2021 using the Scopus database. We have examined such articles based on different scientometric parameters.

1) It is found that in year 2021 maximum no. of articles 166 (25.75%) were published. In year 2016, lowest no. of articles were published.

2) It is analyzed by authorship pattern that 40 articles out of 1054 are of single author. 227 of two authors, 216 of three authors and 206 of four authors.

3) Productivity per author is 0. 238. This is less than one. It means on an average Productivity per author is only 23.80% and Average authors per-paper is 4.20.

4) Relative Growth Rate (RGR) of publication of articles related to *Tinospora cordifolia* is 0.68 and average of Doubling time is 0.969.

5) The overall degree of collaboration was 0.96. And 40 articles are of single authored publications and 1014 articles are multi authored.

6) India is a top position by publishing 900 articles (0.85%) out of 1054 articles.

7) Maharishi Dayanand University & Banaras Hindu University are at I rank by publishing 22 articles.

8) University Grants Commission had Sponsored 52 articles and is at rank I, whereas Indian Council of Medical Research had Sponsored 27 article and is at rank II.

9) In research publication of *Tinospora cordifolia* **.** Pharmacology, Toxicology and Pharmaceutics had published 50% articles followed by Medicine.

10) International Journal of Pharma and Bio Sciences is at top position by publishing 30 articles followed by Research Journal of Pharmacy and Technology, 29 articles.

11) Dabur, R is at top by publishing 12 papers.

REFERENCES

[1] Mittal, J., Sharma, M. M., & Batra, A. (2014). Tinospora cordifolia: A Multipurpose Medicinal Plant-A Review. Journal of Medicinal Plants Studies, 2(2),32-47.

[2] Sangeetha, M. K., Balaji Raghavendran, H. R., Gayathri, V., & Vasanthi, H. R. (2011). Tinospora cordifolia attenuates oxidative stress and distorted carbohydrate metabolism in experimentally induced type 2 diabetes in rats. Journal of natural medicines, 65, 544-550. DOI: https://doi.org/10.1007/s11418-011-0538-6

[3] Zinjarde, S. S., Bhargava, S. Y., & Kumar, A. R. (2011). Potent α-amylase inhibitory activity of Indian Ayurvedic medicinal plants. BMC complementary and alternative medicine, 11(1), 1-10.

[4] Umamaheswari, S. E. L. V. A. R. A. J., & Prince, P. S. M. (2007). Antihyperglycaemic effect of ëilogen-excelí, an ayurvedic herbal formulation in streptozotocin-induced diabetes mellitus. Acta Poloniae Pharmaceutica ñ Drug Research, 64(1), 53-61.

[5] Sinha, K., Mishra, N. P., Singh, J., & Khanuja, S. P. S. (2004). Tinospora cordifolia (Guduchi), a reservoir plant for therapeutic applications: A Review. . Indian Journal of Traditional Knowledge. 3(3), 257-270.

[6] Scientometrics (2008). Glossary of Thompson Scientific Terminology online. Retrieved from http://science.thomsonreuters.com/support/patents/patinf/terms/>

[7] Dobrov, G. M., & Karennoi, A. A. (1969). The informational basis of scientometrics. On theoretical problems of informatics. Moscou: VINITI. FID, 435, 165-191.

[8] Merton, R. K., & Garfield, E. (1963). Forward to Little Science, Big science and Beyond by DJ de solla Price. New York: Columbia University press.

[9] García-Ávila, F., Avilés-Añazco, A., Cabello-Torres, R., Guanuchi-Quito, A., Cadme-Galabay, M., Gutiérrez-Ortega, H., ... & Zhindón-Arévalo, C. (2023). Application of ornamental plants in constructed wetlands for wastewater treatment: A scientometric analysis. Case Studies in Chemical and Environmental Engineering, 7, 100307.

[10] Chaman Sab, M., Kappi, M., & Ahmed, K. M. (2022). Ethnopharmacology Research: A Scientometric Assessment of Indian Publications During 2011 to 2020. Journal of Pharmacology and Pharmacotherapeutics. https://doi. org/10.1177/0976500X221082839.

[11] Huang, Z., Hou, Z., Liu, F., Zhang, M., Hu, W., & Xu, S. (2021). Scientometric analysis of medicinal and edible plant coptis. Frontiers in Pharmacology, 12, 725162.

[12] Atlasi, R., Ramezani, A., Tabatabaei-Malazy, O., Alatab, S., Oveissi, V., & Larijani, B. (2022). Scientometric assessment of scientific documents published in 2020 on herbal medicines used for COVID-19. Journal of Herbal Medicine, 35, 100588. DOI: https://doi.org/10.1016/j.hermed.2022.100588

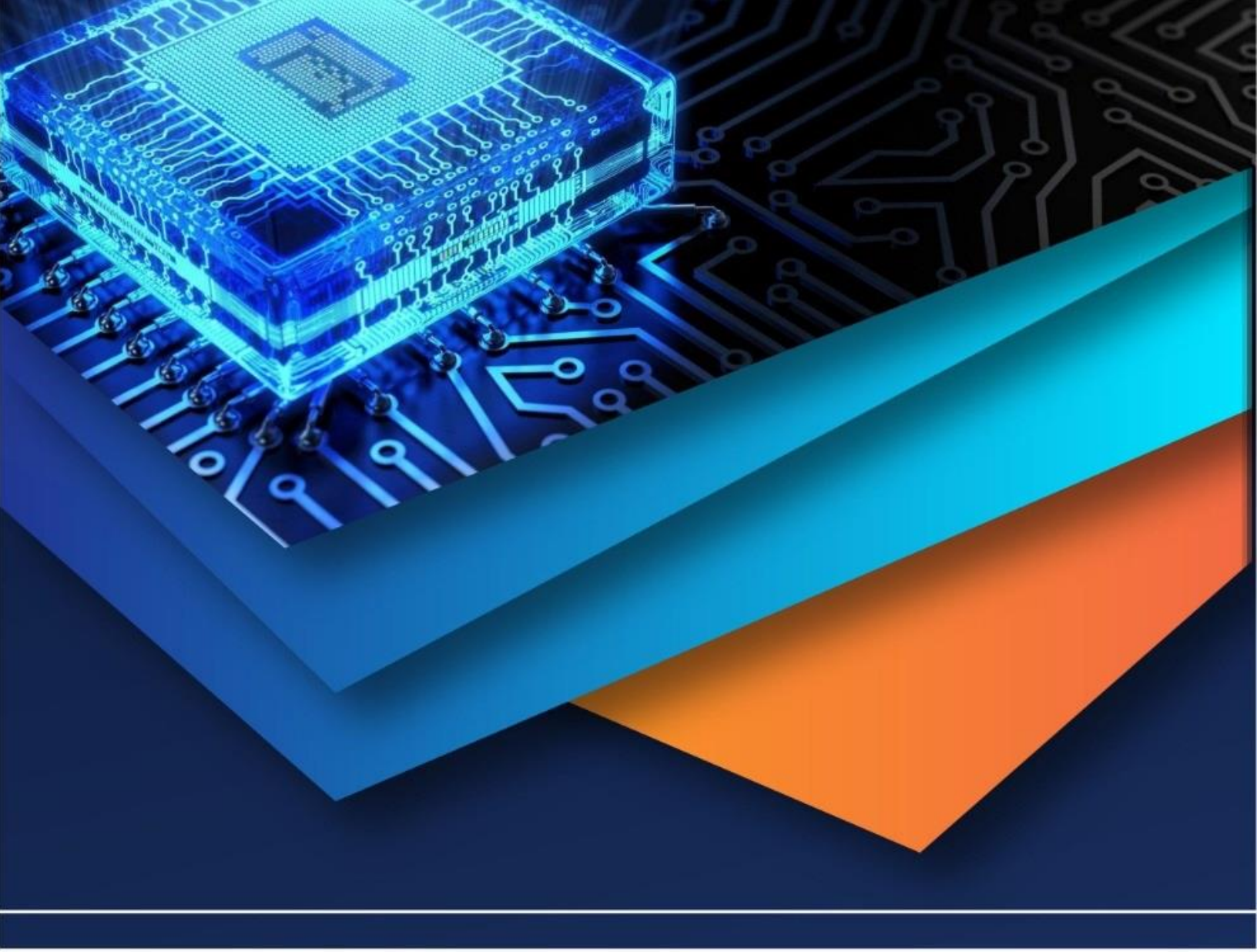
[13] Sivankalai, S., & Sivasekaran, K. (2021). Mucormycosis (black fungus) maiming Covid patients: Scientometrics analysis through prism of Biblioshiny. Libr Philos Pract, 5546. https://digitalcommons.unl.edu/libphilprac/5546

[14] Prasanna Kumari, N., Amsaveni, N., & Surulinathi, M. (2015). Scientometrics Analysis in the field of Occupational Therapy: a global level perspective. International Journal of Next Generation Library and Technologies, 1(2), 1-7.

[15] Jeyshankar, R., & Babu, B. R. (2013). Scientometric analysis of leukemia research output (1960-2011): An Indian perspective. Asia Pacific Journal of Library and Information Science, 3(2).

[16] Surulinathi, M., Balasubramani, R., & Kalisdha, A. (2013). Continent wise Analysis of Green Computing Research: a scientometric study. Journal of Advances in Library and Information Science, 2(1), 39-44.

[17] Gupta, B. M., & Bala, A. (2013). Alzheimer's disease research in India: A scientometric analysis of publications output during 2002-11. Research in Neurology: An International Journal, 2013, 204542. DOI: 10.5171/2013.204542



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Location Analytics Prototype For Business Expansion Analysis

[1]Prof. Neeraj Bhargava, [2]Dr. Ritu Bhargava, [3]Dr. Vaibhav Khanna

[1]Professor, [2]Associate Professor, [3]Associate Professor

[1]Department of Computer Science, MDS University Ajmer

[2] Department of Computer Science, Sophia Girls' College (Autonomous), Ajmer

[3]Department of Computer Science, Dezyne E'Cole College, Ajmer

Abstract: Every decision is made in a specific context to the location and location analytics adds decision supporting context to the "why" "when" and "how much" questions associated to every dataset. This paper outlines a prototype that we developed to be followed for systematically conducting this type of analysis. For demonstrating the usage of the prototype, we have used the laundry business expansion dataset in Michigan and the associated maps and demographic data layers.

One of the most important activities when planning a business expansion is to analyse the existing businesses for identifying the Geographic attributes and Critical success factors for the business. Research results in this paper first analysed a set of best-performing similar businesses to identify critical success factors. These are applied along with other known demographic criteria to identify the most suitable market for the expansion of the business.

Index Terms **- Location analytics, Business expansion Spatial Data Mining, Business Intelligence, Locational Intelligence.**

Introduction

We live in an age of data and the intelligence and insights derived out of that data. It's a 21st century dilemma that getting data has never been easier but understanding it and analyzing it for insights has never been more challenging. The best solution to this situation is "map it, analyze it as layers of information and visualize it." (Ain, Vaia, DeLone, & Waheed, 2019) Literally when data is put on a map, it becomes much easier to analyze it and the patterns get clearer. The relationships between data elements become more obvious and questions get answered through spatial mining of related information. This called location analytics and it provides answers about the "where"' component of data.

Every decision is made in a specific context to the location and location analytics adds decision supporting context to the "why" "when" and "how much" questions associated to every dataset. Whenever there is a computing problem we look for a solution through data analytics as to what do about it. Irrespective of the source data there's a right way to start analysing the data by observing the patterns and converting it into layers of information. (Anselin, A Local Indicator of Multivariate Spatial Association: Extending Geary's c, 2019) Businesses traditionally are good at seeing where things are but not necessarily understanding why they are there. For example, businesses use maps to visualize locations where the product is selling more as the stage one of business intelligence. This is the stage of descriptive analytics in which we monitor what is happening and add a where component to it in the form of location of event. (Anselin & Williams, Digital neighborhoods, 2016)

The next stage of "spatial data mining for location analytics" is very powerful because after seeing data in the map, we look for patterns to start getting an idea about "why" something is happening somewhere.

To compute this analytics we need to model the characteristics that demonstrates why the business is performing well in that particular location. (Dastjerdi, McArdle, Matthews, & Keenan , 2020) So locational intelligence starts with how to make a data driven map and visualizing data maps and moves further to analyzing data using maps. (Huang, Pei, & Xiong, 2006)

I. Review of Related Works

Location analytics organize features in a database about geography and store them as a series of spatial relationships not simply graphic representations. (Newgrove, 2017) This is important because certain things that we want to do with data like queries that are complicated, that need to see interrelationships across space or through different layers. (ESRI White Paper, 2017) This complex structure of layers can support all kind of queries and provide the basis for decision support. (Huang, Pei, & Xiong, 2006)

One of the principles of GIS databases is that we organize data formally to the data models and that data model should be should be able to accommodate all kinds of explicit relationships, spatial as well as non spatial. (Jiang, Sainju, Li, Shekhar, & Knight, 2019) The second one is that it has minimum redundancy you don't store a lot of different graphic views in the database we generate graphic views as we had want them using software to associate symbology to these features. (Keenan, 2020) Environmental Systems Research Institute, ESRI was one of the first companies founded specifically to provide Location software tools. ESRI's ArcGIS software is now a widely used commercial software package and is considered the industry leader for Spatial Data analytics. Spatial data analytics is the superset of Location Analytics and spatial data mining. (ESRI White Paper, 2017)

Spatial data is the building block of spatial data analysis and mining. (Li, Wang, & Yuan, 2016) Understanding the concept of spatial data requires a understanding of the major distinction between three types of things that happen in space and that we will record observe as spatial data. (McKinsey Global Institute, 2019)

Events are things that happen in a particular location for example the addresses of the people or locations of the stores, or the addresses where the crime happened. Those are locations of events that happened at a particular location. (Eftelioglu, Shekhar, Kang, & Farah, 2016) This means that the first set of recorded transactions are generally for the observed events. That will affect what we can say and how much we can say in the analysis. (Anselin, A Local Indicator of Multivariate Spatial Association: Extending Geary's c, 2019) In real world the analysis needs to analyze the existing data as well as interpolate data that does not exist. (Oracle Corporation, 2019)

This would be saying that when we study people demographics and city income, we are analyzing whether there's convergence or divergence of the income between cities or states. (Yilmaz, Elbasi, & Ferhatosmanoglu, 2017) Similarly, we have a spatial pattern of cities, districts, states, countries, regions or zones of similar data patterns. Another example would be an analysis for creating a prized surface in real estate analysis. If we create an interpolated price surface out of the discrete observations of sales at particular points, the analysis will construct the surface of prices. (Yap, Ho, & Ting, 2019)

II. Experimental Analysis Process

Businesses need to plan their expansion meticulously and methodically to new business areas. This can be done using "Location Analytics" as expansion decision is costly and critical for the success of the business.

This paper outlines a prototype that we developed to be followed for systematically conducting this type of analysis. For demonstrating the usage of the prototype we have used the laundry business expansion dataset in Michigan and the associated maps and demographic data layers.

A framework for the Location Analytics Business Expansion Prototype can be outlined as given below:

- Identify Critical Success factors for the business category
- Analyze successful business in potential markets
- Plan potential candidate-markets for expansion
- Analyze geographic attributes of customer derived trade zones
- Analyze existing sales dataset for sale-based zoning
- Identify contributing demographic variables

- Add color coded demographic layers.
- Generate Market Suitability Analysis
- Generate Sub-market suitability analysis layers
- Generate and Rank candidate sites
- Create analysis based on variable criterion
- Adjust Criterion weights for multi criterion analysis
- Create reports and infographics to generate insights.

3.1 Identifying Critical Success Factors

One of the most important activities when planning a business expansion is to analyze the existing businesses for identifying the Geographic attributes and Critical success factors for the business. This can be done by analyzing the location attributes of existing successful businesses and existing markets.

3.2 Analyze successful business in potential markets

We can use locational Analytics to understand what makes a successful business. Using this we can identify the information criteria based on which the market is to be analyzed and then point high potential submarkets and candidate sites.

Location analytics has a built-in Toolbox for geo database analysis. In this current project we analyze the geo database for business expansion of laundry services in Michigan. The ArcGIS dataset used is ExpansionStudies.ppkx.

3.3 Analyze customer attributes for trade area analysis / zones

There are several layers of information that we analyzed especially the customer layer, gym and movie theaters layer, and also the geographic features related to laundry drop service. There is also a layer for competitor attribute analysis. This kind of analysis is called the trade area analysis and we can add a new map layer showing the existing customer trade area zones to the existing map layers. (Kedron, Li, Fotheringham, & Goodchild, 2020)

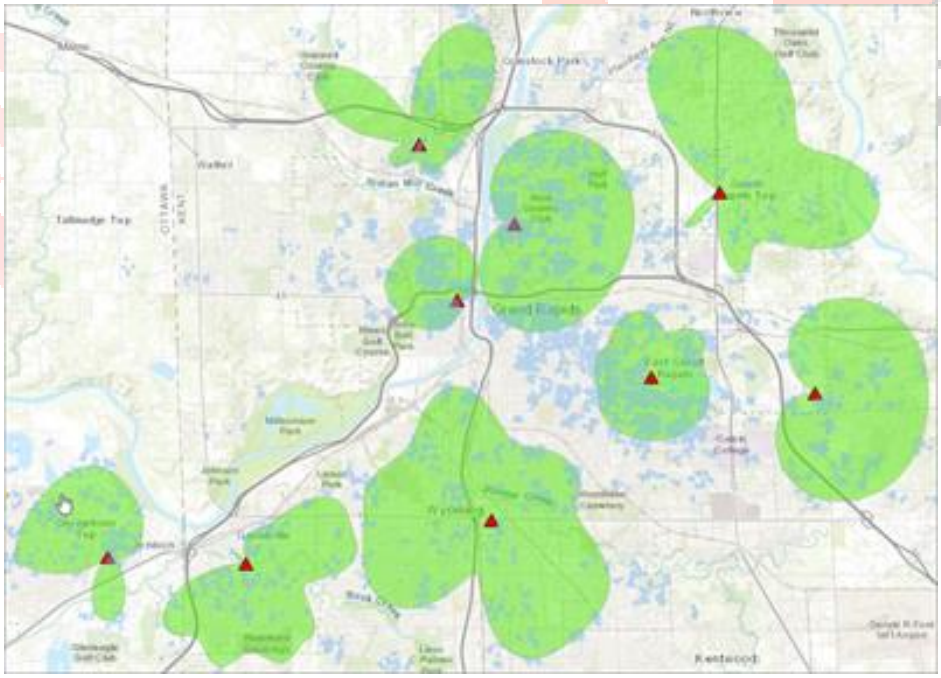


Figure 1: Trade area analysis

3.4 Analyze existing sales dataset for sale-based zoning

If we conduct sales data analysis for these customer trade zones using scripts, we can create trade areas by sales. The trade areas by sales can be overlaid on the customer trade zones to understand the distribution of customers and the distribution of sales at business store level. (Talen, Anselin, Lee, & Koschinsky, 2016)

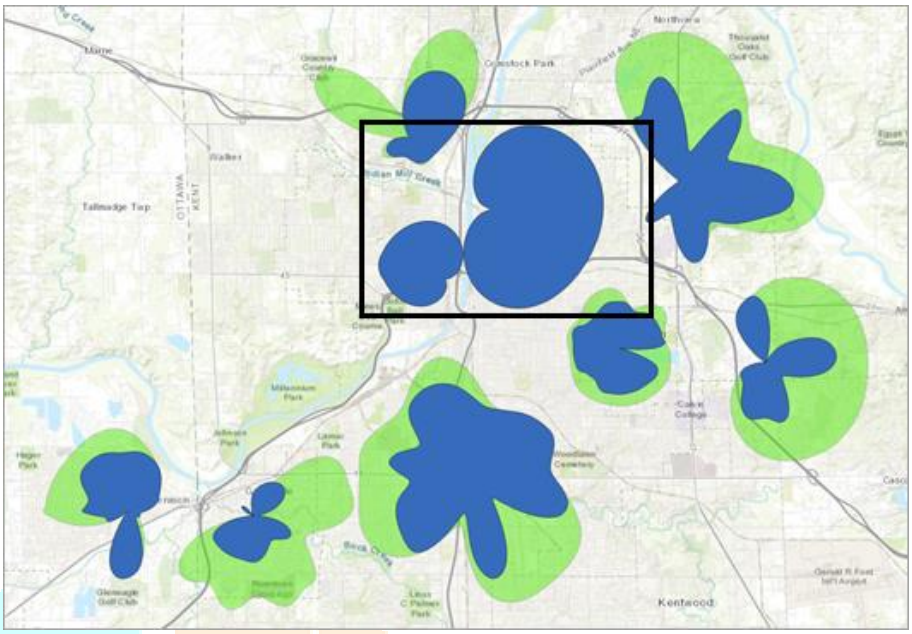


Figure 2: Overlay map for Sale based zoning

From this we can identify the business locations that can generate the highest sales.

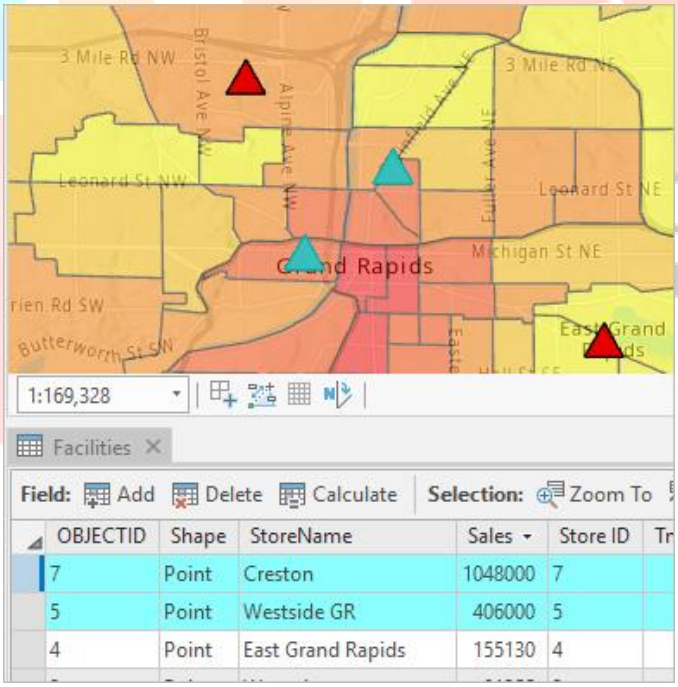


Figure 3: Color Coded Choropleth map for multi factor location analytics

3.5 Add color coded demographic layers for market suitability analysis

Next we can add the demographic variable layers and give them colour codes. The colour coded choropleth layer is very useful for evaluating the market-based opportunities depend on specific variables. The first variable is generally the classification variable that can be used for data enrichment using demographic information. (Tan, Ting, & Ho, 2020) These locations are highlighted in the maps as well as the attribute tables.

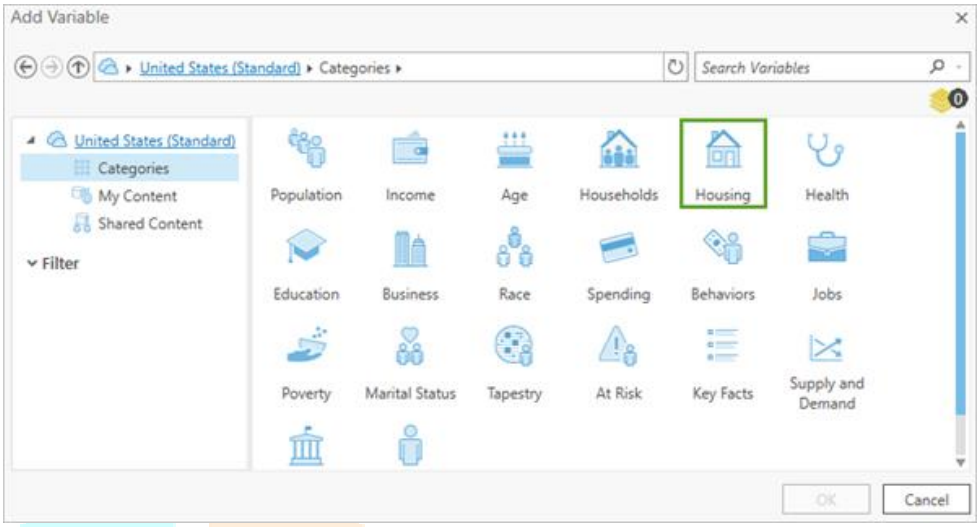


Figure 4: Multifactor Demographic Analysis Layers

3.6 Generate Market Suitability Analysis

We have to analyse several dimensions for market suitability analysis. For example, the housing-units-occupied data in terms of percentage of housing units occupied can give a fair idea of the people living in specific locations.

Similarly, the day time density of population present in a given location during the business as another criteria that can be useful for business analysis. (Ting, Ho, Yee, & Matsah, 2018)

Another parameter can be the workers of age 20 and above that walked to the work and the traffic generated through these workers. To this we can add the layer of workers using public transportation for going to the workplace. The scripts can convert this information to infographics for ready analysis.

Additional attribute can be the propensity of the people to spend money for buying a service and the average spending of a representative customer. (Yee, Ting, & Ho, 2018) This is generally expressed as an index. Through this we get the potential markets for expansion of the business through market suitability analysis.

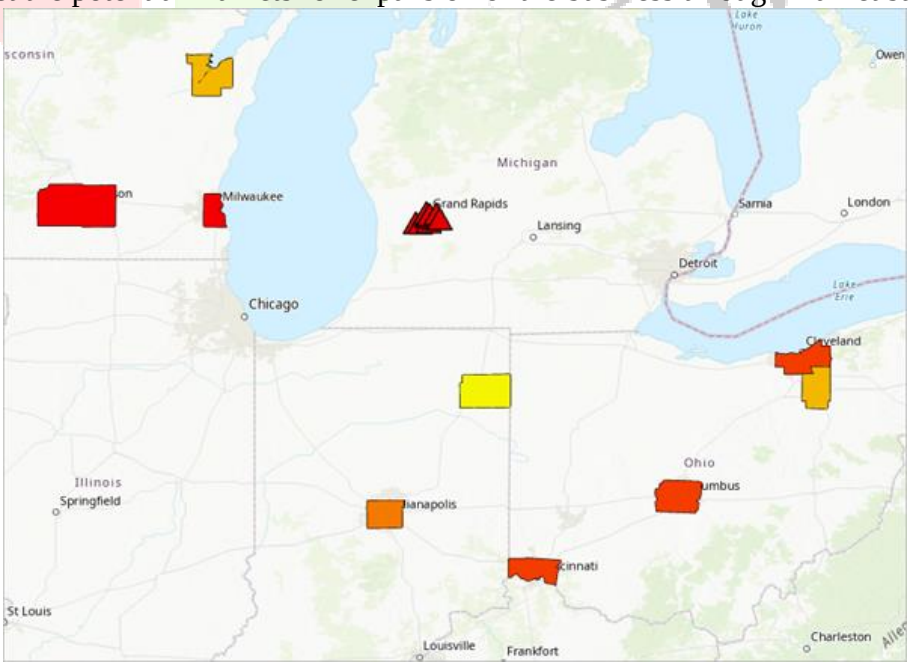


Figure 5: Market suitability Analysis

3.7 Generate and Rank candidate sites

For discovering the most potential sites among the group of candidate sites we conduct suitability analysis. The objective function is to determine the best offered site from a set of alternatives generated as candidate sites.

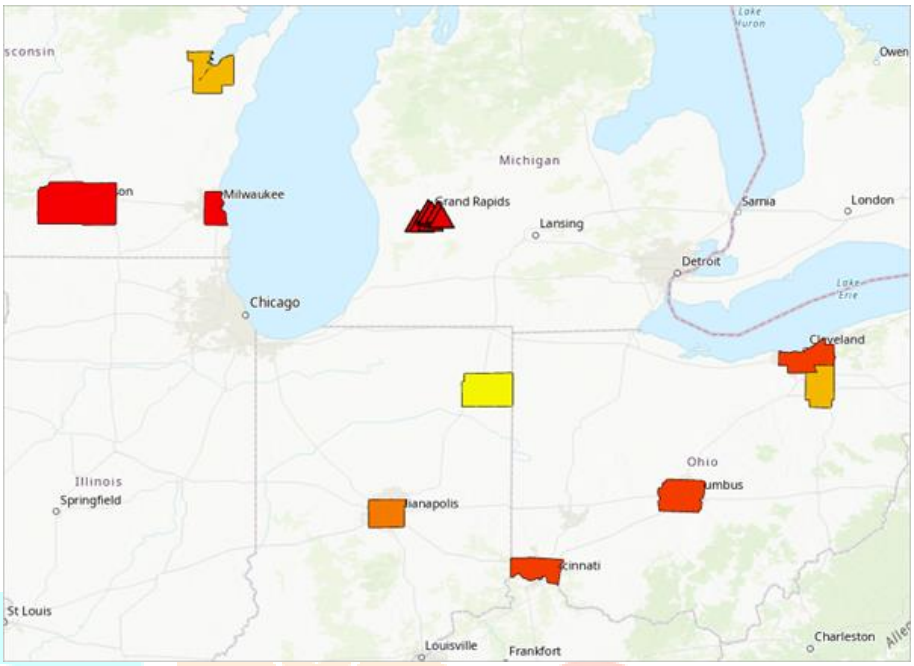


Figure 6: Generate and rank candidate sites

3.8 Adjust Criterion weights for multi criterion analysis

Using scrips for adding weights we can change the relative level of impact of these suitability analysis factors.

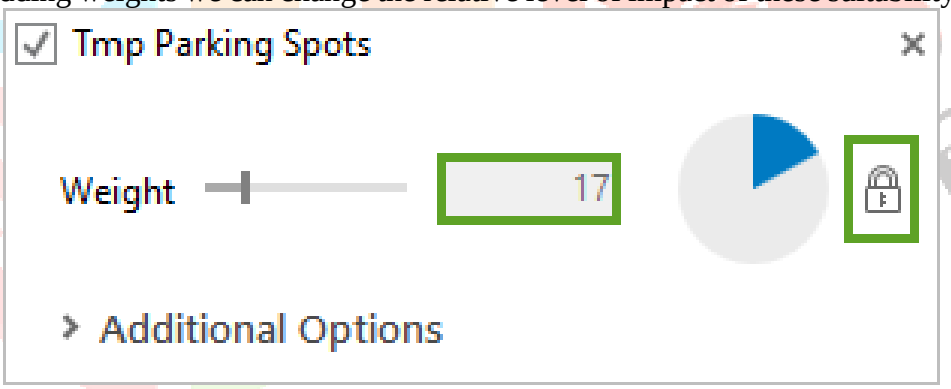


Figure 7: Adjust criterion weights for analysis refinement

III. Outcome Analysis and Discussion

In this experimental dataset we have systematically funneled the search for a suitable business location from a set of potential candidate markets and suitable sites. We conducted the neighborhoods analysis to identify the most suitable market, and then analyzed further to discover the best and most potential location for business expansion.

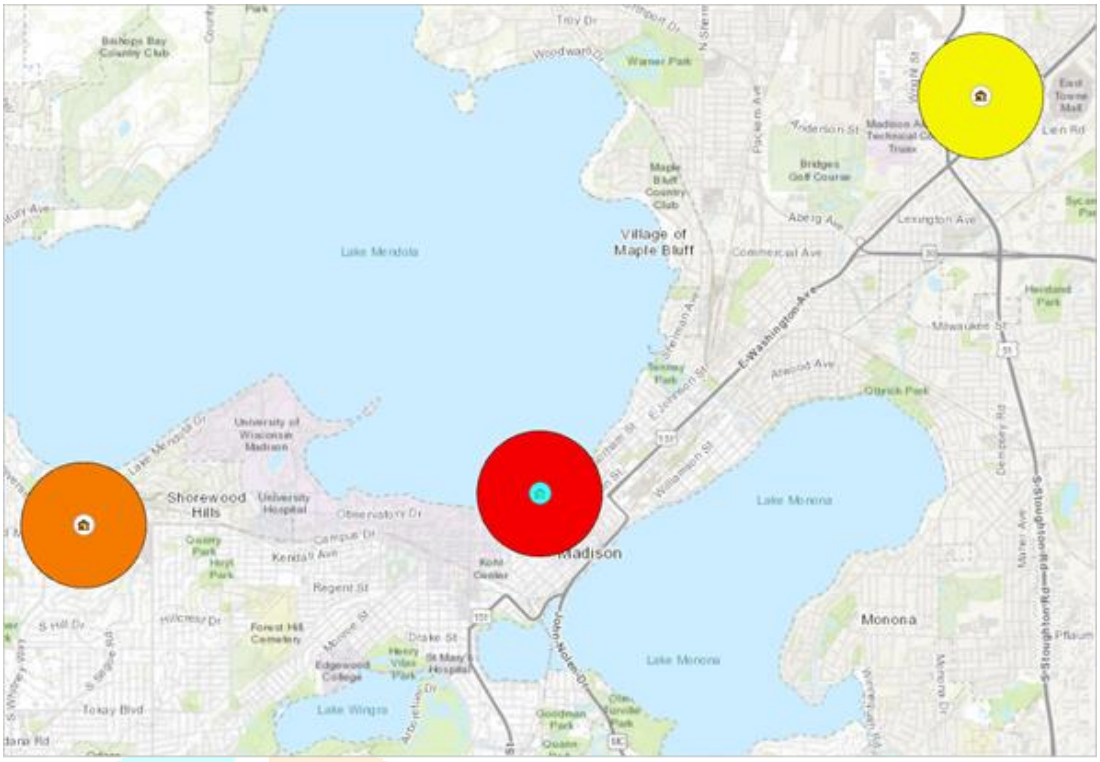


Figure 8: Trade area Rings for identified locations.

We generate infographics and summary analysis reports on the selected location for business expansion. This validates our analysis and makes it more useful by better data visualization. Using these infographics we will generate and view Key Customer Facts, Nearby Business Places and Transportation to Work type of summary reports and infographics.

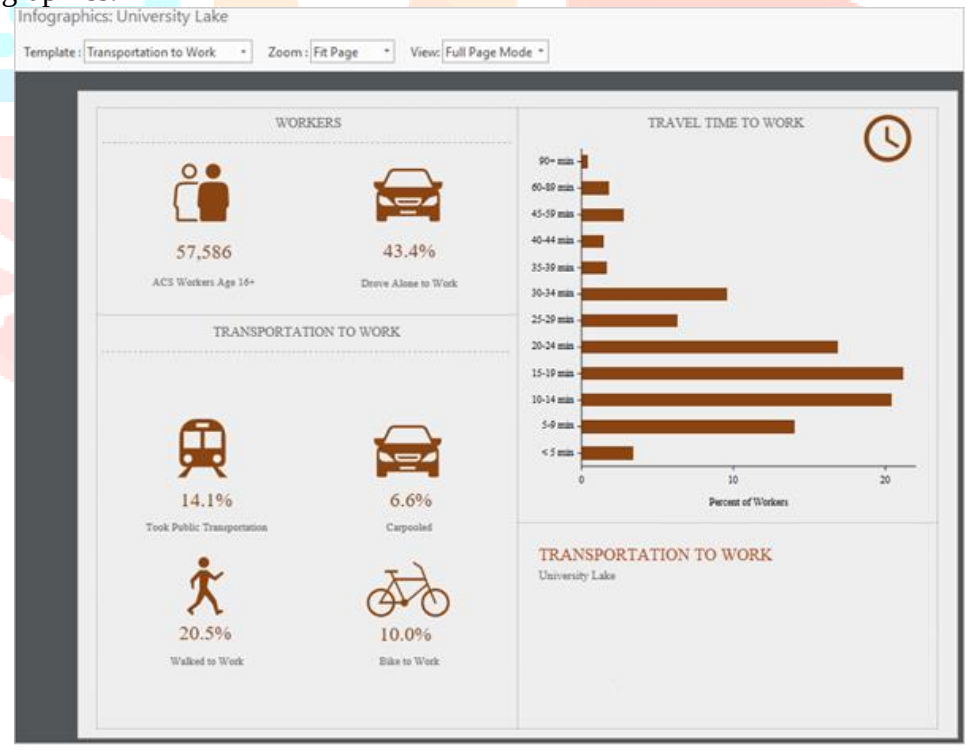


Figure 9: Sample Infographic for better visualization of data

IV. Conclusion

Research results in this paper first analyzed a set of best-performing similar businesses to identify critical success factors and characteristics to be used in business expansion analysis. Once the Critical factors are identified these are applied along with other known demographic criteria to identify the most suitable market for the expansion of the business. Furter refinement may be done by creating submarkets within the market identified in the suitability analysis. We further narrow down and funnel this search to the most suitable zones and add a layer of available commercial business locations available in the most suitable zone. From this set

of alternative candidate sits we have to detect the best location for business expansion. Finally, we embellished the analysis by adding summary reports and infographics.

REFERENCES

[1] Ain, N., Vaia, G., DeLone, W. H., & Waheed, M. (2019). Two decades of research on business intelligence system adoption, utilization and success – A systematic literature review. Decision Support Systems, Volume 125, pp 113113.

[2] Anselin, L. (2019). A Local Indicator of Multivariate Spatial Association: Extending Geary's c. Geographical Analysis, 51(2), 133-150.

[3] Anselin, L., & Williams, S. (2016). Digital neighborhoods. Journal of Urbanism: International Research on Placemaking and Urban Sustainability, 9(4), 305-328.

[4] Dastjerdi, H. R., McArdle, G., Matthews, S. A., & Keenan , P. (2020). Gap analysis in decision support systems for real-estate in the era of the digital earth. International Journal of Digital Earth, doi/abs/10.1080/17538947.2020.1808719.

[5] Eftelioglu, E., Shekhar, S., Kang, J. M., & Farah, C. C. (2016). Ring-shaped hotspot detection. IEEE Transactions on Knowledge and Data Engineering, 28(12), 3367-3381.

[6] ESRI White Paper. (2017). Location Analytics as a Service. ESRI Software as a Service, 12-27. Retrieved from http://www.esri.com/software/businessanalyst/get-started/saas

[7] Huang, Y., Pei, J., & Xiong, H. (2006). Mining co-location patterns with rare events from spatial data sets. Geoinformatica, 10(3), 239–260. .

[8] Jiang, Z., Sainju, A. M., Li, Y., Shekhar, S., & Knight, J. (2019). Spatial ensemble learning for heterogeneous geographic data with class ambiguity. ACM Transactions on Intelligent Systems and Technology (TIST), 10(4), 1-25.

[9] Kedron, P., Li, W., Fotheringham, S., & Goodchild, M. (2020). Reproducibility and replicability: opportunities and challenges for geospatial research. International Journal of Geographical Information Science, 30(1), 1-19.

[10] Keenan, P. (2020, December 3). Geographic Information Systems and Location Analytics for Business and Management. Retrieved from Oxford Research Encyclopedia of Business and Management.: https://oxfordre.com/business/view/10.1093/acrefore/9780190224851.001.0001/acrefore-9780190224851-e-200.

[11] Li, D., Wang, S., & Yuan, H. (2016). Software and applications of spatial data mining. WIREs Data Mining Knowl Discov, 6: 84–114, vol 6: 84–114.

[12] McKinsey Global Institute. (2019). The Age of Analytics: Competing In A Data-Driven World. McKinsey Global Institute Series, 35-60.

[13] Newgrove. (2017). Location Analytics in 2017: What-we-know-so-far. Newgrove Location Analytics Blog. Retrieved from https://newgrove.com/location-analytics-in-2017-what-we-know-so-far/

[14] Oracle Corporation. (2019). Value of Spatial Analytics in BI. Oracle Technetwork Whitepaper, 22-30. Retrieved from http://www.oracle.com/technetwork/middleware/bi-foundation/value-of-spatial-analytics-in-bi-ag-1-130184.pdf

[15] Talen, E., Anselin, L., Lee, S., & Koschinsky, J. (2016). Looking for logic: The zoning—land use mismatch. Landscape and Urban Planning, 152, 27-38.

[16] Tan, N. Y.-Z., Ting, C.-Y., & Ho, C. C. (2020). Location Analytics for Churn Service Type Prediction. In Computational Science and Technology (pp. 709-718). Singapore: Springer, Singapore.

[17] Ting, C.-Y., Ho, C. C., Yee, H. J., & Matsah, W. R. (2018). Geospatial analytics in retail site selection and sales prediction. Big data, 6(1), 42-52.

[18] Yap, J. Y., Ho, C. C., & Ting, C.-Y. (2019). A systematic review of the applications of multi-criteria decision-making methods in site selection problems. Built Environment Project and Asset Management, 9(4), 548-563.

[19] Yee, H. J., Ting, C. Y., & Ho, C. C. (2018). Optimal Geospatial Features for Sales Analytics. Proceedings of the 3rd International Conference on Applied Science and Technology (ICAST'18) (pp. 020152-1 - 8). Online: Published by AIP Publishing. https://doi.org/10.1063/1.5055554.

[20] Yilmaz, E., Elbasi, S., & Ferhatosmanoglu, H. (2017). Predicting optimal facility location without customer locations. Proceedings of the 23rd ACM SIGKDD International Conference on Knowledge Discovery and Data Mining pp 2121-2130. Singapore.

Khoj - *A Peer Reviewed International Journal of Geography*
Vol. 10, January-December, 2023, 66-77
DOI: 10.5958/2455-6963.2023.00005.X

Space Attachment and Human Behaviour

Madhumita Hussain[1]* and Asha Sharma[2]**

[1]Associate Professor, Department of Geography, Sophia Girls' College (Autonomous), Ajmer, Rajasthan, India
[2]Associate Professor, Head, Department of Psychology Sophia Girls' College (Autonomous), Ajmer, Rajasthan, India
*(*Corresponding author) email id: *madhumita@sophiacollegeajmer.in, **asha@sophiacollegeajmer.in*

Received: 11-02-2023; Accepted: 15-11-2023

ABSTRACT

People's relationship with specific locations isn't just about geography; it's deeply intimate and largely affects our lives, our view of ourselves, and where we belong. As a result, the link is so essential. It instils us with a sense of safety and permanence, helping to keep us in the moment, knowing where we're coming from. However, this kind of link isn't only emotional. It can also evolve into concrete steps, such as a desire to improve the community and a need to maintain it. Our connection to certain places goes beyond mere physical location; it integrates itself fiercely into our definitions of self and identity. This connection, known as place attachment, is essential for several causes. To start with, it gives us a feeling of security and stability, rooting us securely in the ground. The present paper is an attempt to explore the connection between individuals and their environment with respect to wellbeing and sense of belongingness. For this purpose, a self-constructed questionnaire was used for the collection of raw data amongst the girl students of 17 to 24 age group. The major findings indicate a strong preference for natural landscapes and the importance of green spaces for ensuring better wellbeing and sense of belongingness.

Keywords: Space, Connection, Community, Emotional Attachment. Wellbeing and sense of belongingness

INTRODUCTION

Geography and Psychology might not seem like two fields that go hand in hand, and yet they are actually more connected than one might first guess. However, Geography has close connectivity with Human Behaviour. One area where Psychology and Geography intersect is the field of Environmental Psychology, which focuses on how the physical environment affects human behaviour and mental processes. Environmental psychologists consider questions such

how different types of natural and built environments influence mood, attention, and other cognitive functions. They also study the psychological impact of environmental issues such as climate change and environmental disasters.

Place attachment refers to the emotional bond or connection that individuals develop with a particular geographic location or physical environment (Manzo and Devine-Wright, 2019). It involves a deep-seated sense of belonging, identity, and affection towards a specific place, extending beyond mere familiarity or convenience (Hidalgo and Hernández, 2001). This attachment can manifest in various ways, such as a desire to protect, maintain, or improve the place, as well as feelings of nostalgia or loss when separated from it (Scannell and Gifford, 2010).

Place attachment is influenced by a variety of factors, including personal experiences, memories, cultural background, social interactions, and the physical characteristics of the environment itself (Lewicka, 2011). People may form attachments to a wide range of places, including their hometowns, neighborhoods, favorite parks, landmarks, or even places they have visited during significant life events (Twigger-Ross and Uzzell, 1996).

Research suggests that place attachment can have significant implications for individual well-being, community cohesion, environmental conservation, and urban planning (Lalli, 1992). For exle, individuals with a strong attachment to their neighborhood may be more likely to engage in local community activities, support neighborhood improvements, and feel a greater sense of satisfaction with their lives (Scannell and Gifford, 2010). Communities with strong place attachments may be more resilient in the face of challenges and more effective in preserving their cultural heritage and natural resources (Hernández and Hidalgo, 2005).

Understanding and promoting place attachment can be important for creating sustainable and livable communities, promoting environmental stewardship, and enhancing overall quality of life (Manzo and Perkins, 2006).

Geography plays a significant role in social psychology, which examines how social factors such as culture, group influences, social norms, and interpersonal relationships influence human behavior and mental processes (Stokols and Altman, 1987). Geographers study how social and cultural factors vary across different regions and how these variations impact people's attitudes, beliefs, and behaviors (Agnew, 2013). Research shows that individuals living in urban environments may be more prone to certain mental health issues, including depression and anxiety (Evans, 2003). This susceptibility could be attributed, in part, to the stress and social isolation resulting from dense population concentrations (Frumkin, 2001).

However, despite their distinctness, psychology and geography intersect and complement each other in the study of human behavior and mental processes (Agnew, 2013) is crucial for understanding the social and spatial contexts in which individuals live and comprehending various psychological phenomena and their impacts on well-being.

Place attachment, a concept central to both geography and psychology, refers to the emotional bond individuals develop with specific places (Lewicka, 2011). It includes affective, cognitive, and behavioral dimensions. The affective component denotes the emotional connection individuals feel towards a place, while the cognitive component involves their beliefs and values associated with that place. The behavioral component encompasses individuals' activities and behaviors within the place (Manzo and Devine-Wright, 2019).

Objectives of the Study

- To explore the connection between individuals and their environment.
- To assess the importance of green spaces for well-being.
- To investigate the sense of belongingness among the youth.

Tools Used

A self-prepared 18-item questionnaire was constructed to study the connection between space attachment and human behavior.

Participants

The questionnaire was circulated among female students aged 17 to 24 through a Google form in Figure 1 to 20.

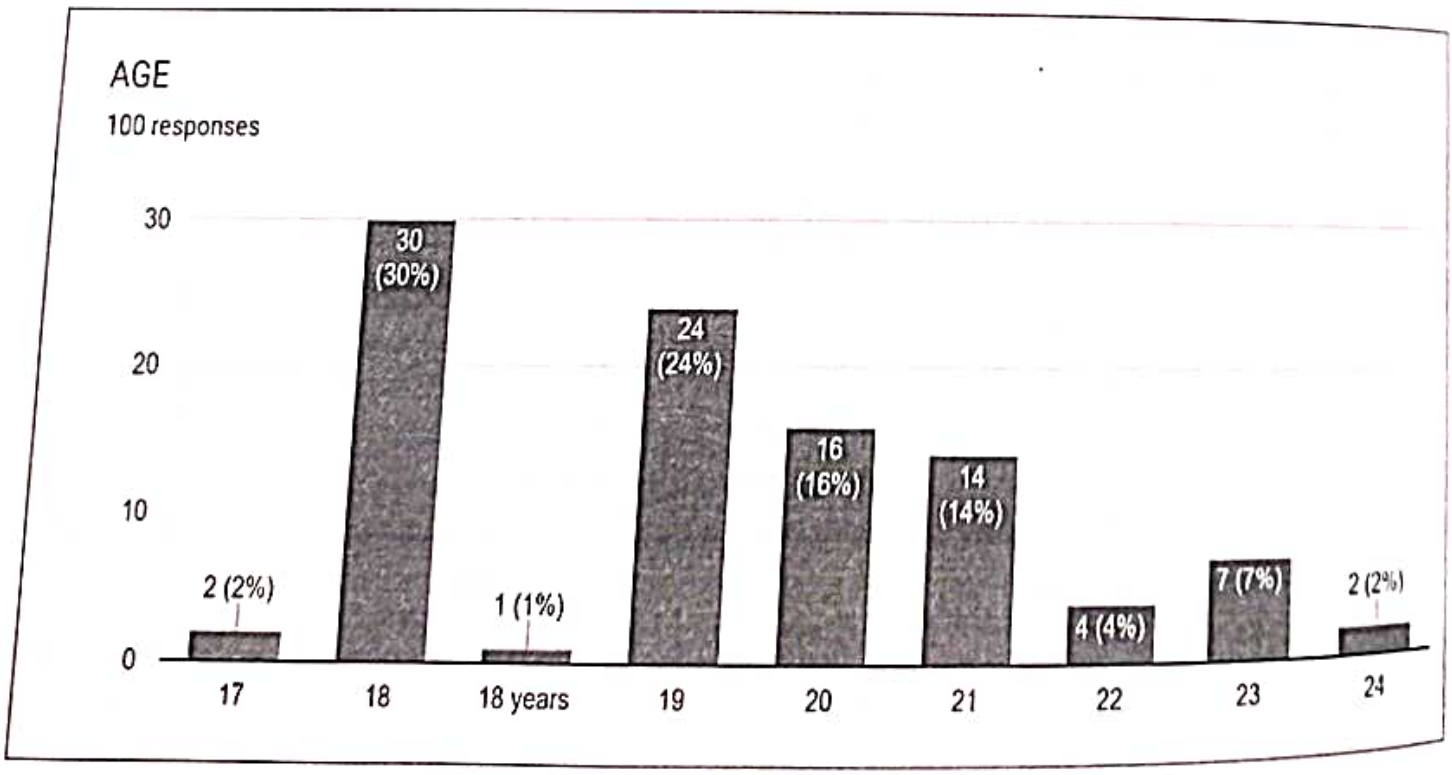


Figure 1: Bar graph depicting demographic information with respect to age

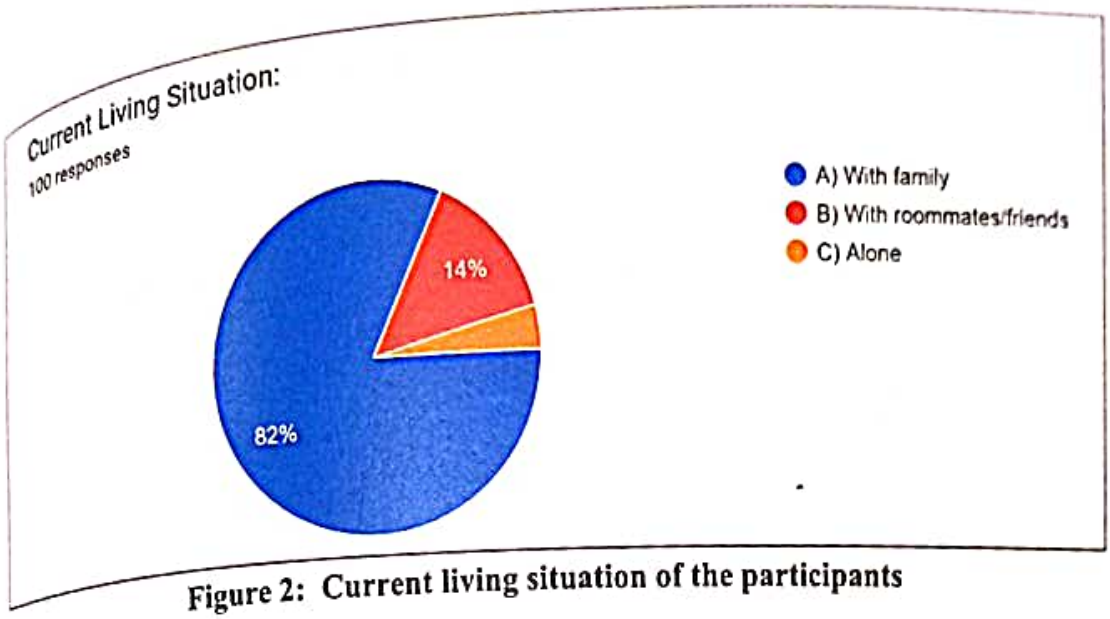


Figure 2: Current living situation of the participants

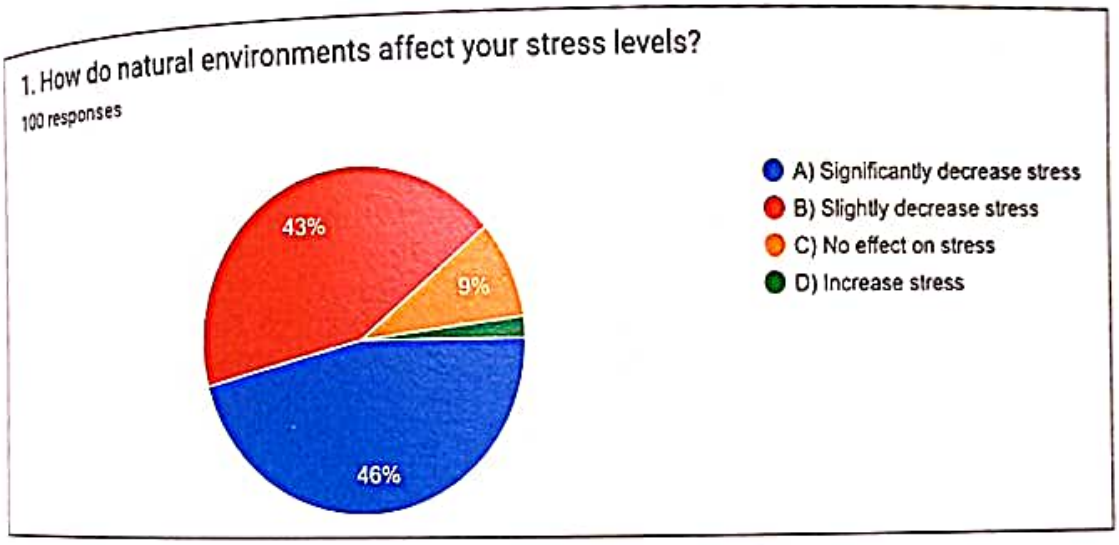


Figure 3: Pie-chart depicting the responses on item no. 1

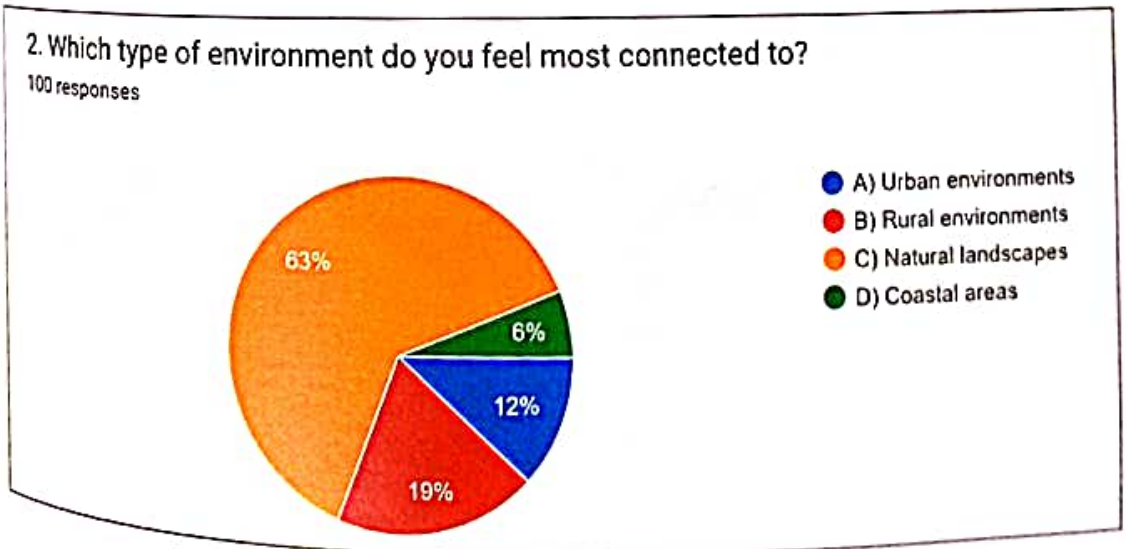


Figure 4: Pie-chart depicting the responses on item no. 2

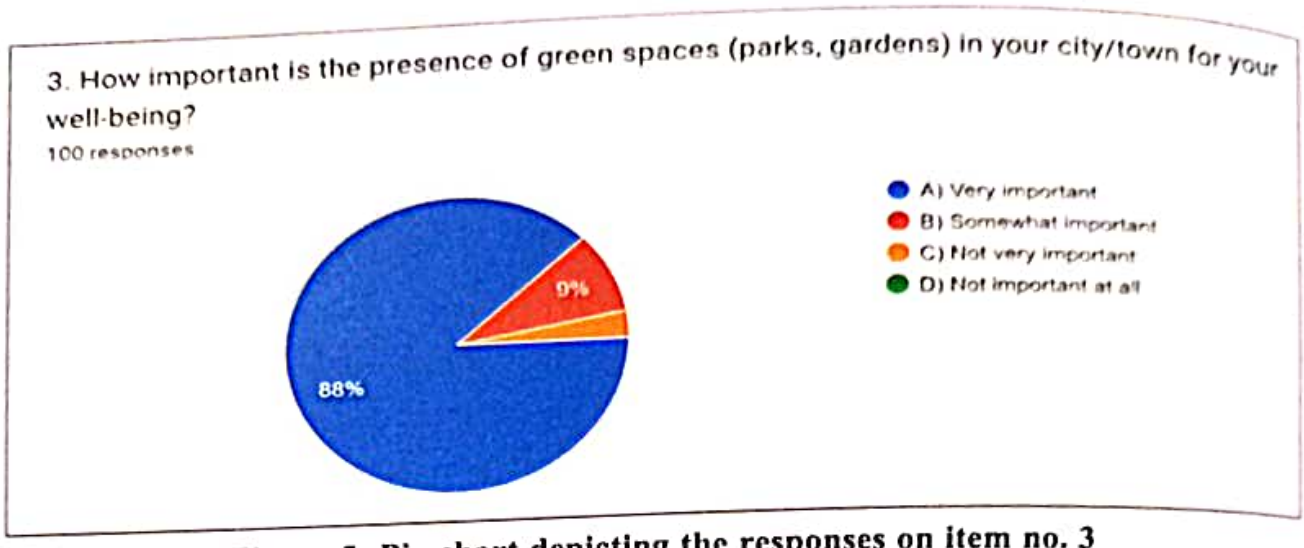


Figure 5: Pie-chart depicting the responses on item no. 3

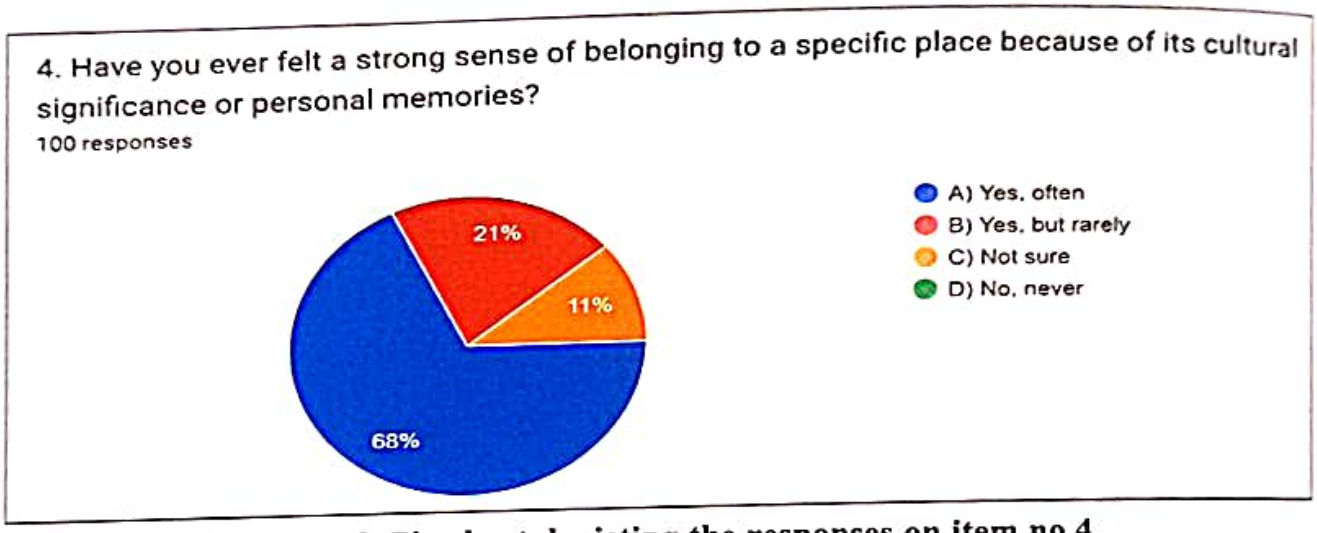


Figure 6: Pie-chart depicting the responses on item no.4

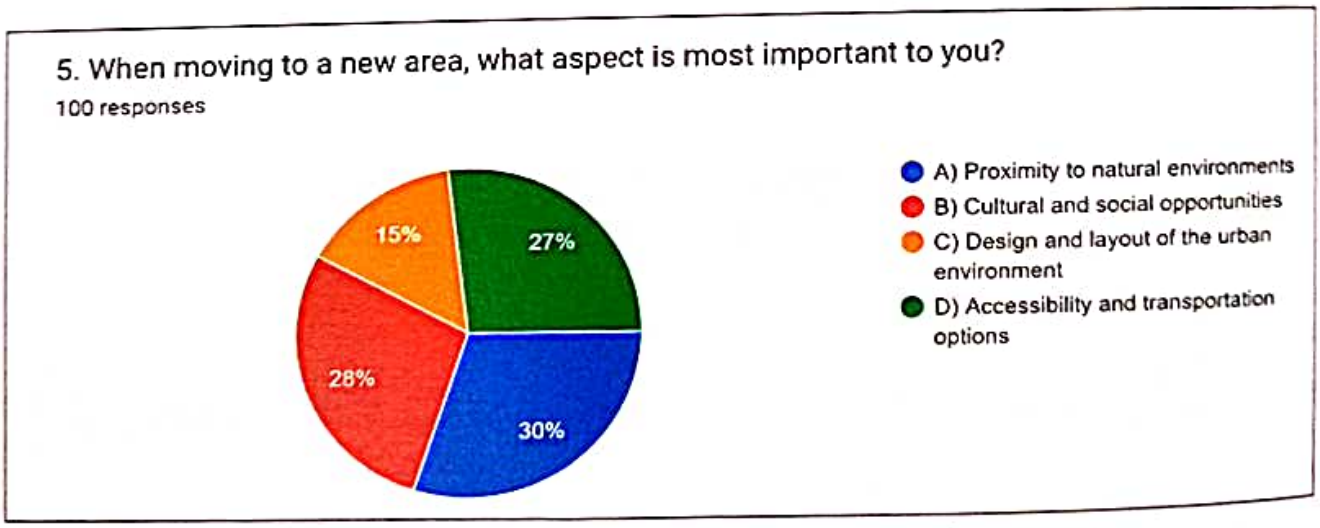


Figure 7: Pie-chart depicting the responses on item no. 5

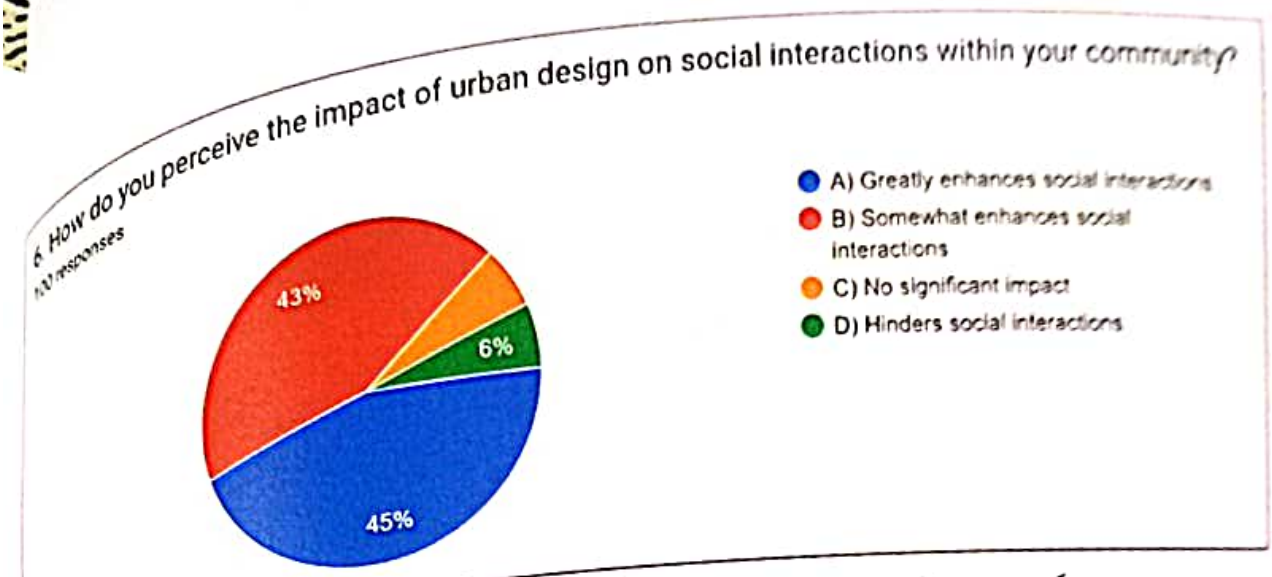


Figure 8: Pie-chart depicting the responses on item no. 6

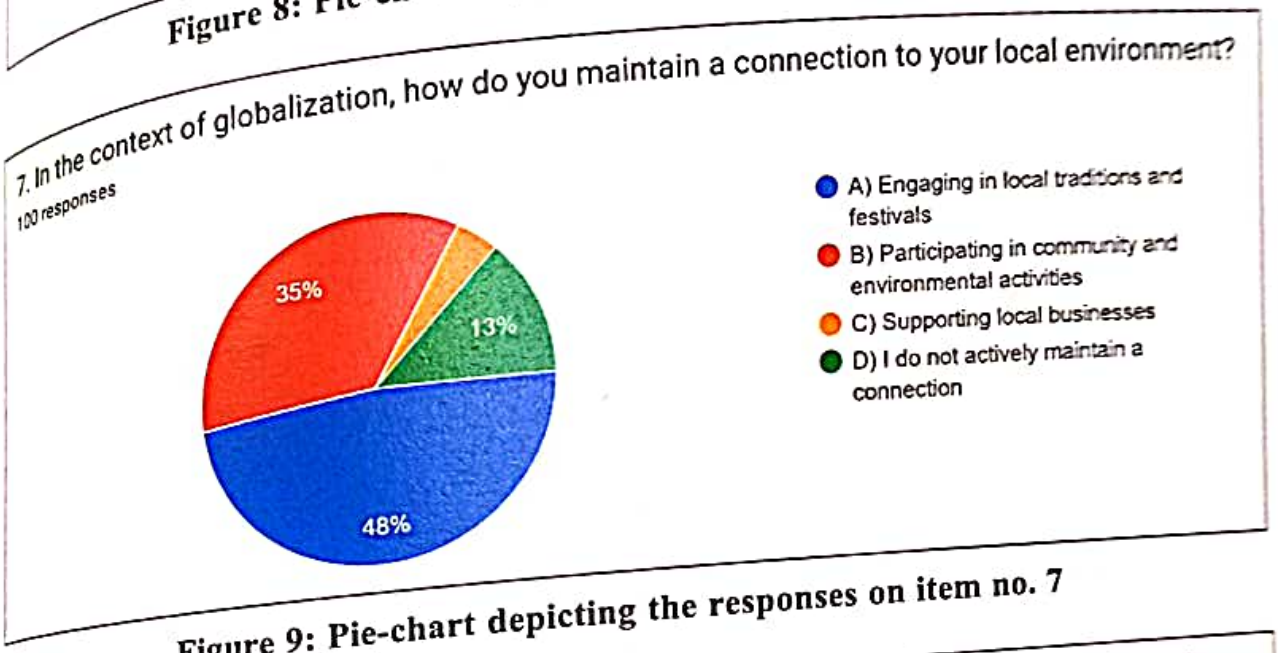


Figure 9: Pie-chart depicting the responses on item no. 7

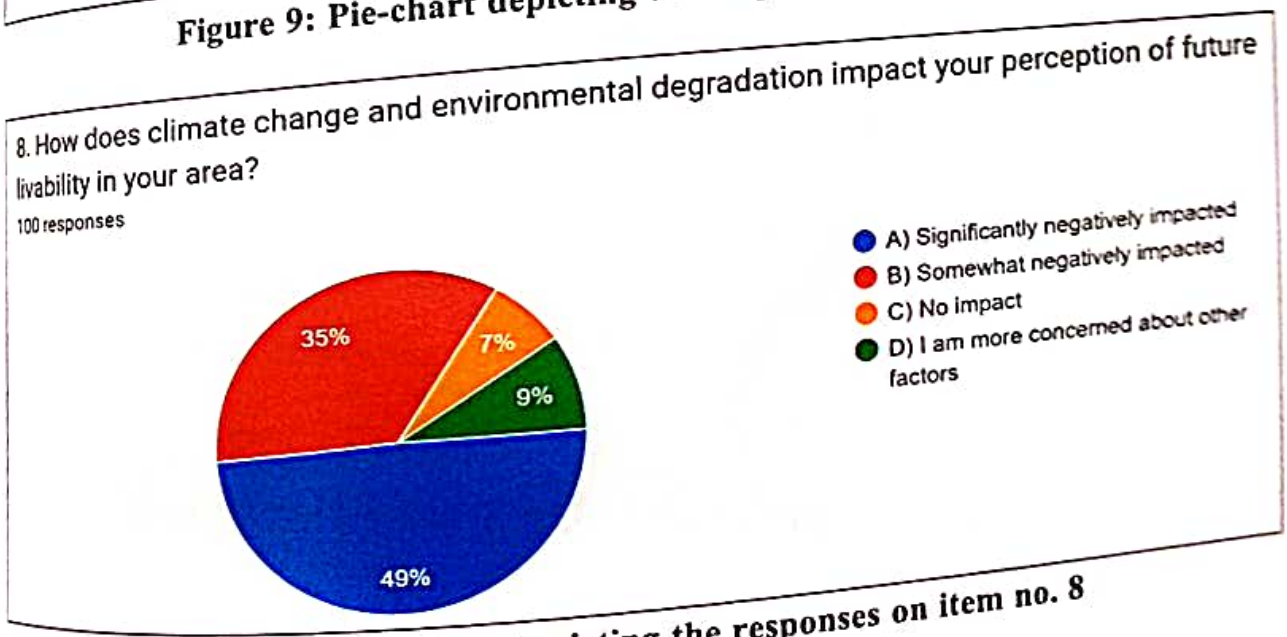


Figure 10: Pie-chart depicting the responses on item no. 8

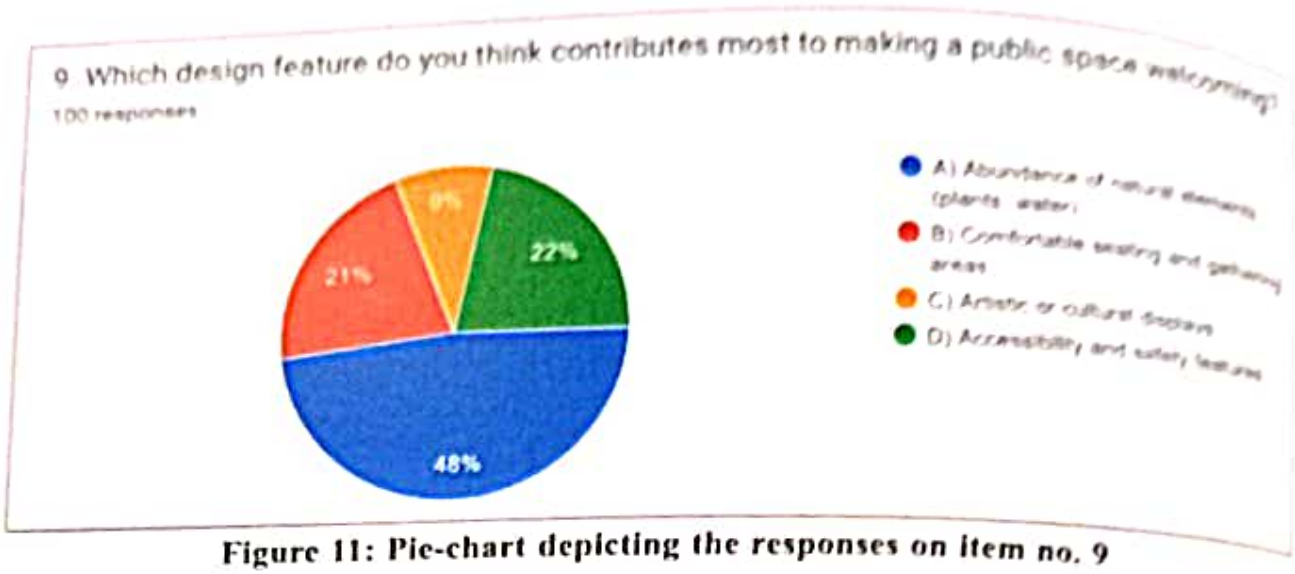


Figure 11: Pie-chart depicting the responses on item no. 9

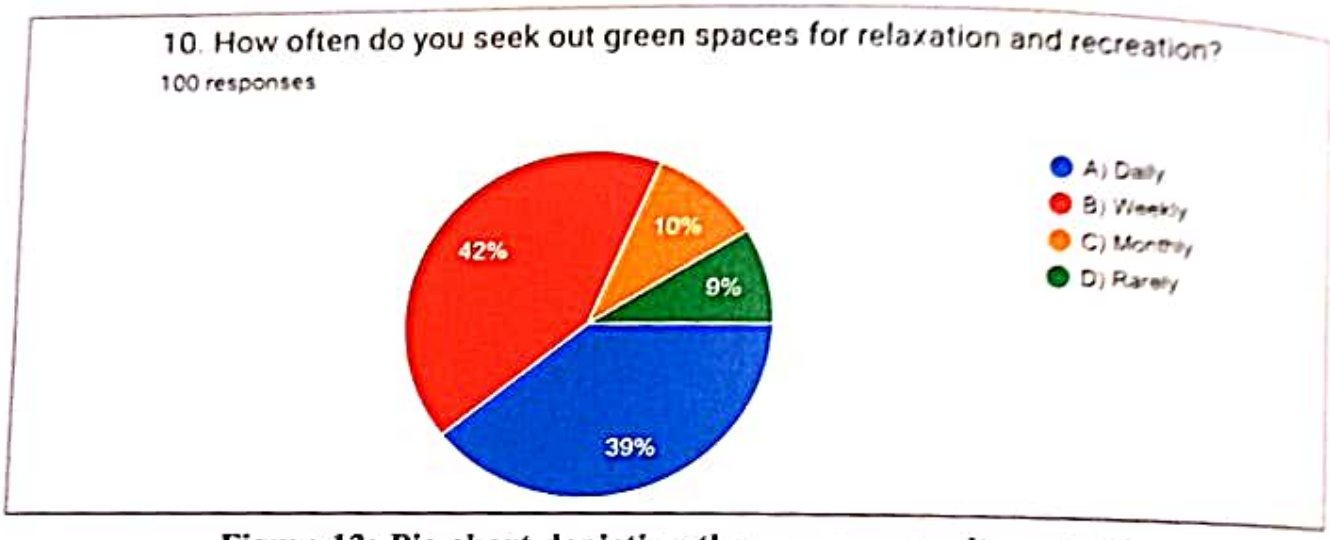


Figure 12: Pie-chart depicting the responses on item no. 10

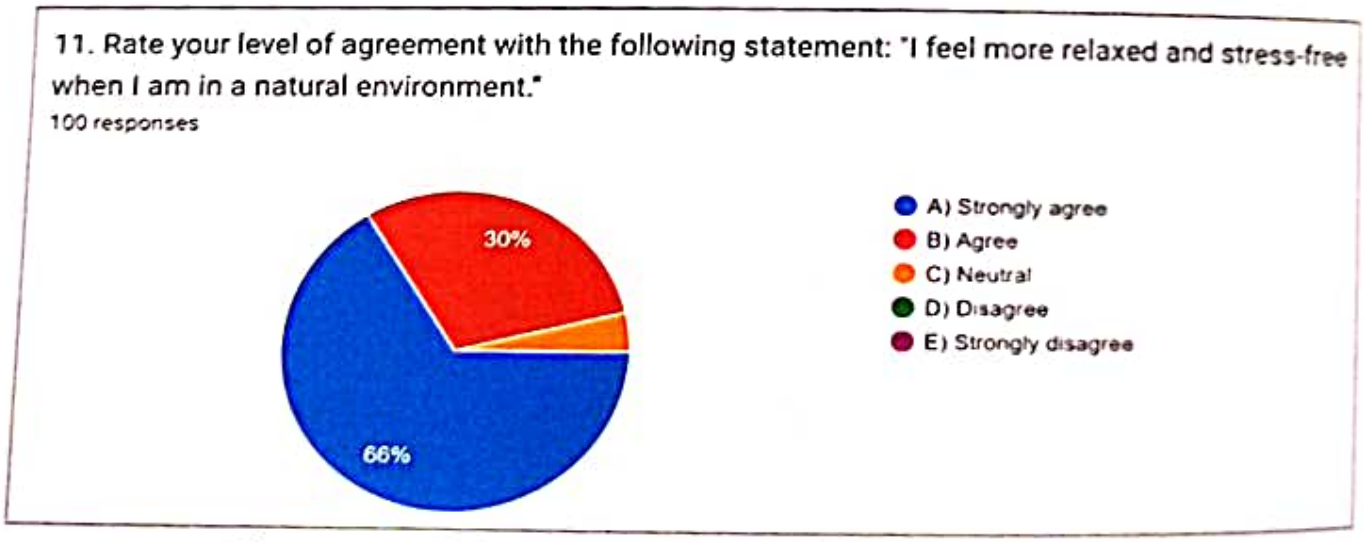


Figure 13: Pie-chart depicting the responses on item no. 11

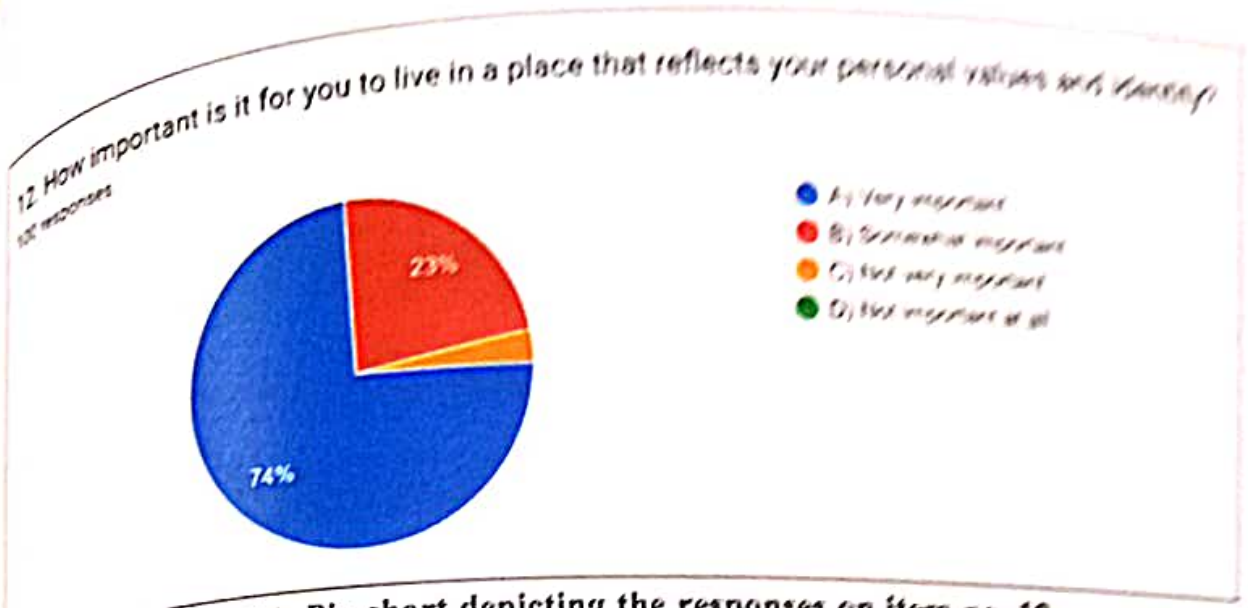


Figure 14: Pie-chart depicting the responses on item no. 12

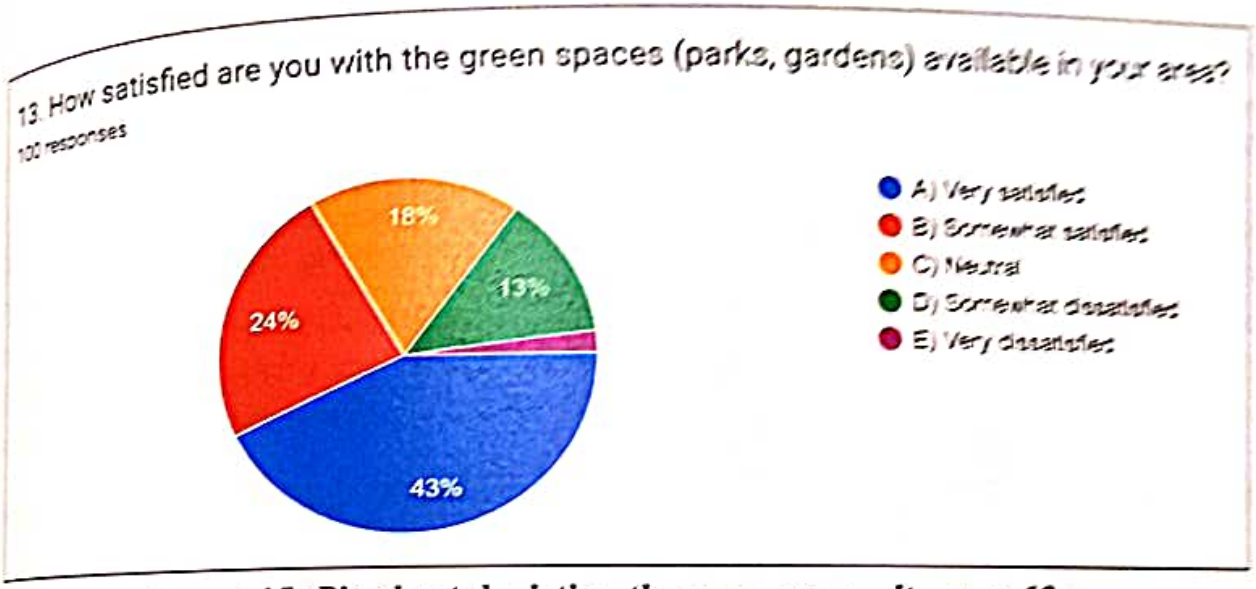


Figure 15: Pie-chart depicting the responses on item no. 13

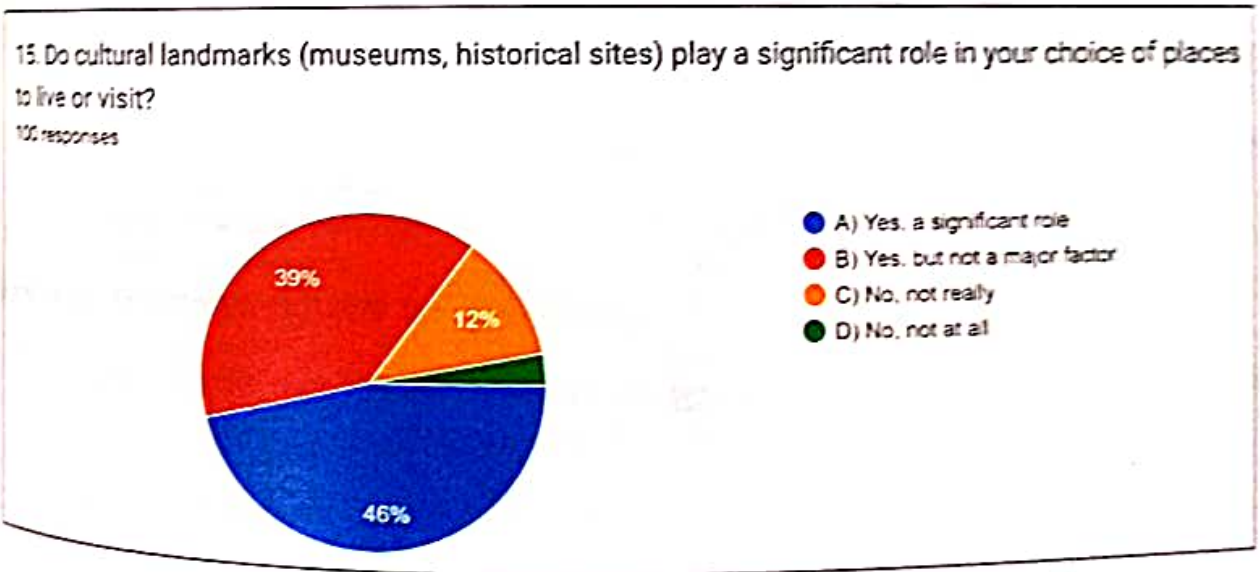


Figure 16: Pie-chart depicting the responses on item no. 14

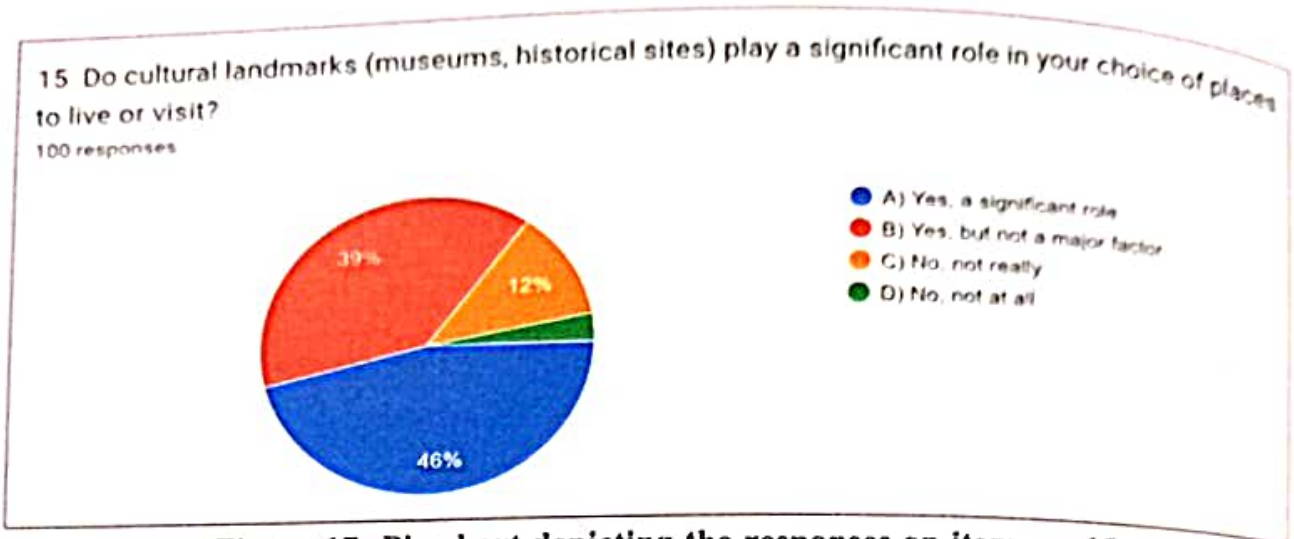


Figure 17: Pie-chart depicting the responses on item no. 15

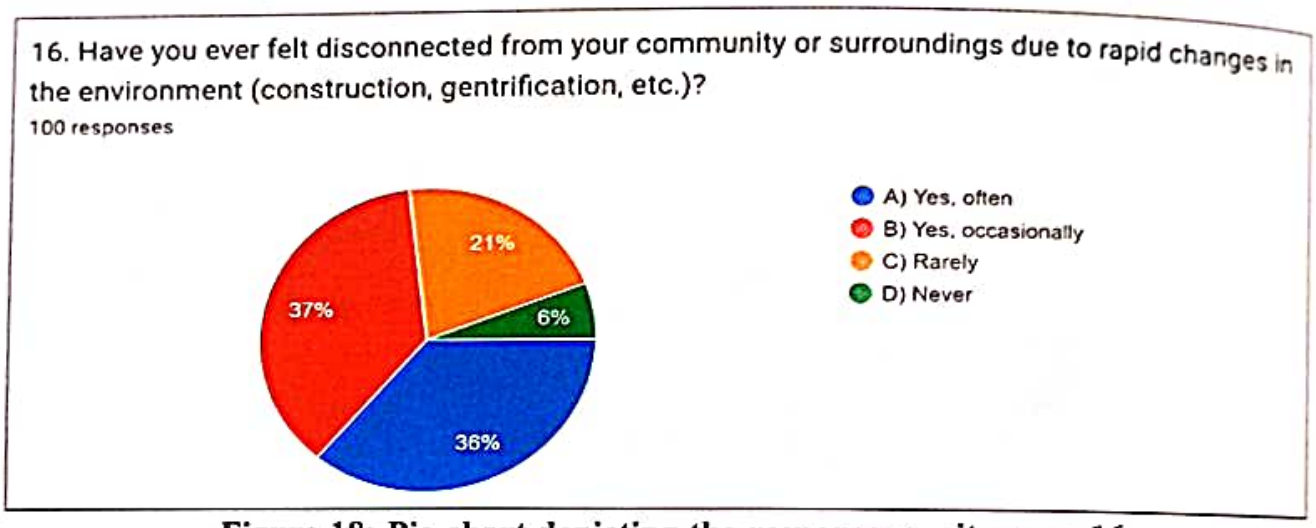


Figure 18: Pie-chart depicting the responses on item no. 16

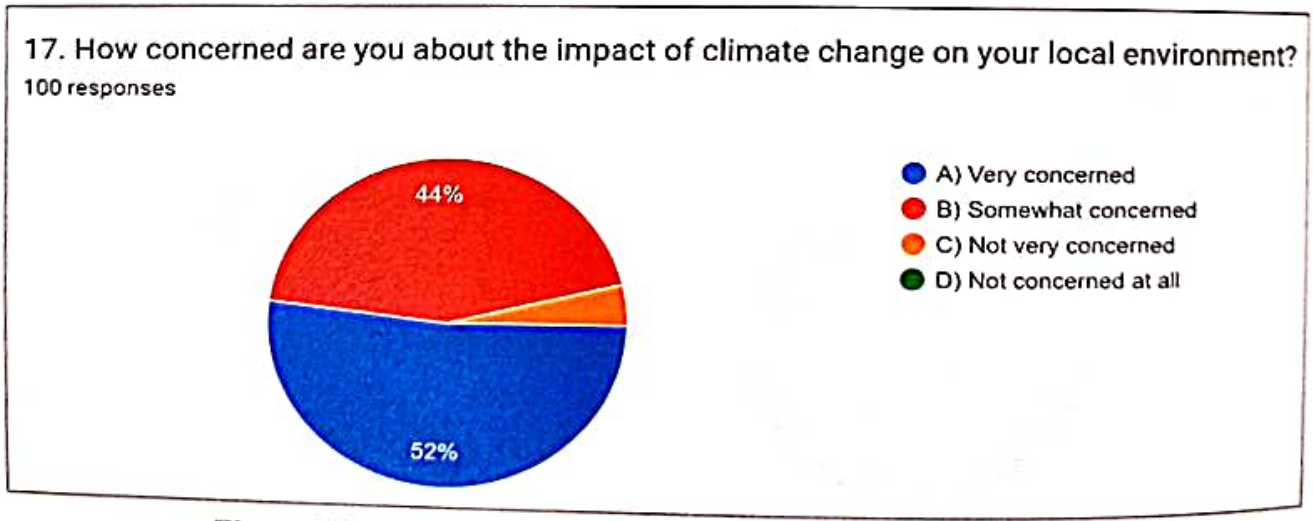


Figure 19: Pie-chart depicting the responses on item no. 17

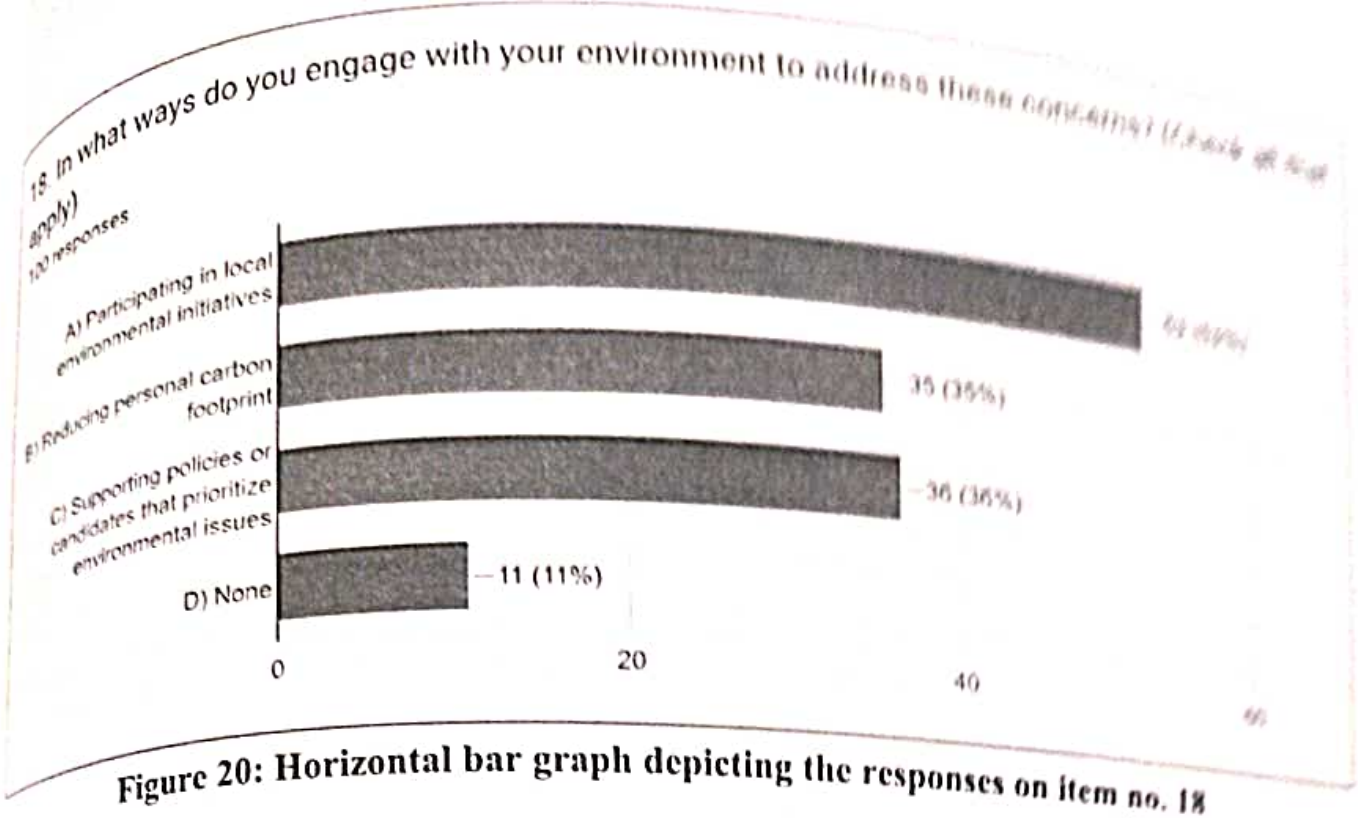


Figure 20: Horizontal bar graph depicting the responses on item no. 18

This questionnaire aims to capture an overview of individual experiences and perceptions regarding the relationship between their psychological well-being and geographical environments. By focusing on the concept of "space connection," we can analyze how respondents feel connected to various environments and spaces, and how these connections influence their well-being, stress levels, and environmental engagement.

The following are key findings related to the theme of "Space Attachment and Human Behavior":

Most Connected Environment

- Natural Landscapes: 63 respondents reported feeling most connected to natural landscapes.
- Rural Environments: 19 respondents reported feeling most connected to rural environments.
- Urban Environments: 12 respondents reported feeling most connected to urban environments.
- Coastal Areas: 6 respondents reported feeling most connected to coastal areas.

Importance of Green Spaces for Well-being

- Very Important: 88 respondents consider the presence of green spaces (parks, gardens) in their city or town to be very important for their well-being.
- Somewhat Important: 9 respondents consider it somewhat important.
- Not Very Important: 3 respondents consider it not very important.

Sense of Belonging

Yes, Often: 68 respondents have often felt a strong sense of belonging to a specific place because of its cultural significance or personal memories.

Yes, But Rarely: 21 respondents have felt this sense of belonging but rarely.

Not Sure: 11 respondents are not sure about their feelings of belonging to places with cultural significance or personal memories.

These results highlight a strong connection between respondents and natural landscapes, indicating a significant value placed on green spaces for personal well-being. A majority of respondents have experienced a strong sense of belonging to places with cultural or personal significance, reflecting the deep connections people form with their environments. The implications of place attachment for community development show active participation in community activities and contributions to community well-being.

CONCLUSION

The data show a strong preference for natural landscapes, and the importance of green spaces for well-being aligns with the principles of environmental psychology. This preference underscores the restorative effects of natural environments on human mental health, offering a buffer against the stressors of modern life. The significant number of respondents who value green spaces in their urban or rural settings highlights a widespread recognition of the benefits these spaces bring to individual and community well-being.

REFERENCES

Agnew, J. (2013). A companion to social geography. John Wiley & Sons.

Evans, G. W. (2003). The built environment and mental health. *Journal of Urban Health, 80*(4), 536-555.

Frumkin, H. (2001). Beyond toxicity: Human health and the natural environment. *American Journal of Preventive Medicine, 20*(3), 234-240.

Kyle, G. T., Graefe, A. R., & Manning, R. E. (2005). Testing the dimensionality of place attachment in recreational settings. *Environment and Behavior, 37*(2), 153-177.

Lewicka, M. (2011). Place attachment: How far have we come in the last 40 years? *Journal of Environmental Psychology, 31*(3), 207-230.

Manzo, L. C., & Devine-Wright, P. (2014). Place, attachment, and everyday life: Some reflections on the intersection of environmental psychology and human geography. *Journal of Environmental Psychology, 40*, 256-264.

rson, M. E., Williams, D. R., & Roggenbuck, J. W. (2013). Understanding place attachment in a forested landscape through structural equation modeling. *Environment and Behavior, 45*(4), 546-569.

hansky, H. M., Fabian, A. K., & Kaminoff, R. (1983). Place-identity: Physical world socialization of the self. *Journal of Environmental Psychology, 3*(1), 57-83.

nnell, L., & Gifford, R. (2010). Defining place attachment: A tripartite organizing framework. *Journal of Environmental Psychology, 30*(1), 1-10.

nnell, L., & Gifford, R. (2017). The relations between natural and civic place attachment and pro-environmental behavior. *Journal of Environmental Psychology, 51*, 238-248.

mson, D. (2014). Place attachment and phenomenology: The synergistic dynamism of place. *Phenomenology and the Cognitive Sciences, 13*(4), 573-590.

dman, R. C. (2003). Is it really just a social construction?: The contribution of the physical environment to sense of place. *Society & Natural Resources, 16*(8), 671-685.

ooks, D., & Altman, I. (Eds.). (1987). Handbook of environmental psychology. John Wiley & Sons.

illiams, D. R., & Vaske, J. J. (2003). The measurement of place attachment: Validity and generalizability of a psychometric approach. *Forest Science, 49*(6), 830-840.

How to cite this article: Hussain, M., & Sharma, A. (2023). Space Attachment and Human Behaviour. *Khoj - A Peer Reviewed International Journal of Geography, 10*, 66-77.

Cover Page

DOI: http://ijmer.in.doi./2023/12.11.7
www.ijmer.in

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :8.017(2023); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed and Refereed Journal: VOLUME:12, ISSUE:11(2), November: 2023
Online Copy of Article Publication Available (2023 Issues)
Scopus Review ID: A2B96D3ACF3FEA2A
Article Received: 2nd November 2023
Publication Date:30th November 2023
Publisher: Sucharitha Publication, India
Digital Certificate of Publication: www.ijmer.in/pdf/e-CertificateofPublication-IJMER.pdf

FALTERING EFFORTS: ASSESSING THE TROUBLED PROJECTS AFTER THE JOSHIMATH DISASTER

[1]Dr. Madhumita Hussain and [2]Ms. Anushka Narnoliya
[1]Associate Professor in Geography,Sophia Girls' College(Autonomous), Ajmer
[2]Research Scholar

INTRODUCTION

Situated at an elevation of 6,150 feet (1,875 meters), Joshimath serves as a crucial gateway to numerous Himalayan mountain climbing expeditions, trekking routes, and pilgrimage sites like Badrinath. This town is home to one of the four cardinal pīthas established by Aadi Shankara and holds deep connections to Hindu mythology and legends. According to Hindu lore, Lord Vishnu, one of the principal deities in Hinduism, is said to have resided in Joshimath during the winter months. Joshimath is also renowned for the Nanda Devi Raj Jat Yatra, a famous pilgrimage that occurs every 12 years. Beyond its cultural and historical significance, Joshimath plays a pivotal role as aan educational hub in the region, housing the Hemwati Nandan Bahuguna Garhwal University, which offers a wide array of undergraduate and postgraduate programs across various disciplines. Furthermore, owing to its strategic location, Joshimath acts as a vital transit point for travelers exploring other parts of the region, including Auli, a popular skiing destination, and the Valley of Flowers National Park, a UNESCO World Heritage Site celebrated for its breathtaking natural scenery and diverse ecosystems.

Map: 1.1: Location of Joshimath

Source: Google Map

DEMOGRAPHICS

The population of Children of age 0–6 years in Joshimath city is 2103 which is 13% of the total population. There are 1127 male children and 976 female children between the ages 0–6 years. Thus as per the Census 2011 the As of 2011 India census, there are a total of 3,898 families residing in Joshimath city. The total population of Joshimath is 16,709 out of which 9,988 are males and 6,721 are females. Thus the Average Sex Ratio of Joshimath is 673.Child Sex Ratio of Joshimath is 866 which is greater than Average Sex Ratio (673). As per the Census 2011, the literacy rate of Joshimath is 91.3% up from 77% in 2001. Thus Joshimath has a higher literacy rate compared to the 82.7% of its own district, Chamoli. The male literacy rate is 95.2% and the female literacy rate is 85.2% in Joshimath.

Cover Page

DOI: http://ijmer.in.doi./2023/12.11.7
www.ijmer.in

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :8.017(2023); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed and Refereed Journal: VOLUME:12, ISSUE:11(2), November: 2023
Online Copy of Article Publication Available (2023 Issues)
Scopus Review ID: A2B96D3ACF3FEA2A
Article Received: 2nd November 2023
Publication Date:30th November 2023
Publisher: Sucharitha Publication, India
Digital Certificate of Publication: www.ijmer.in/pdf/e-CertificateofPublication-IJMER.pdf

OBJECTIVES

1. The primary objective of this study is to characterise quantitatively the distribution and the potential of subsidence.
2. To identity and study the effects of parameters responsible for land subsidence –

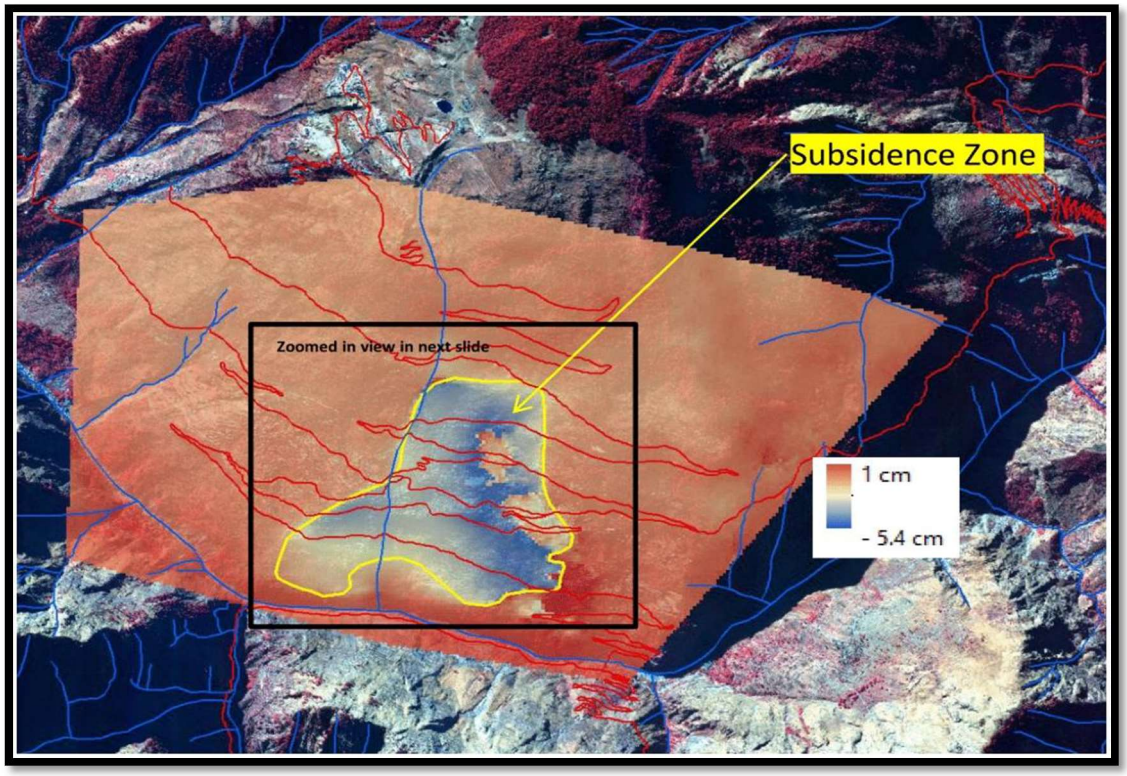
RELEVANCE

Back in 1976, a committee led by MC Mishra predicted that Joshimath, a hilly town, was at risk of subsiding due to its unstable geological location and poor load-bearing capacity of the land. The committee recommended limiting construction and ensuring proper drainage systems to prevent the town from sinking. Recent satellite data from the Indian Space Research Organization (ISRO), collected on January 13, 2023, confirms that Joshimath has indeed been sinking at a significant rate.

Joshimath is now facing a serious crisis because it's located in a high-risk seismic zone (Zone V) in India. There are growing concerns about the town's future as 723 houses across nine wards have developed cracks in their ceilings, walls, and floors. Some houses have even experienced dislodged beams.

According to ISRO's report, from December 27, 2022, to January 8, 2022, Joshimath sank by 5.4 cm. This situation highlights the urgent need for attention and action to address the town's subsidence issue, as it poses a significant risk to its residents and infrastructure.

Image 1.1: Subsidence of Joshimath



Source: ISRO Satellite Image

Cover Page

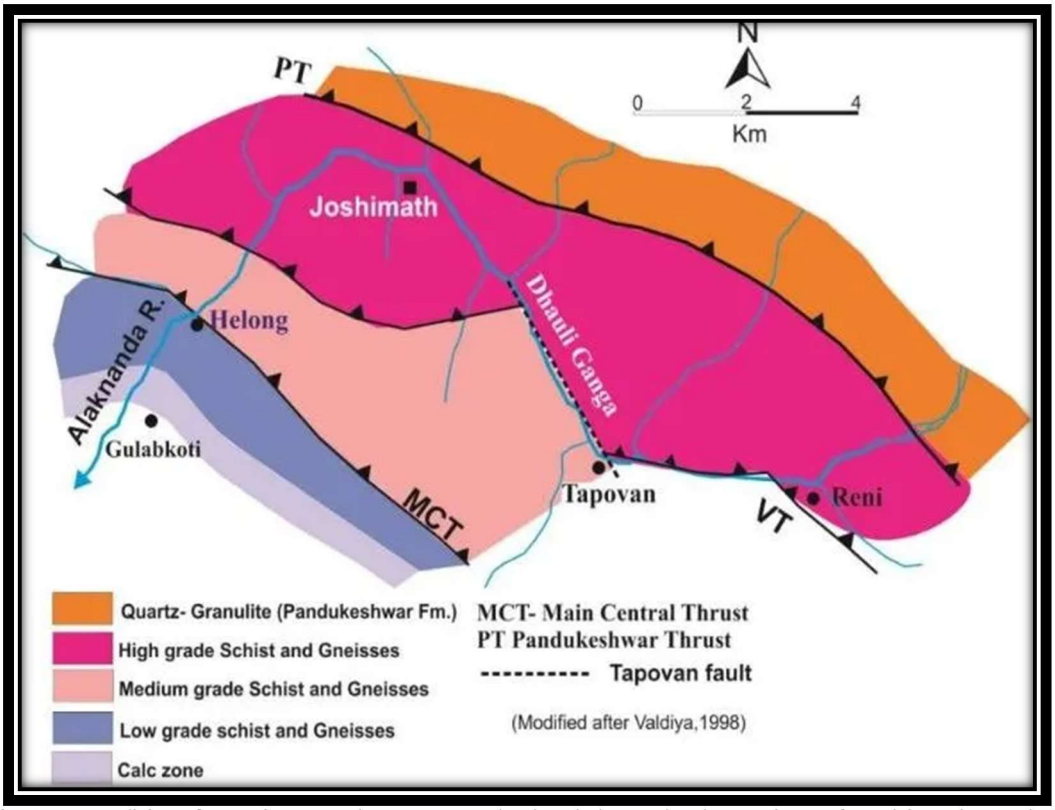
DOI: http://ijmer.in.doi./2023/12.11.7
www.ijmer.in

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :8.017(2023); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed and Refereed Journal: VOLUME:12, ISSUE:11(2), November: 2023
Online Copy of Article Publication Available (2023 Issues)
Scopus Review ID: A2B96D3ACF3FEA2A
Article Received: 2nd November 2023
Publication Date:30th November 2023
Publisher: Sucharitha Publication, India
Digital Certificate of Publication: www.ijmer.in/pdf/e-CertificateofPublication-IJMER.pdf

GEOGRAPHICAL SETTING OF THE STUDY AREA

Joshimath, also known as Jyotirmath, is situated in a region known for its seismic activity, specifically in the central seismic gap of the Himalayan arc. This area is anticipated to experience a major earthquake in the near future, given its history of seismic events. Notably, in 1991, a significant earthquake measuring 6.6 on the Richter scale struck the region, resulting in widespread damage and loss of life. Subsequently, several smaller earthquakes have occurred in the area. The seismic activity in this region is attributed to the collision of the Indian and Eurasian tectonic plates, which has led to the formation of various thrust faults and reverse faults. These geological features can trigger earthquakes of varying magnitudes. Joshimath is positioned near the Main Central Thrust (MCT), one of the major active faults in the Himalayas, marking the boundary between the Indian and Eurasian plates. The MCT has been responsible for several large earthquakes in the region, with the last major one occurring in 1950, measuring 8.6 on the Richter scale.
The geological complexity and high seismic risk make Joshimath, located in Zone V of India's seismic zone map, a region of significant concern. This seismic zone map divides earthquake-prone areas into different zones based on past intensity levels during earthquakes, with Zone V being the highest risk category. Approximately 11% of India falls in Zone V, emphasizing the importance of preparedness and safety measures in regions like Joshimath.

Image 1.2: Seismic Zone



https://i0.wp.com/blog.forumias.com/wp-content/uploads/2023/01/Location-of-Joshimath-Fault Zones-e1673613117853.jpg?resize=642%2C463&is-pending-load=1#038;ssl=1

THE JOSHIMATH ISSUES

Joshimath (also called Jyotirmath), located in the Chamoli district of the Himalayan state of Uttarakhand, is located in seismic zone five and bound by two regional thrusts: Vaikrita in the north and Munsiari in the south.

Cover Page

DOI: http://ijmer.in.doi./2023/12.11.7
www.ijmer.in

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :8.017(2023); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed and Refereed Journal: VOLUME:12, ISSUE:11(2), November: 2023
Online Copy of Article Publication Available (2023 Issues)
Scopus Review ID: A2B96D3ACF3FEA2A
Article Received: 2nd November 2023
Publication Date:30th November 2023
Publisher: Sucharitha Publication, India
Digital Certificate of Publication: www.ijmer.in/pdf/e-CertificateofPublication-IJMER.pdf

Image 1.3: Landslide at Joshimath

Source: The Indian Express 9th Jan; 2023

- The 1991 and 1999 earthquakes proved that the area is susceptible to earthquakes.
- Scientists from the Indian Institute of Remote Sensing, Dehradun, observed that Joshimath and the surrounding areas have been sinking at a rate of 6.5 cm (2.5 inches) per year based on satellite data from July 2020 to March 2022. Their findings correlate well with the base erosion of the Joshimath slope along the Alaknanda river.
- The city is located at an altitude of approximately 1875 m in the Middle Himalayas. It is also an important tourist and religious site, being close to the holy shrine of Badrinath, the Valley of Flowers National Park and Shri Hemkund Sahib, a holy place for Sikhism.

JOSHIMATH CRISIS

The residents of Joshimath are alarmed over the unprecedented number of cracks appearing on roads, and commercial and residential buildings. People have been asked to vacate following fears of landslides and imminent disaster. Authorities have declared Joshimath a landslide and subsidence-hit zone.

The first case of a 'crack in a house' was reported from Joshimath's Gandhi Nagar area in October 2021 when cracks developed in 14-15 houses

- Experts have pointed out that Joshimath city has been built on an ancient landslide material meaning it rests on a deposit of sand and stone, not rock, which doesn't have high load-bearing capacity. This makes the area extremely vulnerable to ever-burgeoning infrastructure and population.
- Unplanned and unauthorised construction has led to the blocking of the natural flow of water, which eventually results in frequent landslides.
- The construction of NTPC's Tapovan Vishnugad Hydro Power Project is also seen as one of the reasons for the incident. It was found that the tunnel had water seepage from a punctured aquifer, leading to the drying of water sources in Joshimath.
- It may also be the result of the reactivation of a geographic fault — defined as a fracture or zone of fractures between two blocks of rock — where the Indian Plate has pushed under the Eurasian Plate along the Himalayas.

Cover Page

DOI: http://ijmer.in.doi./2023/12.11.7
www.ijmer.in

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :8.017(2023); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed and Refereed Journal: VOLUME:12, ISSUE:11(2), November: 2023
Online Copy of Article Publication Available (2023 Issues)
Scopus Review ID: A2B96D3ACF3FEA2A
Article Received: 2nd November 2023
Publication Date:30th November 2023
Publisher: Sucharitha Publication, India
Digital Certificate of Publication: www.ijmer.in/pdf/e-CertificateofPublication-IJMER.pdf

Image 1.4: Showing Cracks in the houses of Joshimath

https://www.thethirdpole.net/content/uploads/2023/01/20230109_CracksJoshimath_PuranBilangwalTTP-1.jpg

PROJECTS TO DISASTERS

THE CHAR DHAM ROAD PROJECT IS A FREEWAY TO DISASTER

Dr. C.P. Rajendran is among India's foremost experts on seismo-tectonics, earthquakes and tsunami geology. He is also a strong critic of the development model being pursued in Uttarakhand, a hilly state where the intensity of large-scale infrastructure projects has been rising along with the risks this poses to the fragile ecosystem, the latest being the cracks and landslide in Joshimath.

Government's Char Dham project, which is under construction at a relentless pace. In the next 10 years, the government also plans to build 66 tunnels in Uttarakhand, which already has 18 tunnels in operation. What is the problem with these projects?

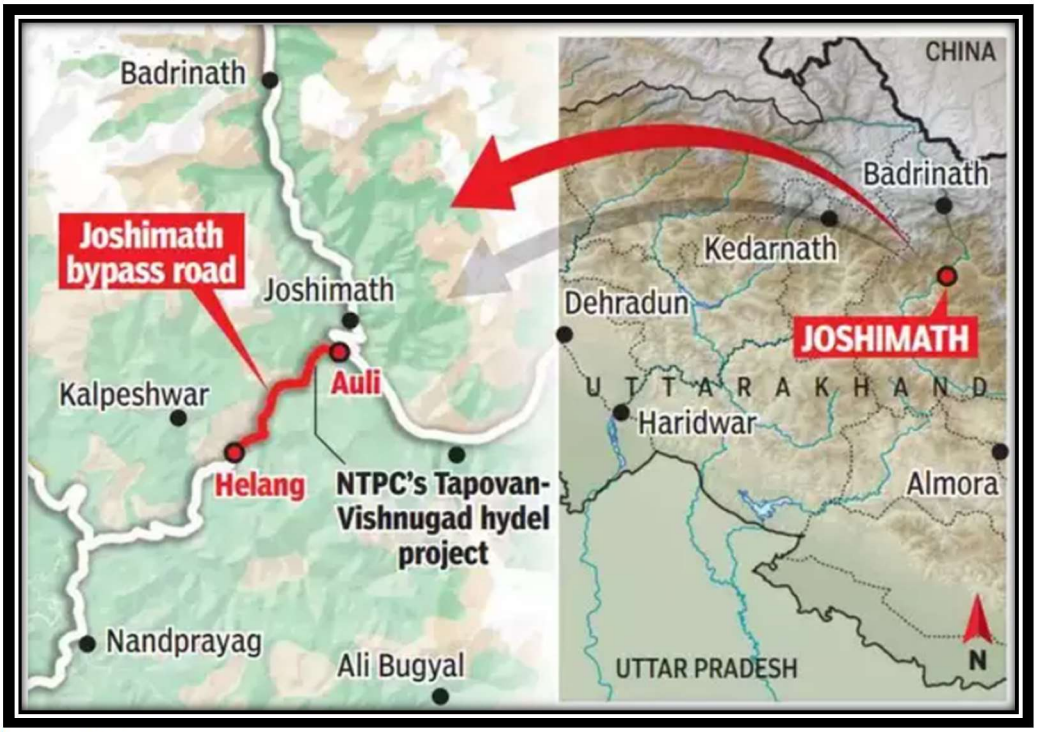
As feared, it is indeed turning out to be an unscientific road construction project with catastrophic consequences for the mountain ecology. There are important environmental caveats to be respected before engaging in a mammoth engineering project in the Himalayas. The authorities, in their enthusiasm for "smoother" and "faster" "all-weather" connectivity for pilgrim tourists.

Cover Page

DOI: http://ijmer.in.doi./2023/12.11.7
www.ijmer.in

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :8.017(2023); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed and Refereed Journal: VOLUME:12, ISSUE:11(2), November: 2023
Online Copy of Article Publication Available (2023 Issues)
Scopus Review ID: A2B96D3ACF3FEA2A
Article Received: 2nd November 2023
Publication Date:30th November 2023
Publisher: Sucharitha Publication, India
Digital Certificate of Publication: www.ijmer.in/pdf/e-CertificateofPublication-IJMER.pdf

Image 1.5: Projects of Joshimath

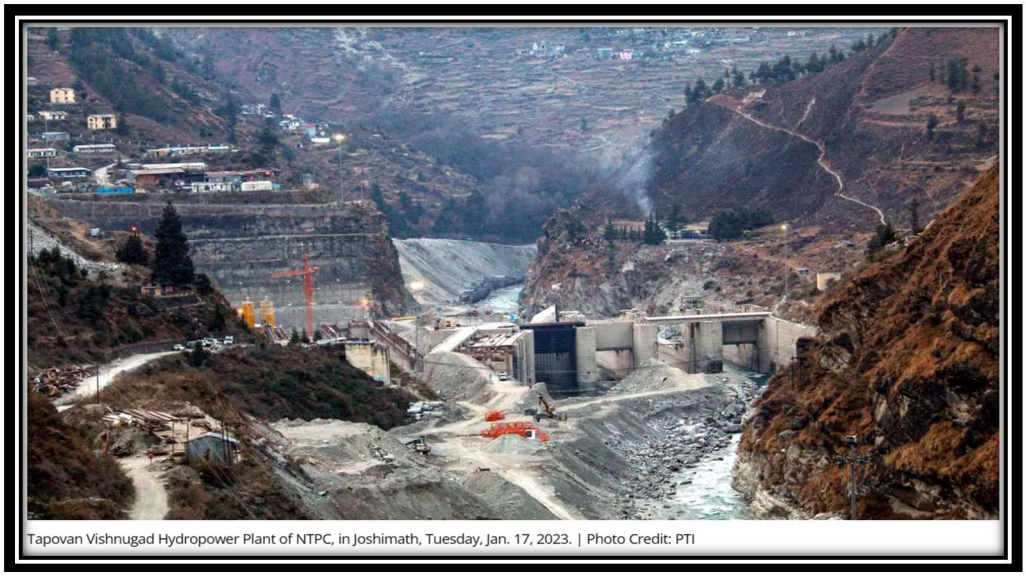


Source : TOI: 6th Jan 2023

TAPOVAN VISHNUGAD HYDRO POWER PROJECT TO DISASTER

The first direct cause is said to be the Tapovan Vishnugad Hydro Power Project.It is a hydro-power project whose construction began in 2006 and the construction is still going on. The Tapovan Vishnugad Hydro Power Plant is a 520 MW run-of-river hydroelectric project being constructed on Dhauliganga River in Chamoli District of Uttarakhand, India. The plant is expected to generate over 2.5 TWh of electricity annually.

Image 1.6: Tapovan Hydropower Project


Tapovan Vishnugad Hydropower Plant of NTPC, in Joshimath, Tuesday, Jan. 17, 2023. | Photo Credit: PTI

Cover Page

DOI: http://ijmer.in.doi./2023/12.11.7
www.ijmer.in

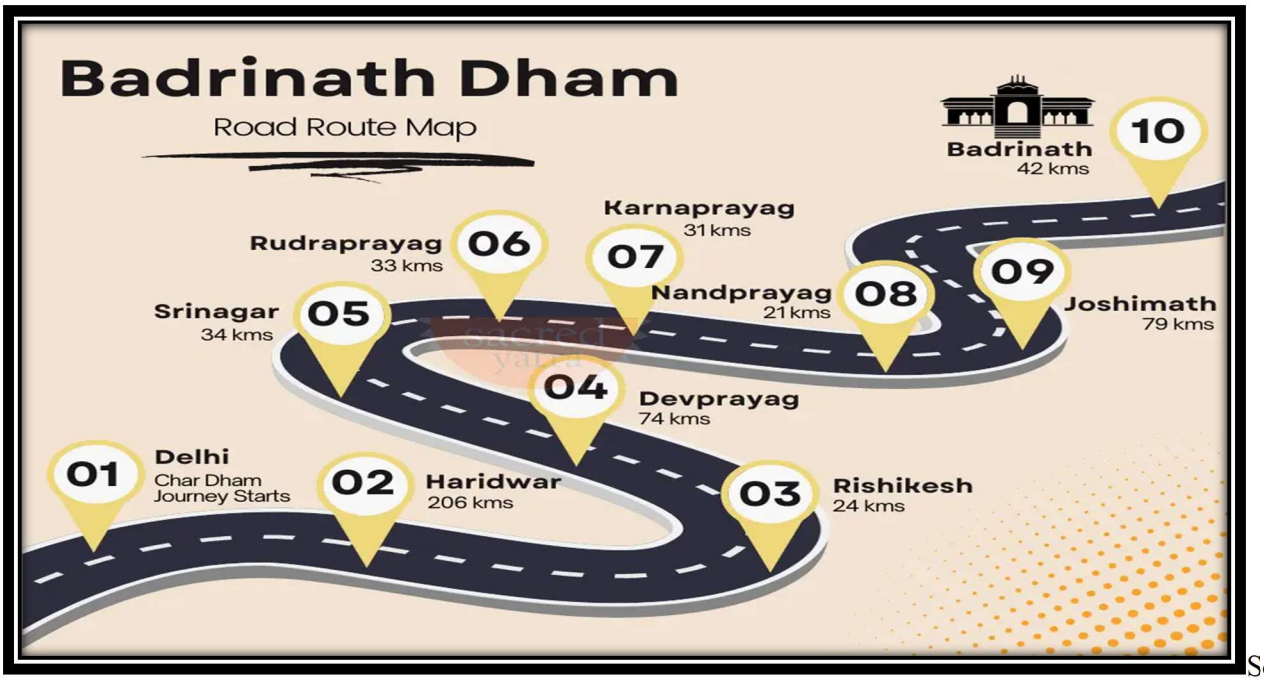
INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :8.017(2023); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed and Refereed Journal: VOLUME:12, ISSUE:11(2), November: 2023
Online Copy of Article Publication Available (2023 Issues)
Scopus Review ID: A2B96D3ACF3FEA2A
Article Received: 2nd November 2023
Publication Date:30th November 2023
Publisher: Sucharitha Publication, India
Digital Certificate of Publication: www.ijmer.in/pdf/e-CertificateofPublication-IJMER.pdf

A tunnel was dug out for this project that goes right under joshimath. Geologist M.P.S. Bisht and Piyoosh Rautela published a paper in 2010,title disaster Looms Large over joshimath. In their research paper,they mentioned that particular project can single handedly change the landscape of joshimath.The equipment that was being used,during the construction the equipment punctured an aquifer in joshimath. An aquifer is a kind of underground structure that is surrounded by rocks. Tunnel boring machine was used to puncture this aquifer, about 5km from joshimath.By puncturing, the corner of the purifier from where the groundwater started linking. 70 million litres of groundwater is discharged. About 700 and 800 litres per second.

BADRINATH DHAM ROUTE

Char Dham National Highway, is an under construction two-lane (in each direction) express National Highway with a minimum width of 10 metres in the Indian state of Uttarakhand under Char Dham Pariyojana. The under construction highway will complement the under-construction Char Dham Railway by connecting the four holy places in Uttarakhand states namely Badrinath, Kedarnath, Gangotri and Yamunotri. The project includes 900 km national highways which will connect the whole of Uttarakhand state.
It is elevated at an altitude of 3133 mt above sea level, from the left of river Alaknanda. This sacred place is devoted to Lord Vishnu, legends say that Lord Vishnu meditated at this place.
Important Place to Visit: Pandukeshwar, Yog Dhyan Badri Temple, Mana Village, Satopanth Lake, Tapta Kund, Neelkanth Peak, Charan Paduka, Mata Murti Temple, Narad Kund, Bheem Pul, Ganesh Cave, Brahma Kapal, Sheshnetra, Vyas Cave etc.

Image 1.7: Route Map to Badrinath Dham



Source: https://www.sacredyatra.com/chardham-route-map`

The world's longest 30-km road tunnel is also being constructed between Dehradun and Tehri despite scientists warning on the increase in landslides from large-scale construction works. Landslides do not occur in isolation. Depending on the nature of rocks, their competency, and the blasting methods employed, road and dam constructions act as contributing

Cover Page

DOI: http://ijmer.in.doi./2023/12.11.7
www.ijmer.in

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :8.017(2023); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed and Refereed Journal: VOLUME:12, ISSUE:11(2), November: 2023
Online Copy of Article Publication Available (2023 Issues)
Scopus Review ID: A2B96D3ACF3FEA2A
Article Received: 2nd November 2023
Publication Date:30th November 2023
Publisher: Sucharitha Publication, India
Digital Certificate of Publication: www.ijmer.in/pdf/e-CertificateofPublication-IJMER.pdf

triggering mechanisms. The geology of the rocks and the nature of facility within them (their tendency to split along planes of weakness) are important criteria to be considered. Many times, a slip occurs along such fractures. Increased anthropogenic activities like road construction have made hill slopes extremely unstable. That is why recurring landslides have increased in numbers in the Himalayas, to which heavy downpours and cloud bursts due to climatic changes have also contributed. Excavating a tunnel induces stress changes, and consequent deformation within rock formations could also contribute to landslide vulnerability. Infrastructural development is one thing, but we also need to understand the fragility of the landscape we are interfering with. A realistic development strategy should be based on a blueprint that strikes a balance between infrastructure development, acceptable levels of risk, and the carrying capacity of the terrain. The average daily footfall last year in these areas was around 58,000. Ground reports say plastic waste has been dumped in large or small pits, and the cleaning operations resort to open burning, which is highly hazardous.

Image 1.8 : Drilling of Tunnel in the Region

Source: The Economic Times 13th July; 2022

FUTURE OF JOSHIMATH

The four-member panel of experts from the Sri Dev Suman Uttarakhand University, which carried out a survey of the cracks in Joshimath town, submitted its report to university vice-chancellor M S Rawat on Tuesday. It will now be forwarded to the Uttarakhand government.

In Manohar Baag, the cracks were as wide as 2 feet, enough for a person to stand inside one, and extended till 300m in open areas and up to half-a-km in areas where there are constructions," said Shrikrishna Nautiyal (Geologist).

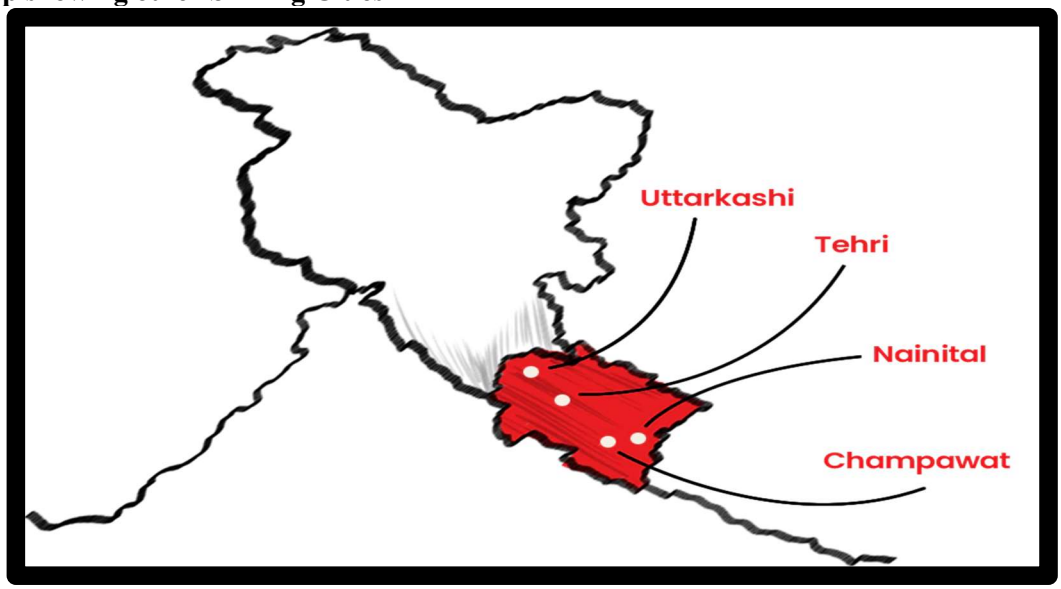
The future of Joshimath appears to be risky based on the information provided. The problem of aquifer puncture causing rapid sinking is a significant concern. The cracks identified in the town, some of which are substantial, indicate structural instability. The report from the panel of experts emphasizes that the upcoming monsoon season will be critical in determining Joshimath's future.

Cover Page

DOI: http://ijmer.in.doi./2023/12.11.7
www.ijmer.in

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :8.017(2023); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed and Refereed Journal: VOLUME:12, ISSUE:11(2), November: 2023
Online Copy of Article Publication Available (2023 Issues)
Scopus Review ID: A2B96D3ACF3FEA2A
Article Received: 2nd November 2023
Publication Date:30th November 2023
Publisher: Sucharitha Publication, India
Digital Certificate of Publication: www.ijmer.in/pdf/e-CertificateofPublication-IJMER.pdf

Image 1.9: Map showing other Sinking Cities



Source: https://www.indiatimes.com/news/india/places-at-risk-of-sinking-590297.html

The geological developments underway in Joshimath should be a case study for every town planner working in the hills. The factors at play in Joshimath are also found in other cities such as Nainital, Champawat, and Uttarkashi. All these cities are witnessing rampant construction, deforestation, population boom, and poor civic management. The only silver lining is that they are not on top of ancient glacial debris.
Nature has its own way of claiming its resources. Government, civil bodies, and citizens need to factor in these parameters when developing new cities.

Joshimath Not Alone: here are the other places at risk of sinking soon. The risks, flagged for decades by environmentalists and activists, came to the fore recently after land subsidence - gradual sinking due to displacement of underground earth layers - led to cracks in hundreds of homes in the tiny town of Joshimath, located at an altitude of over 6,000 feet (1,830 metres) in the northern hill state of Uttarakhand.

1) Tehri

Cracks have appeared in some houses in the region. The nearby Tehri Dam is India's tallest dam and one of the largest hydroelectric power projects. It's also a popular tourist destination. The project also raised concerns about the environmental problems of locating a large dam in the delicate ecosystem of the Himalayan foothills.

2) Mana

Mana is being linked with a national highway part of a project promoted by Prime Minister Narendra Modi to improve connectivity between pilgrimage sites. Environmental groups have raised concern about the project saying the felling of trees in the wildlife-rich area will increase landslide risks.

3) Dharasu

It is an important military and civil hub. Apart from being a large administrative centre, it has an air strip that can accommodate large aircraft and is crucial to the military.

5) Nainital

Further, experts warn Nainital could meet the same fate as Joshimath. The risk for towns like Nainital has increased due to heavy tourism and major construction. Half of the area of Nainital township is covered with debris generated by landslides, according to a report published in 2016.

Cover Page

DOI: http://ijmer.in.doi./2023/12.11.7
www.ijmer.in

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :8.017(2023); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed and Refereed Journal: VOLUME:12, ISSUE:11(2), November: 2023
Online Copy of Article Publication Available (2023 Issues)
Scopus Review ID: A2B96D3ACF3FEA2A
Article Received: 2nd November 2023
Publication Date:30th November 2023
Publisher: Sucharitha Publication, India
Digital Certificate of Publication: www.ijmer.in/pdf/e-CertificateofPublication-IJMER.pdf

5) Uttarkashi & Champawat

The same study said Uttarkashi and Champawat districts are at threat. The study concluded that the slope pattern seemed to be the fundamental factor for the catastrophe as most of the area possessed very high slopes. "Secondly, rock types also play a very dominant role in the mass movements followed by the tectonic set-up of the area.

SOLUTION TO THE PROBLEMS OF JOSHIMATH

There is no single solution to the issues faced by the Joshimath region, as they are complex and multifaceted. However, here are some potential solutions that could be considered:

Strengthening disaster preparedness and response mechanisms: This could include early warning systems, emergency evacuation plans, and training programs for local communities and officials to better prepare for and respond to natural disasters.

Investing in infrastructure: This could include the construction of stronger buildings and roads, as well as the development of better drainage systems and flood protection measures.

Promoting sustainable land use practices: This could include the implementation of sustainable agriculture practices, afforestation programs, and the promotion of ecotourism to encourage conservation and preservation of natural resources.

Improving access to healthcare and education: This could include building more health clinics and awareness schools in the region to improve the quality of life and well-being of local communities.

Strengthening local governance and community participation: This could include empowering local communities to take ownership of their own development, and working with local governments to ensure that policies and programs are developed with the needs of local people in mind.

CONCLUSION:

Joshimath is located in the Garhwal region of Uttarakhand in India, which is a seismically active area. The region is characterised by frequent earthquakes and landslides due to the tectonic activity of the Indian plate moving northward and colliding with the Eurasian plate.

Geologically, the region is part of the Lesser Himalayas, which is made up of several tectonic units. The topography of the region is characterised by high mountains, deep valleys, and narrow ridges, which have been formed due to the intense tectonic activity. The "load-bearing capacity" of the town needs to be reduced, likely implying that measures to reduce pressure on the already unstable landscape must be implemented. The area's geological characteristics, with loose unconsolidated glacial material on a steep slope, make it highly susceptible to further subsidence and geological disturbances.

In light of this, it's essential for authorities to take immediate and effective actions to address the issues, reinforce the town's infrastructure, and mitigate the risks associated with subsidence. The fate of Joshimath will largely depend on how well these challenges are/will be managed and whether measures are taken to protect the town's residents and its cultural and historical significance.

REFERENCES:

"Natural Hazards in the Himalayas: Assessment and Mitigation." Springer, 2017. https://www.springer.com/gp/book/9783319544559

"Climate Change and Sustainable Development: Ethical Perspectives on Land Use and Food Production in the Himalayas." Springer, 2020. https://www.springer.com/gp/book/9783030414218

"Forest Ecosystem Services in the Hindu Kush Himalayas." International Centre for Integrated Mountain Development (ICIMOD), 2017. https://www.icimod.org/publications/7192

Cover Page

DOI: http://ijmer.in.doi./2023/12.11.7
www.ijmer.in

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :8.017(2023); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed and Refereed Journal: VOLUME:12, ISSUE:11(2), November: 2023
Online Copy of Article Publication Available (2023 Issues)
Scopus Review ID: A2B96D3ACF3FEA2A
Article Received: 2nd November 2023
Publication Date:30th November 2023
Publisher: Sucharitha Publication, India
Digital Certificate of Publication: www.ijmer.in/pdf/e-CertificateofPublication-IJMER.pdf

"Dynamics of Hydrological Disasters in the Himalayan Region: Recent Trends and Future Outlook." Water, vol. 13, no. 1, 2021, https://www.mdpi.com/2073-4441/13/1/61

Verma, A. K., et al. (2015). Active fault studies and seismic hazard evaluation in the Uttarakhand region, Garhwal Himalaya. Journal of Earth System Science, 124(1), 59-74. doi: 10.1007/s12040-014-0506-8

Kumar, S., et al. (2018). Active fault studies and seismic hazard evaluation in the northwestern Himalaya, India. Journal of the Geological Society of India, 92(4), 487-498. doi: 10.1007/s12594-018-0899-4

Mishra, D. C., et al. (2014). Seismic hazard assessment in and around Uttarkashi, Uttarakhand Himalaya, India. Journal of the Geological Society of India, 83(2), 147-160. doi: 10.1007/s12594-014-0075-1

National Centre for Seismology. (2021). Seismic Hazard Microzonation. Retrieved from http://www.ncs.gov.in/SHMZ.html

Negi, J. G., et al. (2015). Seismicity, active tectonics and earthquake hazard in the western Himalayan region. Tectonophysics, 666, 65-81. doi: 10.1016/j.tecto.2015.08.002

Parvez, I. A., et al. (2018). Identification and characterization of active faults and earthquake hazard assessment of Chamoli district, Garhwal Himalaya, India. Journal of Earth System Science, 127(4), 63. doi: 10.1007/s12040-018-0932-1

Paul, A., et al. (2017). Identification of active faults and earthquake hazard assessment in and around Pithoragarh, Uttarakhand Himalaya, India. Natural Hazards, 85(1), 29-45. doi: 10.1007/s11069-016-2561-9

Rawat, G., et al. (2016). Seismotectonic evaluation of the Uttarakhand Himalaya, India using geospatial techniques. Natural Hazards, 84(1), 187-203. doi: 10.1007/s11069-016-2349-x

Singh, A. P., et al. (2015). Earthquake hazard and seismotectonic zonation in the Uttarakhand Himalaya, India. Natural Hazards, 76(3), 1475-1494. doi: 10.1007/s11069-014-1578-4

Suresh, G., et al. (2015). Earthquake hazard assessment in the Kumaun Himalaya, India. Journal of the Geological Society of India, 85(5), 537-547. doi: 10.1007/s12594-015-0306-7

Tiwari, A. K., et al. (2019). Active tectonics and earthquake hazard assessment in the Kullu Valley, northwestern Himalaya, India. Journal of Earth System Science, 128(5), 1-17. doi: 10.1007/s12040-019-1177-6

Tiwari, V. M., et al. (2017). Seismic hazard assessment of Chamoli district, Uttarakhand, India. Journal of the Geological Society of India, 90(5), 509-520. doi: 10.1007/s12594-017-0659

Khoj - *A Peer Reviewed International Journal of Geography*
Vol. 10, January-December, 2023, 66-77
DOI: 10.5958/2455-6963.2023.00005.X

Space Attachment and Human Behaviour

Madhumita Hussain[1]* and Asha Sharma[2]**

[1]Associate Professor, Department of Geography, Sophia Girls' College (Autonomous), Ajmer, Rajasthan, India
[2]Associate Professor, Head, Department of Psychology Sophia Girls' College (Autonomous), Ajmer, Rajasthan, India
*(*Corresponding author) email id: *madhumita@sophiacollegeajmer.in, **asha@sophiacollegeajmer.in*

Received: 11-02-2023; Accepted: 15-11-2023

ABSTRACT

People's relationship with specific locations isn't just about geography; it's deeply intimate and largely affects our lives, our view of ourselves, and where we belong. As a result, the link is so essential. It instils us with a sense of safety and permanence, helping to keep us in the moment, knowing where we're coming from. However, this kind of link isn't only emotional. It can also evolve into concrete steps, such as a desire to improve the community and a need to maintain it. Our connection to certain places goes beyond mere physical location; it integrates itself fiercely into our definitions of self and identity. This connection, known as place attachment, is essential for several causes. To start with, it gives us a feeling of security and stability, rooting us securely in the ground. The present paper is an attempt to explore the connection between individuals and their environment with respect to wellbeing and sense of belongingness. For this purpose, a self-constructed questionnaire was used for the collection of raw data amongst the girl students of 17 to 24 age group. The major findings indicate a strong preference for natural landscapes and the importance of green spaces for ensuring better wellbeing and sense of belongingness.

Keywords: Space, Connection, Community, Emotional Attachment. Wellbeing and sense of belongingness

INTRODUCTION

Geography and Psychology might not seem like two fields that go hand in hand, and yet they are actually more connected than one might first guess. However, Geography has close connectivity with Human Behaviour. One area where Psychology and Geography intersect is the field of Environmental Psychology, which focuses on how the physical environment affects human behaviour and mental processes. Environmental psychologists consider questions such

how different types of natural and built environments influence mood, attention, and other cognitive functions. They also study the psychological impact of environmental issues such as climate change and environmental disasters.

Place attachment refers to the emotional bond or connection that individuals develop with a particular geographic location or physical environment (Manzo and Devine-Wright, 2019). It involves a deep-seated sense of belonging, identity, and affection towards a specific place, extending beyond mere familiarity or convenience (Hidalgo and Hernández, 2001). This attachment can manifest in various ways, such as a desire to protect, maintain, or improve the place, as well as feelings of nostalgia or loss when separated from it (Scannell and Gifford, 2010).

Place attachment is influenced by a variety of factors, including personal experiences, memories, cultural background, social interactions, and the physical characteristics of the environment itself (Lewicka, 2011). People may form attachments to a wide range of places, including their hometowns, neighborhoods, favorite parks, landmarks, or even places they have visited during significant life events (Twigger-Ross and Uzzell, 1996).

Research suggests that place attachment can have significant implications for individual well-being, community cohesion, environmental conservation, and urban planning (Lalli, 1992). For exle, individuals with a strong attachment to their neighborhood may be more likely to engage in local community activities, support neighborhood improvements, and feel a greater sense of satisfaction with their lives (Scannell and Gifford, 2010). Communities with strong place attachments may be more resilient in the face of challenges and more effective in preserving their cultural heritage and natural resources (Hernández and Hidalgo, 2005).

Understanding and promoting place attachment can be important for creating sustainable and livable communities, promoting environmental stewardship, and enhancing overall quality of life (Manzo and Perkins, 2006).

Geography plays a significant role in social psychology, which examines how social factors such as culture, group influences, social norms, and interpersonal relationships influence human behavior and mental processes (Stokols and Altman, 1987). Geographers study how social and cultural factors vary across different regions and how these variations impact people's attitudes, beliefs, and behaviors (Agnew, 2013). Research shows that individuals living in urban environments may be more prone to certain mental health issues, including depression and anxiety (Evans, 2003). This susceptibility could be attributed, in part, to the stress and social isolation resulting from dense population concentrations (Frumkin, 2001).

However, despite their distinctness, psychology and geography intersect and complement each other in the study of human behavior and mental processes (Agnew, 2013) is crucial for understanding the social and spatial contexts in which individuals live and comprehending various psychological phenomena and their impacts on well-being.

Place attachment, a concept central to both geography and psychology, refers to the emotional bond individuals develop with specific places (Lewicka, 2011). It includes affective, cognitive, and behavioral dimensions. The affective component denotes the emotional connection individuals feel towards a place, while the cognitive component involves their beliefs and values associated with that place. The behavioral component encompasses individuals' activities and behaviors within the place (Manzo and Devine-Wright, 2019).

Objectives of the Study

- To explore the connection between individuals and their environment.
- To assess the importance of green spaces for well-being.
- To investigate the sense of belongingness among the youth.

Tools Used

A self-prepared 18-item questionnaire was constructed to study the connection between space attachment and human behavior.

Participants

The questionnaire was circulated among female students aged 17 to 24 through a Google form in Figure 1 to 20.

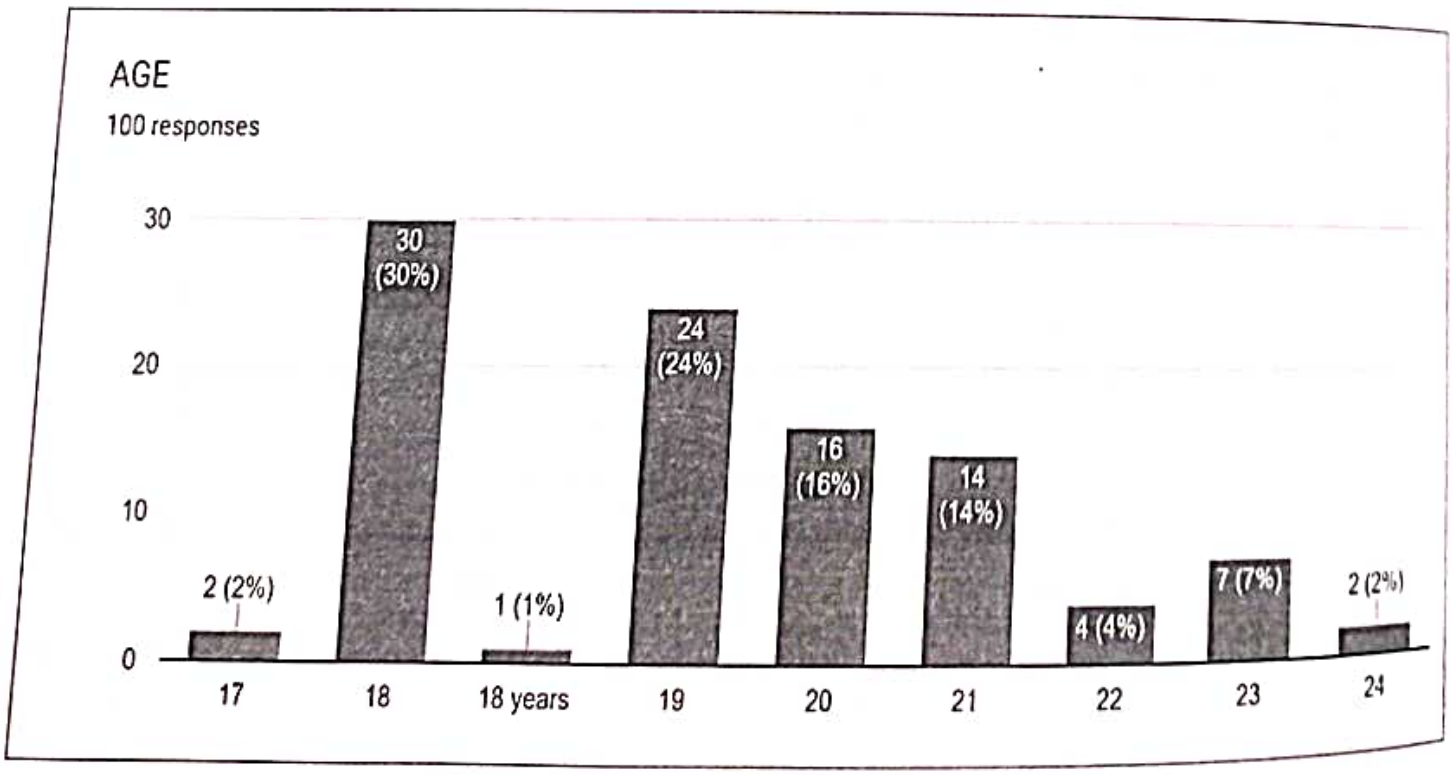


Figure 1: Bar graph depicting demographic information with respect to age

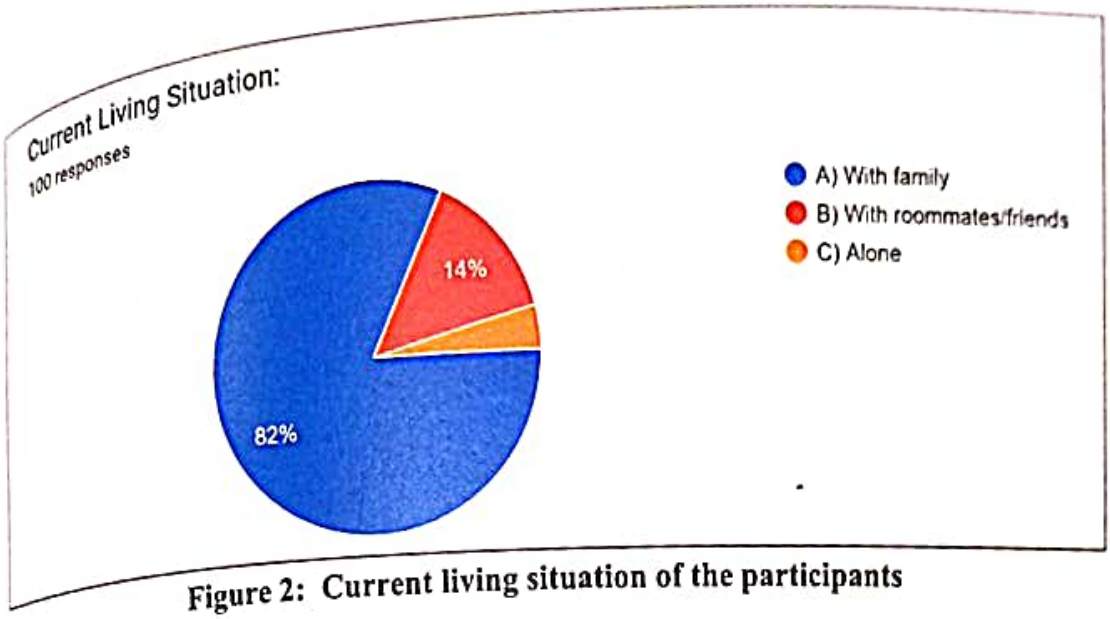


Figure 2: Current living situation of the participants

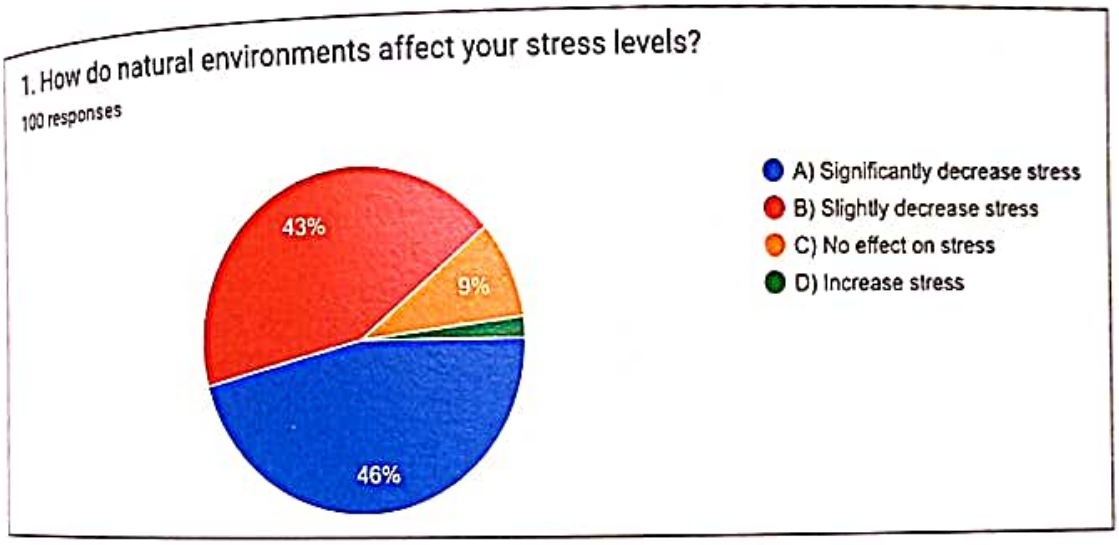


Figure 3: Pie-chart depicting the responses on item no. 1

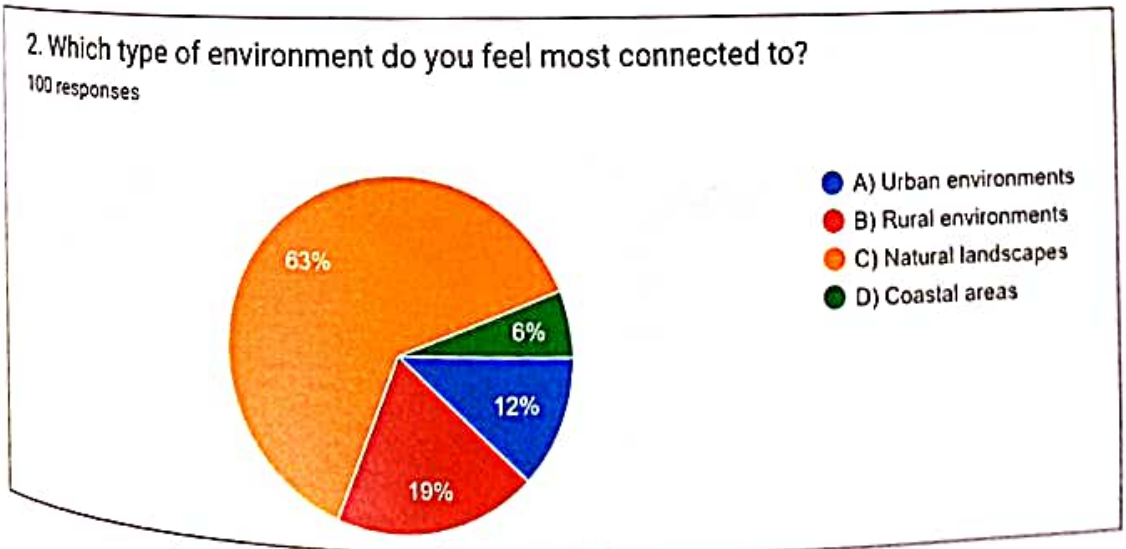


Figure 4: Pie-chart depicting the responses on item no. 2

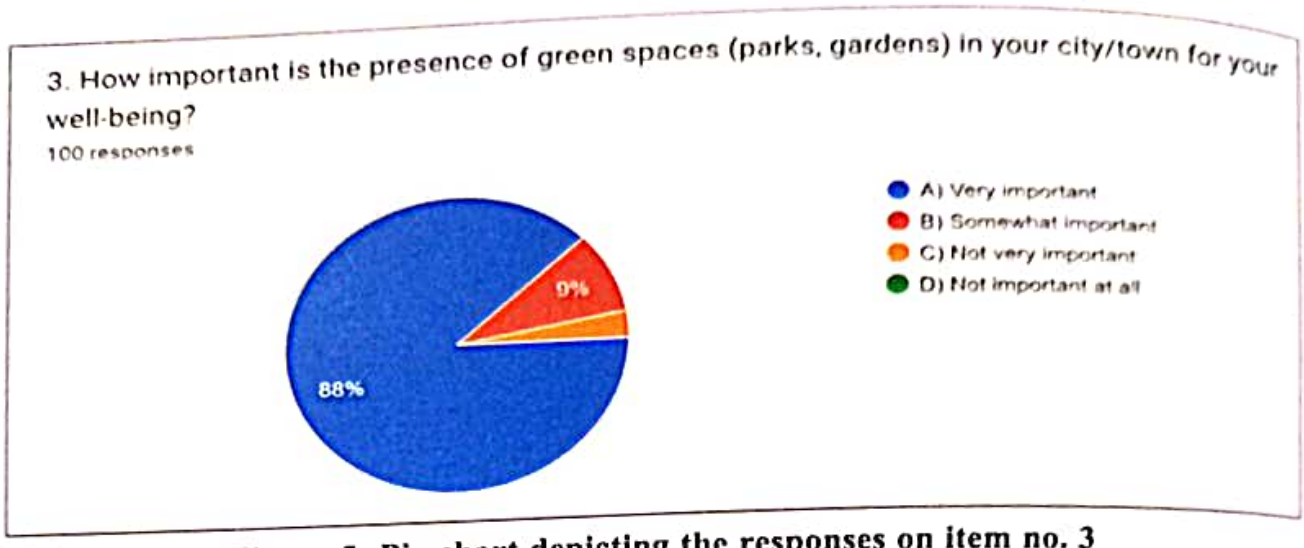


Figure 5: Pie-chart depicting the responses on item no. 3

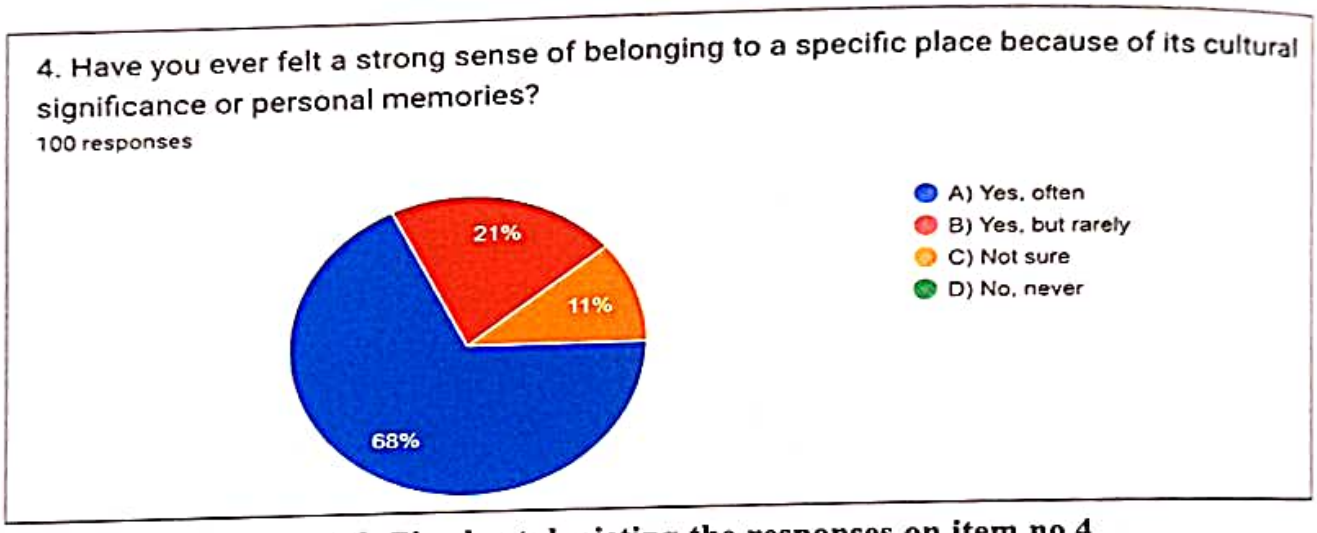


Figure 6: Pie-chart depicting the responses on item no.4

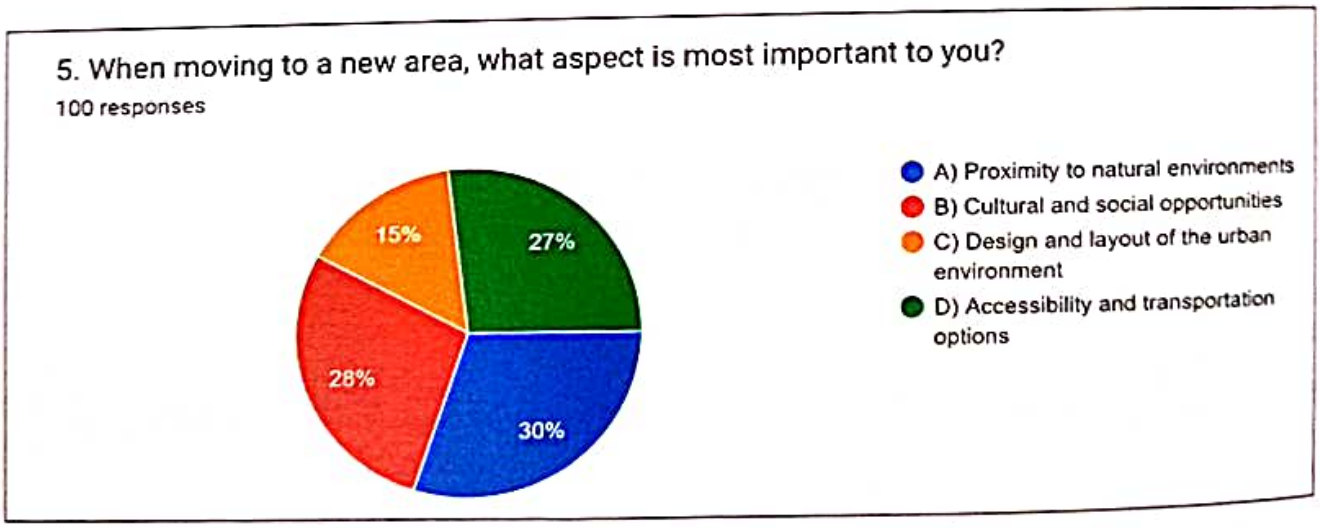


Figure 7: Pie-chart depicting the responses on item no. 5

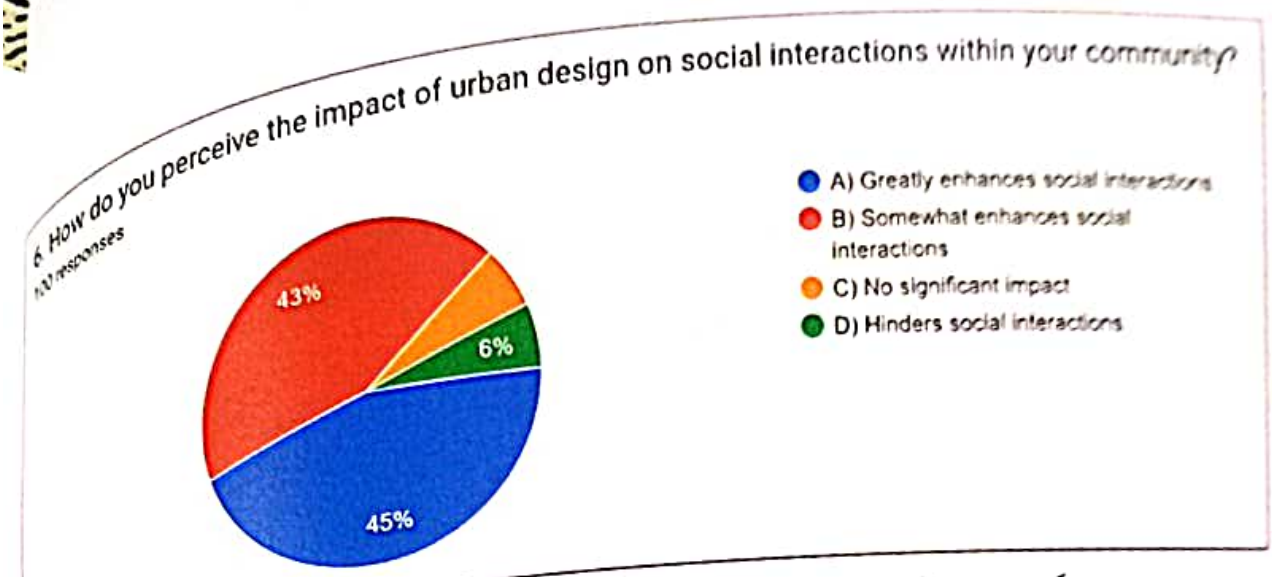


Figure 8: Pie-chart depicting the responses on item no. 6

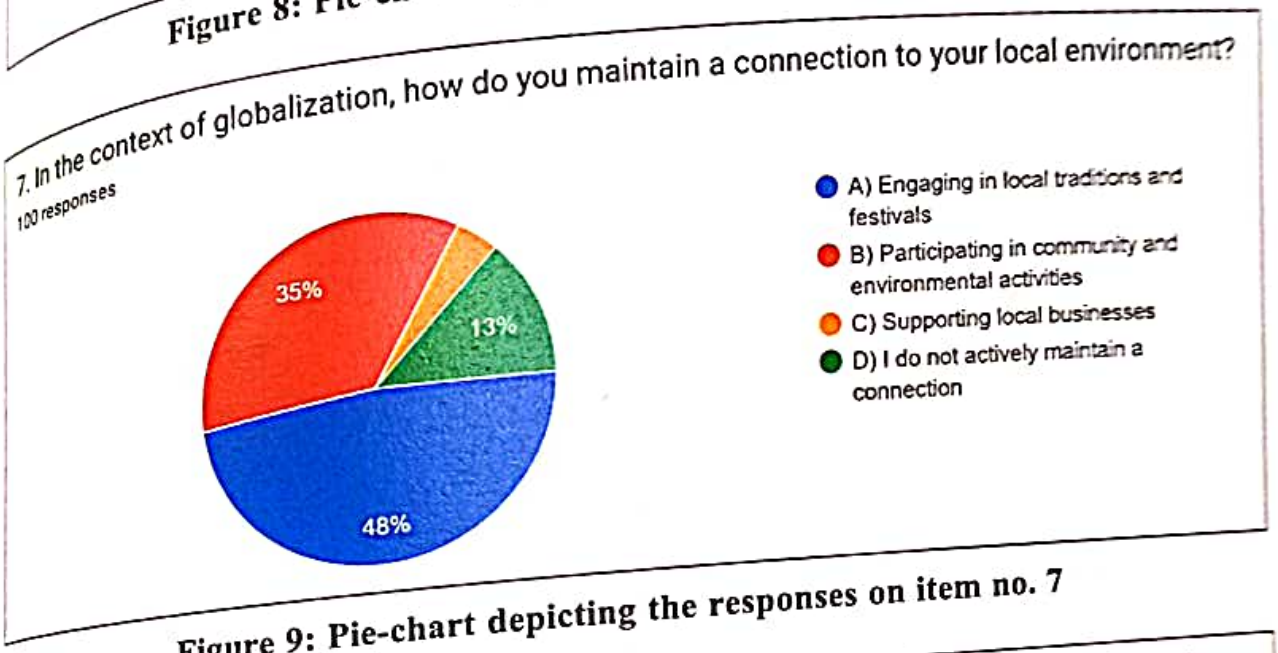


Figure 9: Pie-chart depicting the responses on item no. 7

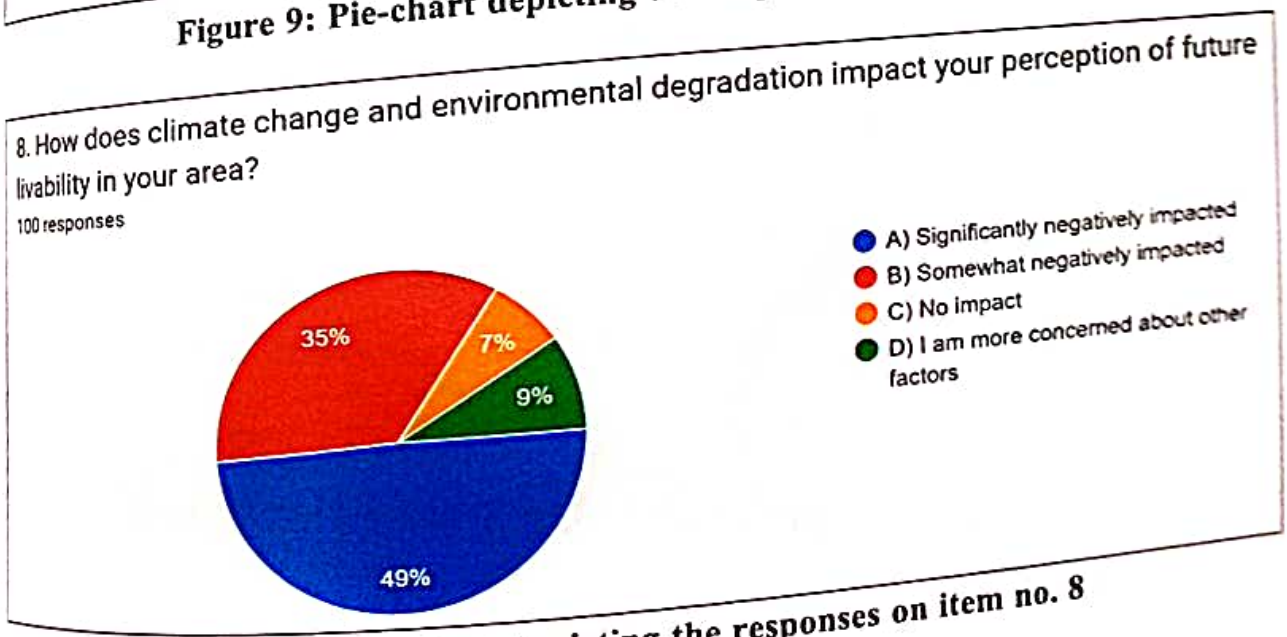


Figure 10: Pie-chart depicting the responses on item no. 8

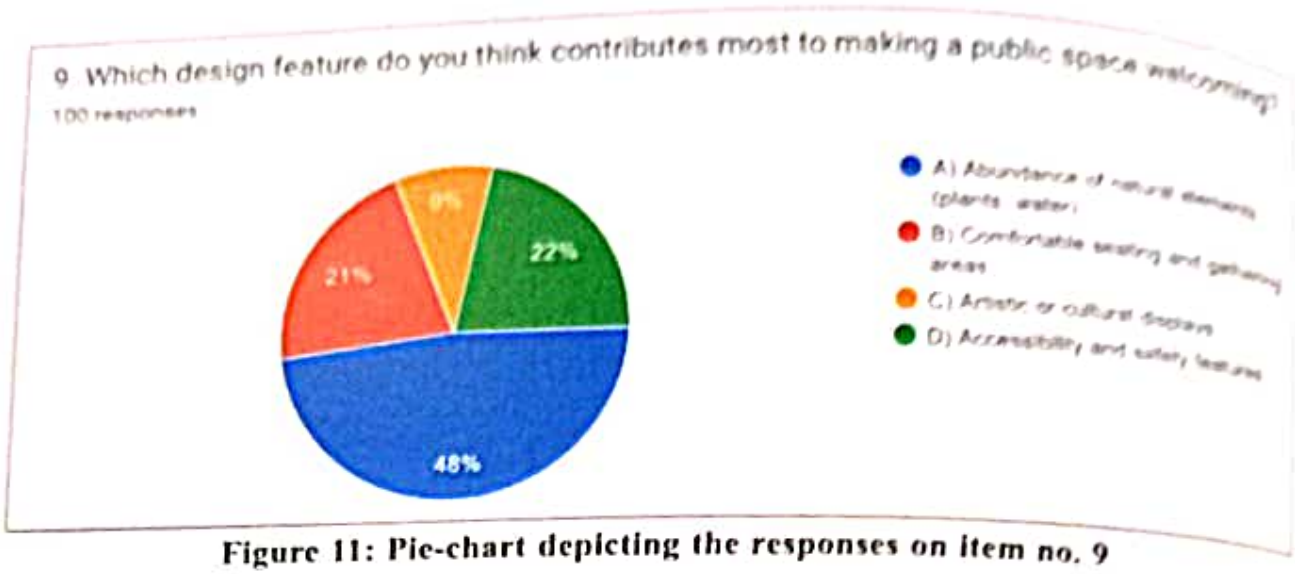


Figure 11: Pie-chart depicting the responses on item no. 9

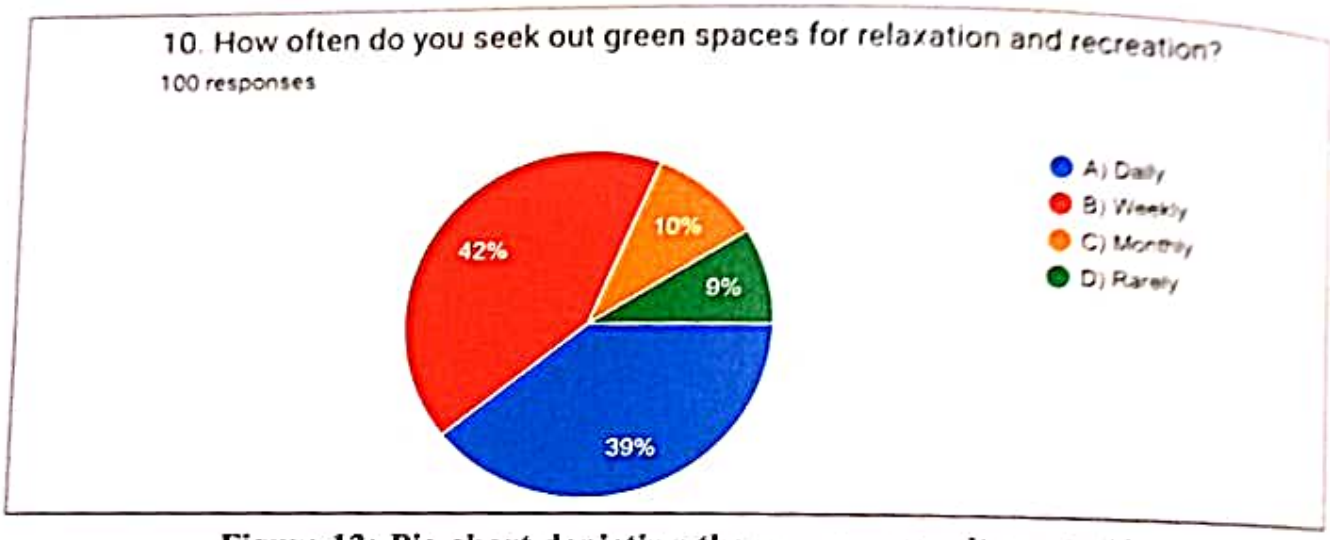


Figure 12: Pie-chart depicting the responses on item no. 10

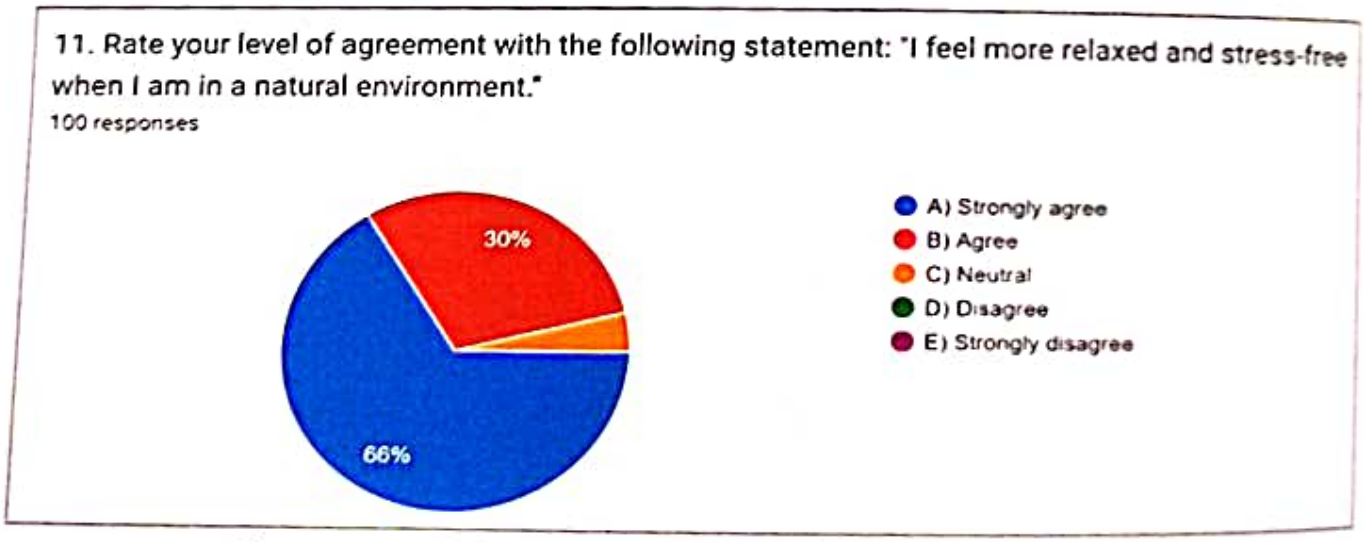


Figure 13: Pie-chart depicting the responses on item no. 11

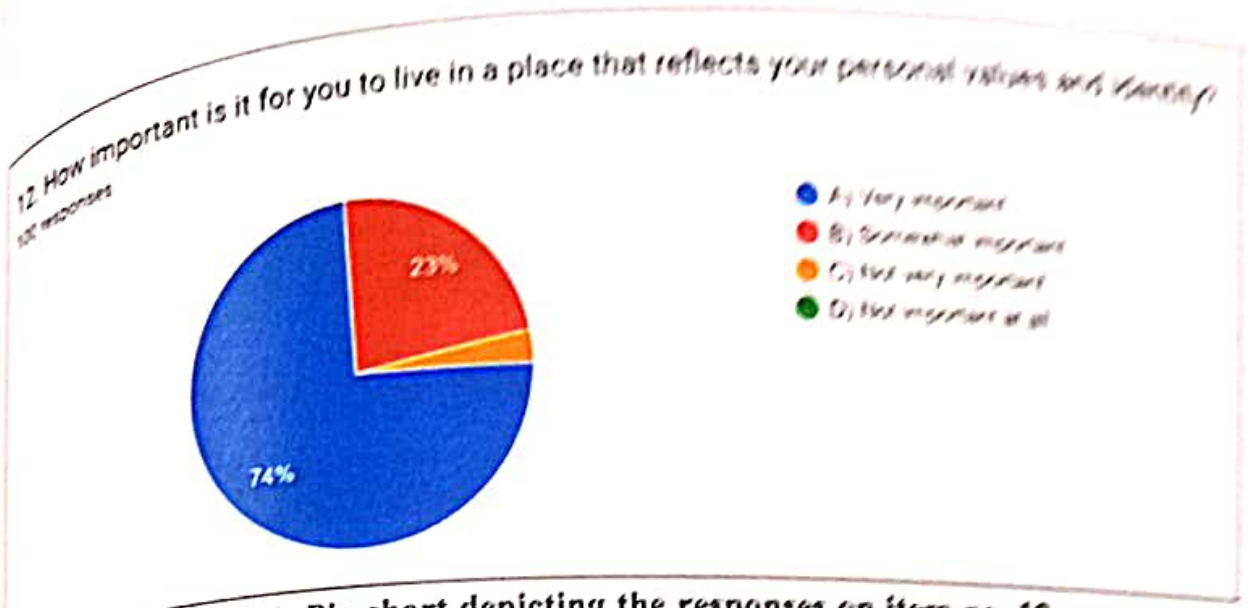


Figure 14: Pie-chart depicting the responses on item no. 12

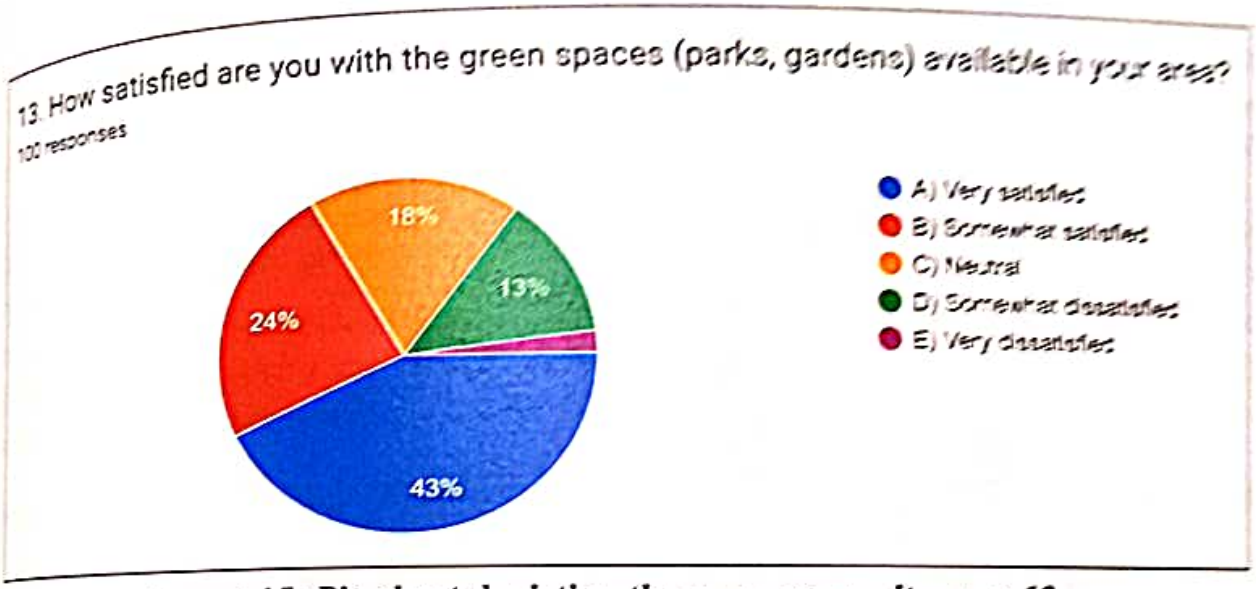


Figure 15: Pie-chart depicting the responses on item no. 13

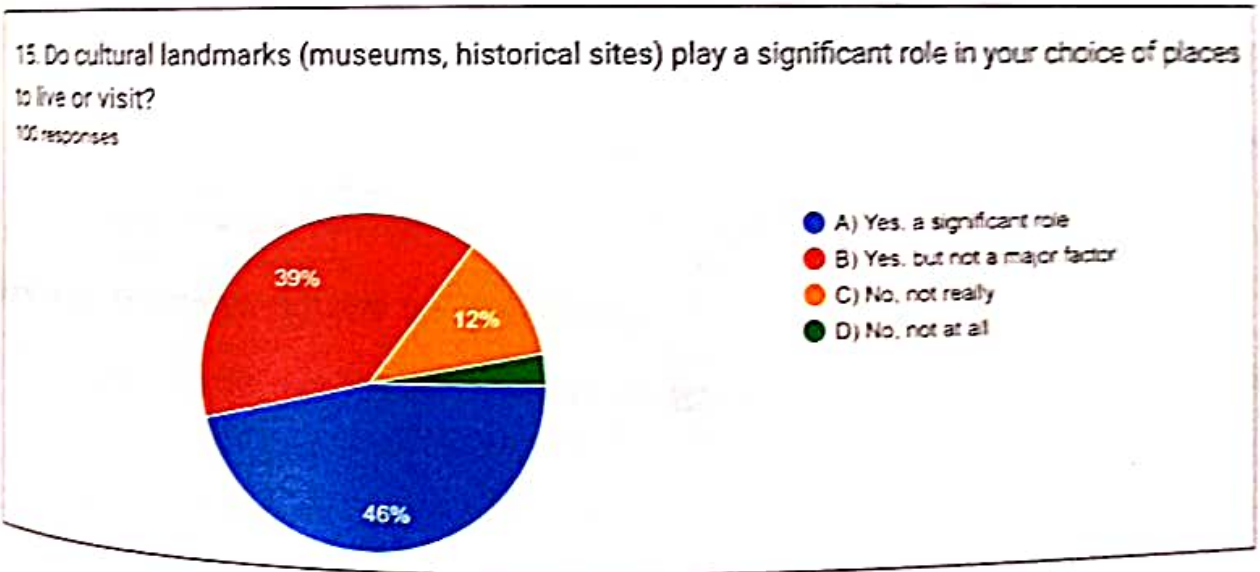


Figure 16: Pie-chart depicting the responses on item no. 14

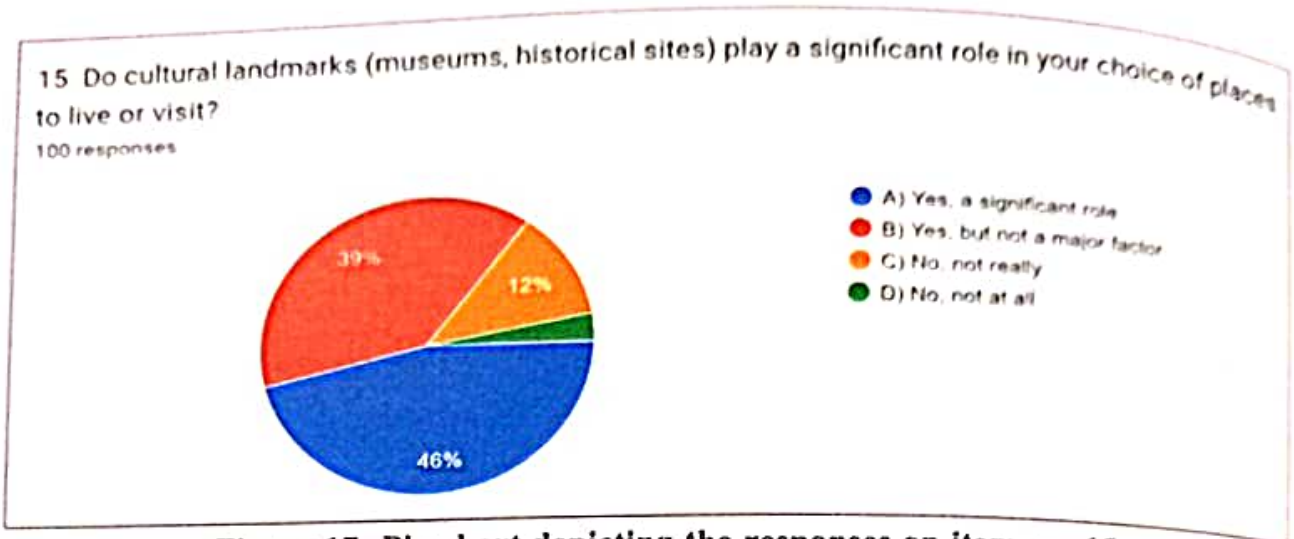


Figure 17: Pie-chart depicting the responses on item no. 15

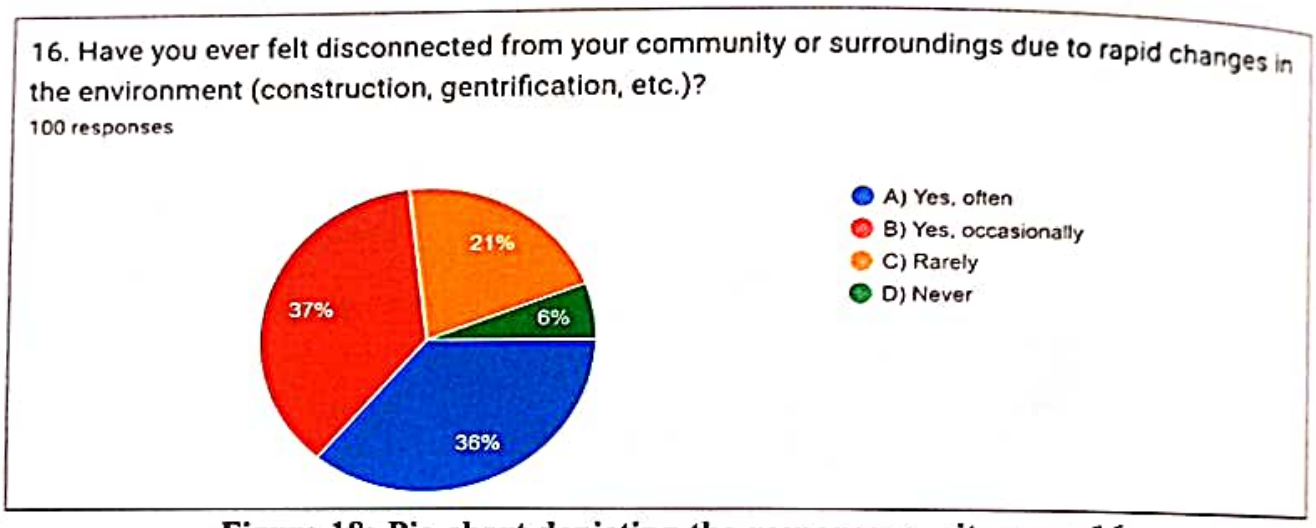


Figure 18: Pie-chart depicting the responses on item no. 16

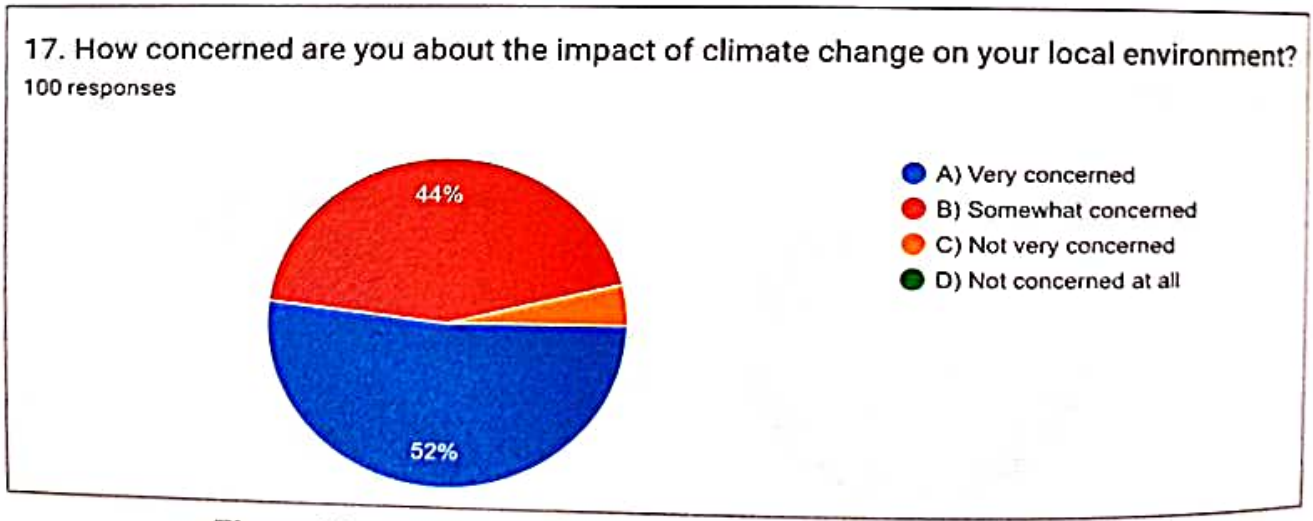


Figure 19: Pie-chart depicting the responses on item no. 17

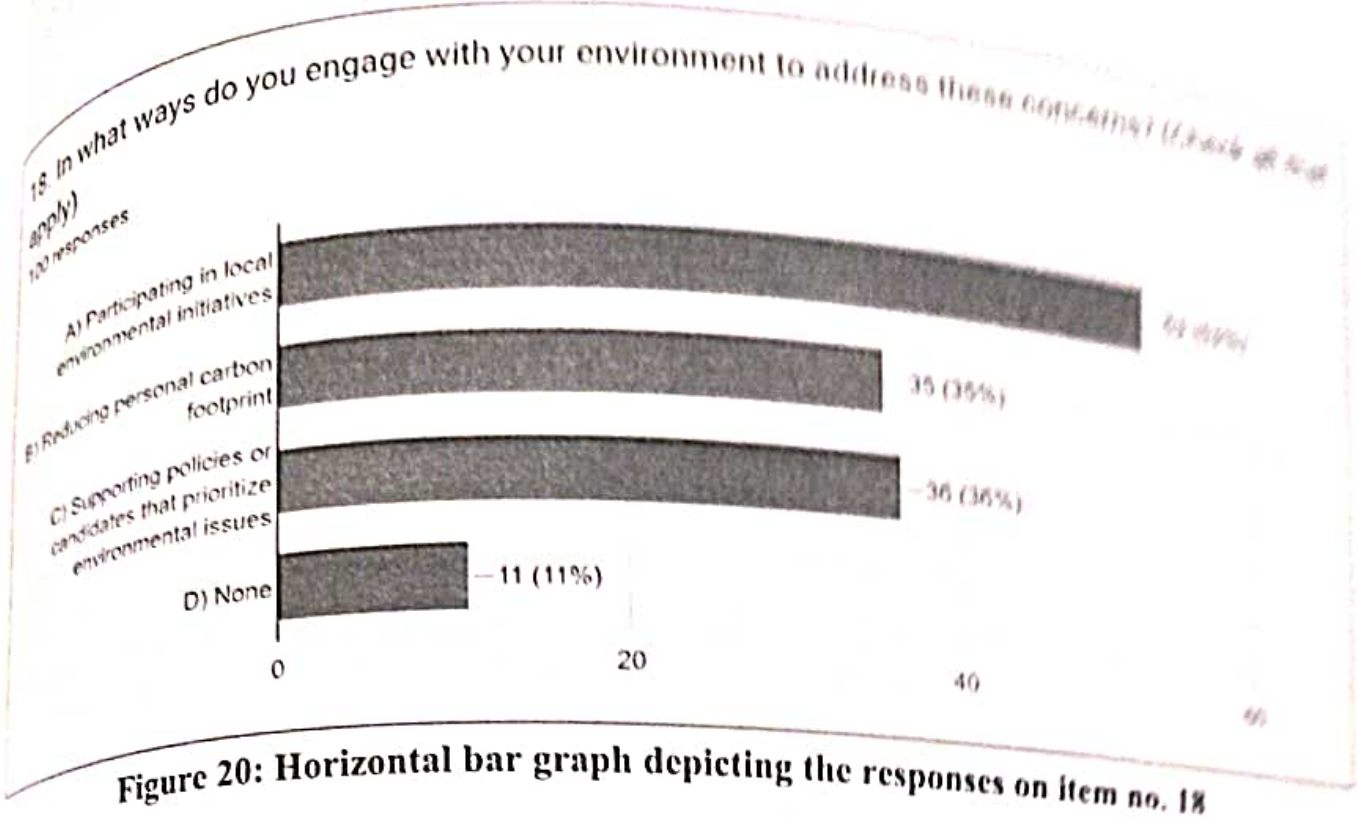


Figure 20: Horizontal bar graph depicting the responses on item no. 18

This questionnaire aims to capture an overview of individual experiences and perceptions regarding the relationship between their psychological well-being and geographical environments. By focusing on the concept of "space connection," we can analyze how respondents feel connected to various environments and spaces, and how these connections influence their well-being, stress levels, and environmental engagement.

The following are key findings related to the theme of "Space Attachment and Human Behavior":

Most Connected Environment

- Natural Landscapes: 63 respondents reported feeling most connected to natural landscapes.
- Rural Environments: 19 respondents reported feeling most connected to rural environments.
- Urban Environments: 12 respondents reported feeling most connected to urban environments.
- Coastal Areas: 6 respondents reported feeling most connected to coastal areas.

Importance of Green Spaces for Well-being

- Very Important: 88 respondents consider the presence of green spaces (parks, gardens) in their city or town to be very important for their well-being.
- Somewhat Important: 9 respondents consider it somewhat important.
- Not Very Important: 3 respondents consider it not very important.

Sense of Belonging

Yes, Often: 68 respondents have often felt a strong sense of belonging to a specific place because of its cultural significance or personal memories.

Yes, But Rarely: 21 respondents have felt this sense of belonging but rarely.

Not Sure: 11 respondents are not sure about their feelings of belonging to places with cultural significance or personal memories.

These results highlight a strong connection between respondents and natural landscapes, indicating a significant value placed on green spaces for personal well-being. A majority of respondents have experienced a strong sense of belonging to places with cultural or personal significance, reflecting the deep connections people form with their environments. The implications of place attachment for community development show active participation in community activities and contributions to community well-being.

CONCLUSION

The data show a strong preference for natural landscapes, and the importance of green spaces for well-being aligns with the principles of environmental psychology. This preference underscores the restorative effects of natural environments on human mental health, offering a buffer against the stressors of modern life. The significant number of respondents who value green spaces in their urban or rural settings highlights a widespread recognition of the benefits these spaces bring to individual and community well-being.

REFERENCES

Agnew, J. (2013). A companion to social geography. John Wiley & Sons.

Evans, G. W. (2003). The built environment and mental health. *Journal of Urban Health, 80*(4), 536-555.

Frumkin, H. (2001). Beyond toxicity: Human health and the natural environment. *American Journal of Preventive Medicine, 20*(3), 234-240.

Kyle, G. T., Graefe, A. R., & Manning, R. E. (2005). Testing the dimensionality of place attachment in recreational settings. *Environment and Behavior, 37*(2), 153-177.

Lewicka, M. (2011). Place attachment: How far have we come in the last 40 years? *Journal of Environmental Psychology, 31*(3), 207-230.

Manzo, L. C., & Devine-Wright, P. (2014). Place, attachment, and everyday life: Some reflections on the intersection of environmental psychology and human geography. *Journal of Environmental Psychology, 40*, 256-264.

rson, M. E., Williams, D. R., & Roggenbuck, J. W. (2013). Understanding place attachment in a forested landscape through structural equation modeling. *Environment and Behavior, 45*(4), 546-569.

hansky, H. M., Fabian, A. K., & Kaminoff, R. (1983). Place-identity: Physical world socialization of the self. *Journal of Environmental Psychology, 3*(1), 57-83.

nnell, L., & Gifford, R. (2010). Defining place attachment: A tripartite organizing framework. *Journal of Environmental Psychology, 30*(1), 1-10.

nnell, L., & Gifford, R. (2017). The relations between natural and civic place attachment and pro-environmental behavior. *Journal of Environmental Psychology, 51*, 238-248.

mson, D. (2014). Place attachment and phenomenology: The synergistic dynamism of place. *Phenomenology and the Cognitive Sciences, 13*(4), 573-590.

dman, R. C. (2003). Is it really just a social construction?: The contribution of the physical environment to sense of place. *Society & Natural Resources, 16*(8), 671-685.

ooks, D., & Altman, I. (Eds.). (1987). Handbook of environmental psychology. John Wiley & Sons.

illiams, D. R., & Vaske, J. J. (2003). The measurement of place attachment: Validity and generalizability of a psychometric approach. *Forest Science, 49*(6), 830-840.

How to cite this article: Hussain, M., & Sharma, A. (2023). Space Attachment and Human Behaviour. *Khoj - A Peer Reviewed International Journal of Geography, 10*, 66-77.

IJRAR.ORG E-ISSN: 2348-1269, P-ISSN: 2349-5138

INTERNATIONAL JOURNAL OF RESEARCH AND ANALYTICAL REVIEWS (IJRAR) | IJRAR.ORG

An International Open Access, Peer-reviewed, Refereed Journal

Green Cosmetics: Green Purchase Behaviour among the Youth of Ajmer City (Rajasthan)

Ms. Divya Mishra: Assistant Professor, Department of Economics

Sophia Girls' College (Autonomous), Ajmer

Abstract

"Organic", "Natural", "Herbal", "Eco-friendly", "Biodegradable" or "Recyclable" are some of the common terms which are in trend due to growing love and concern for the better sustainable future. New categories of consumers who have started finding ways and means to protect mother Earth by becoming eco-friendly are emerging. Consumers are now switching towards the natural product including the fashion industry. The present paper is an attempt to identify the motivational factors responsible for such paradigm shift in the cosmetic industry. The study is conducted on 120 youth (18- 29 years) from Ajmer city, Rajasthan through the primary survey. From the survey it is summed up that most of the customers are aware about the green cosmetics and the factors which played crucial role in deciding their consumer behaviour are environment consciousness, health consciousness, information and certification, online availability and consumer satisfaction.

Key words: Green Cosmetics, sustainability, consumer behaviour, environment consciousness, health consciousness

Introduction:

"Organic", "Natural", "Herbal", "Eco-friendly", "Biodegradable" or "Recyclable" are some of the common terms which are in trend due to growing love and concern for the better sustainable future. New categories of consumers who have started finding ways and means to protect mother Earth by becoming eco-friendly are emerging. Consumers are now switching towards the natural product including the fashion industry. This is forcing many brands to change their game and opt green to be in the market. Understanding a company's clients' purchasing habits is critical. Understanding your users' behaviour increases your earnings and helps to grow (Noel).

As per Kotler (2009), the consumer decision-making process consists of five stages. Every customer, knowingly or unconsciously, goes through these stages. The following model is a simple tool for understanding the decision-making process in general.

Figure 1 the decision-making process (Kotler, 2001)

The first phase in the decision-making process, according to Kotler (2009), is to identify the need or problem. This first stage is critical because it provides a clear image of the issue, and once the need is identified, the individual may take action to meet it.

According to Michele (1993), after the need is identified the second stage occurs - searching for information. This stage is defined as the buyer's endeavour to observe sources and seek information about the desired product. At this point, the consumer is likely to visit several shops, websites, and advertising brochures in order to gather enough information on the product of interest.

The third step in the decision-making process, according to Kotler (2009), is the appraisal of alternatives. At this point, consumers are comparing different items and brands to see if they match their standards.

The fourth phase in the decision-making process is to make a purchase decision. According to Philip Kotler, Keller, Koshy, and Jha (2009), a poor remark from another consumer or unforeseen events can impede the actual purchase.

Post-purchase behaviour is the fifth step in the decision-making process, according to Blythe (2008). This stage is critical because it influences future purchases made by the same consumer from the same brand. At this point, the consumer compares the product's qualities to his or her initial expectations.

Consumer concern about the change in environment is increasing day by day changing the buying pattern of the customers including the cosmetics. Healthy lifestyle and environment consciousness is changing the mind-set of the customers which result in the emergence of "Green Cosmetic" market. The word "***cosmetae***" was first used to describe Roman slaves whose job was to bathe men and women in perfume. (Keville, Green, 1995)

Review of literature

L. M. Csorba, V. A. Boglea (2011), the primary goal of this paper was to examine the green cosmetics market, focusing on the interaction between green cosmetics, ecologically responsible business practises, and consumer protection policies. The article attempts to raise environmental awareness and interest among consumers in healthy and safe consumption, consumption that is sustainable in nature and not harmful to their own health, by comparing green and synthetic cosmetics and demonstrating the high risk involved in using a lot of dangerous chemicals contained in the latter.

J.A. Ottman (2011), in his study realized that the growing concern of consumers' towards environment is because of an apprehension that the planet is losing its ability to sustain human life. Green marketing emerged as a solution to marketers to prevent further environmental degradation without preventing industrial growth. The best part is it can safely be used as a strategy to differentiate ones product from that of the competitors which will ensure their profit margin too.

Jurnal Muara Ilmu Sosial, Humaniora, dan Seni, (2017), the purpose of this study was to identify characteristics that could influence consumers' green purchasing behaviour toward green cosmetic products in the Indonesian cosmetics industry. According to the findings of this study, attitude toward behaviour and perceived behavioural control had a good impact on behavioural intention, while perceived behavioural control also had a favourable impact on customers' green purchasing behaviour. Meanwhile, behavioural intention had no effect on green purchasing behaviour.

Yifeng Lin, Shaohua Yang, Haniruzila Hanifah and Qaisar Iqbal, (2018), this study investigates consumer views about green cosmetics. Since this study's goal was to uncover in-depth customer opinions and feelings, data were gathered using qualitative research instruments. The primary findings of this study were the prevalent ambivalent views toward green cosmetics as a result of a lack of understanding and unclear market norms. When it came to cosmetics, the majority of respondents said that price and performance were more essential than green components. However, given the increased awareness of natural and organic components, as well as green manufacturing, most respondents admitted that their current neutral opinions could shift to be more favourable in the future. Green cosmetics are a recent development in the personal beauty business. This study investigates consumer views regarding green cosmetics and advocates for clearer green industry standards and regulations, as well as sophisticated biotechnology to extract natural ingredients.

Rachita Kapoor, Anurupa B Singh, Richa Misra (2019), analyses the problems that consumers confront while switching from non-green to green cosmetics. After careful consideration, it has been determined that modifications must be implemented by marketers in order to segment, target, and motivate a diverse client base. They had conducted the study on the NCR, Delhi region.

Nora Amberg and Csaba Fogarassy (2019), the paper focused on knowing what factors influence consumer groups when buying green products. The descriptive statistics and cluster analysis results suggest that some consumers prefer natural cosmetics, while others prefer traditional cosmetics. A third group employs both natural and conventional cosmetics. The findings indicate that on the cosmetics market, Health and environmental consciousness will be a major trend for both producers and consumers. Cosmetics have a far narrower range of health effects than the pharmaceutical business. Natural colour palettes will be popular in the future. Cosmetics will become considerably more diverse. The appearance of green cosmetics components and ecologically friendly production processes will be the primary reason for this, especially packaging. Customers will also be able to select the ones that best fit their needs.

Objective of the study:

The research focuses on evaluating the factors responsible for green cosmetic purchase behaviour of youth in Ajmer city.

Research Methods

The present study is based on the primary data collected from the questionnaire circulated online amongst the youth of Ajmer from the age group 18-29. The questionnaire consisting of 35 items was created on Google forms. The Google form was sent to total 150 respondents using the snow ball sampling method out of which 120 respondents respond back.

The first part of the questionnaire was intended to measure the consumer's awareness about green cosmetics and the brands available in the market. The second part consists of items on a 5 Point Likert Scale to measure the consumer's attitude towards green cosmetics which has been adapted from the factors identified from

various researches (SS, 2018)(Khan M. F., 2013)(Sharma R., 2014) (Green generation: millennials say sustainability is a shopping priority, 2015).

Data Analysis-

Awareness of the respondents

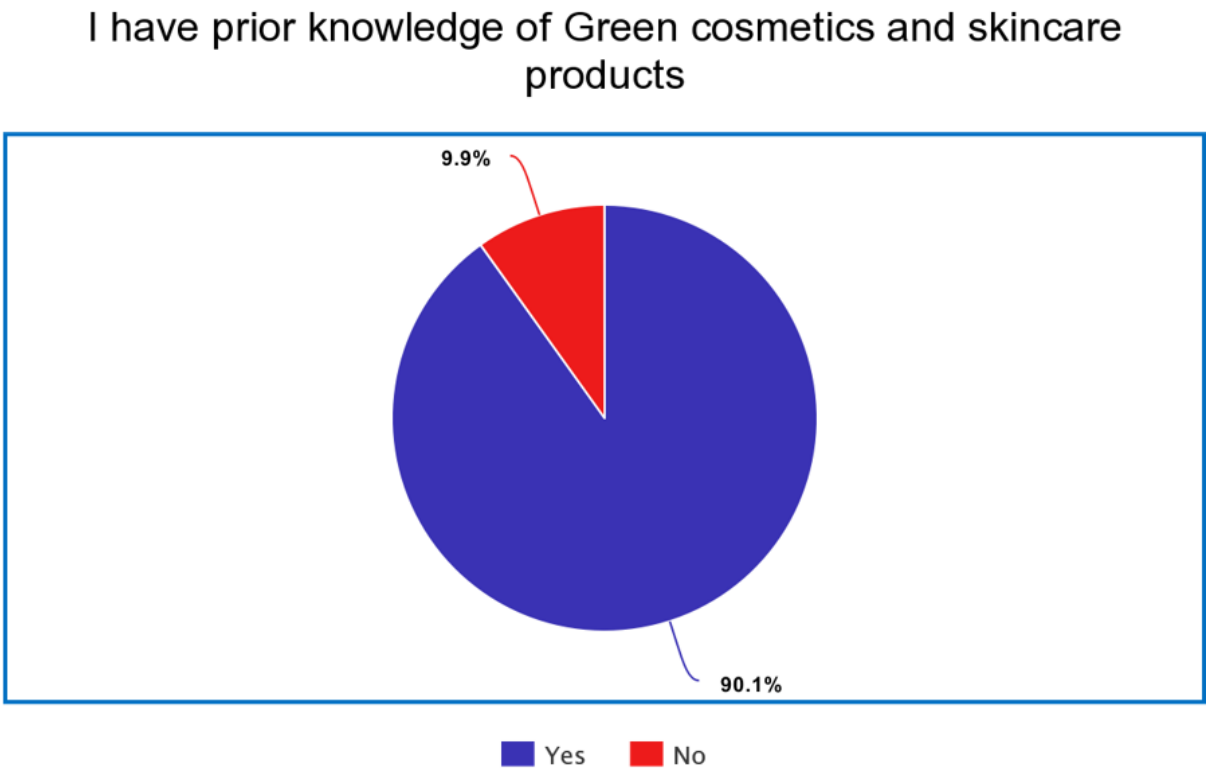


Figure 2.Computed

In total 120 respondents answered the online questionnaire. All between the age group of 18-29 from Ajmer city. Among 120 respondents, 90.1% or 108 respondents were aware of green cosmetics and claimed to have prior knowledge about them. 9.9% i.e. 12 were unaware of green cosmetics or skin care products.

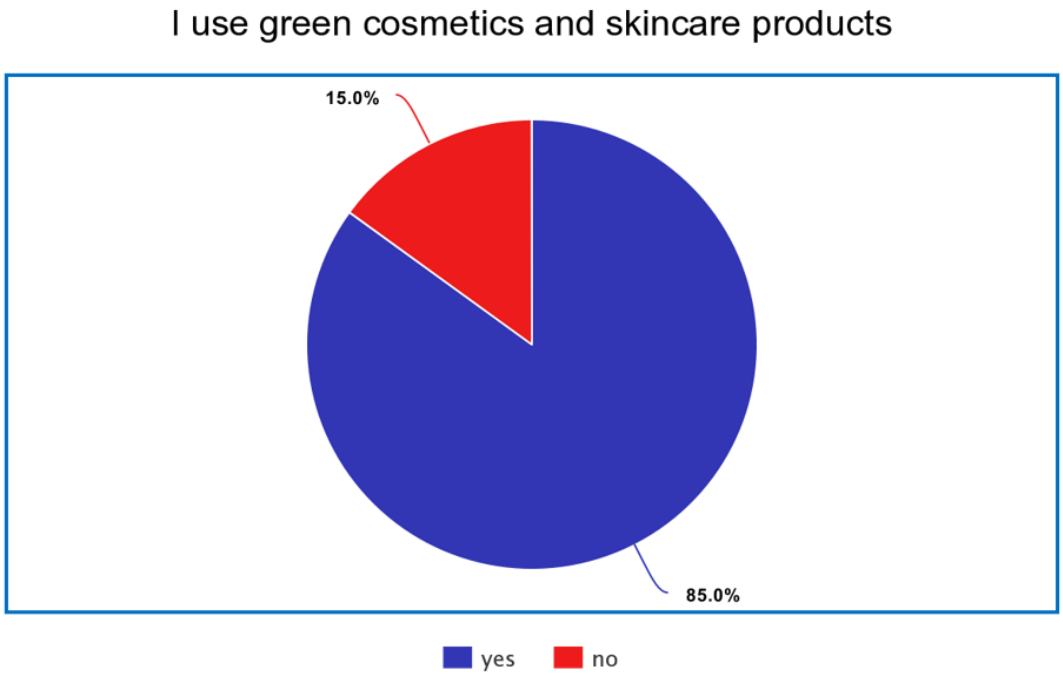


Figure 3. Computed

85% or 102 of the respondents out of 120 use green cosmetics or skincare products and 15% or 18 claimed to not use them. This clearly showed that the majority of our population was aware of green or sustainable cosmetics and skincare products.

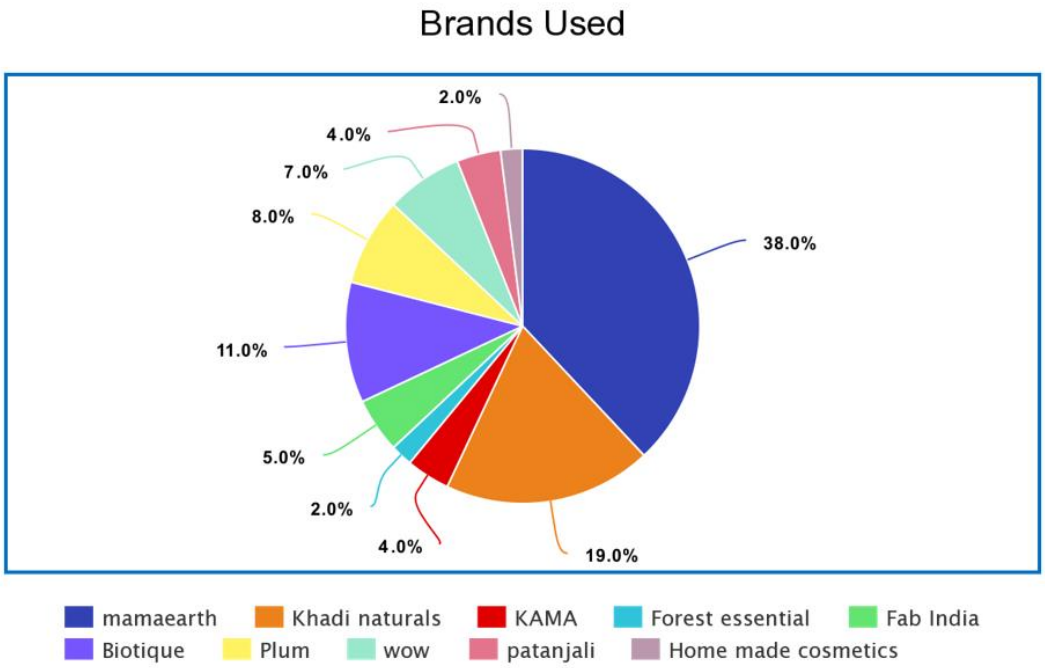


Figure 4. Computed

When asked the question from those who use green cosmetic about the brand they are using s 38% were found to be using the brand Mamaearth, 19% were using Khadi naturals, 11% were using Biotique and 8% were using products from the brand Plum. The Remaining 24% was using other natural brands like KAMA, wow, Fab India, etc.

Consumer attitudes and behaviours regarding green cosmetics are heavily influenced by consumer awareness and perception. For this they were asked to rate their agreement and disagreement with a series of statements on green cosmetics on a five-point Likert scale (1-Strongly disagree, 2-Disagree, 3-Neutral, 4-Agree, 5-Strongly Agree).

Exploratory Factor Analysis was conducted on Exploratory factor analysis was conducted using 27 variables with Varimax as a rotation method and Eigen value greater than 1 as a cut off point for the number of factors extracted. The result indicates KMO statistics was 0.966 and Bartlett's test of Sphericity is significant, which indicates the appropriateness of extracted variables for factor analysis. The analysis resulted in selection of five factors. The factors explained a total of 73.146 percent of total variance explained by the model. The factors considered here are-

Factor Analysis Result:

Factors		Factor Loading	Eigen Values
F1	**Environmental Consciousness**	**15.687**	**26.603**
1.	Prefer green cosmetics because they are safe to the environment	.810	
2.	Prefer green cosmetics as they can reduce pollution.	.614	
3.	Prefer green cosmetics as they are derived from the natural products.	.789	
4.	Prefer green cosmetics as they are eco-friendly.	.767	
5.	Prefer green cosmetics as I want to join the group to save environment.	.644	
Total number of items = 5			
F2	**Health Consciousness**	**3.235**	**17.557**
1.	Prefer green cosmetics as they are good for my skin.	.859	
2.	Prefer green cosmetics as for me health is the priority over price.	.721	
3.	Prefer green cosmetics as they are good for me.	.823	
4.	Prefer green cosmetics as they are safe with less side-effect.	.852	
Total Number of items = 4			
F3	**Information and certification**	**1.765**	**9.087**
1.	Prefer green cosmetics because of trust.	.612	
2.	Prefer green cosmetics because of reliable price.	.634	
3.	Prefer green cosmetics because of awareness campaigns.	.678	
4.	Prefer green cosmetics because of green marketing.	.625	
5.	Prefer green cosmetics because of government regulations on product safety.	.776	
6.	Prefer green cosmetics because of minute detailing and labelling of the product.	.637	
Total Number of items = 6			
F4	**Online Availability**	**1.021**	**8.9**
1.	Prefer online buying of green cosmetics because more options are available with reviews.	.628	
2.	Prefer online buying of green cosmetics because it is easy to access.	.589	
3.	Prefer online buying of green cosmetics because comparison with others products is easy.	.708	
4.	Prefer online buying of green cosmetics because of easy exchange policy.	.712	
5.	Prefer online buying of green cosmetics because of easy return policy.	.711	

6.	Prefer online buying of green cosmetics because of offers and discounts available.	.706	
7.	Prefer online buying of green cosmetics because of easy and flexible payment mode.	.701	
8.	Prefer online buying of green cosmetics because it is more transparent.	.689	
Total items = 8			
F5	**Satisfaction**	**.708**	**6.455**
1.	Prefer to purchase green cosmetics because it gives more satisfaction.	.781	
2.	Prefer online buying of green cosmetics because they are cruelty free.	.651	
3.	Prefer online buying of green cosmetics because it satisfies my way of healthy lifestyle.	.788	
4.	Prefer online buying of green cosmetics because it provides status in the society.	.799	
Total items = 4			

Factor 1 (Environmental Concern)- Explains the preference for green cosmetics due to presence of characteristics such as environmental friendly behaviour of the consumer, use of natural components as an ingredients and making a beneficial contribution to the environment. Green consumers are conscious of environmental issues and want to know where the raw materials are sourced. They prefer products that do not cause pollution.

Factor 2 (Health Consciousness) - Explains the preference of green cosmetics over inorganic one is due to health consciousness which includes safety for skin and less side-effects of the products. People who are more conscious about their health, appearance, and beauty are more attracted towards green cosmetics.

Factor 3 (Information and certification) - Explains that for the consumer awareness proper advertisement, labelling, certification, and government regulations are important. Certificates and product information are critical for environmentally conscious shoppers. The presence of Eco labels on cosmetic products undoubtedly facilitates the procurement of green cosmetics.

Factor 4 (Online Availability) - Explains the advantages of purchasing green cosmetics digitally. It includes factors such as ease to purchase, comparison with other similar products, reviews from other customers, flexible payment mode, easy exchange and return policy. Green skincare products are growing at an exponential rate, and their presence in online shops and numerous ecommerce platforms has aided their growth.

Factor 5 (Satisfaction) - Explains the satisfaction consumers gain after the purchase. This satisfaction also includes factors such as the product being free of animal testing, having a higher standing, and living a healthy lifestyle. Green consumer happiness also demonstrates care for and devotion to the ecosystem. So they feel more conscious about the future.

Conclusion:

The empirical study shows that environmental consciousness is the most important factor which influences the consumer behaviour towards the green cosmetics followed by the health consciousness. So the companies should give more emphasis on the labelling of the economic cost and benefits of their product. These companies should do more research and can tie up with the environment protection agencies to provide more satisfactory labelling for the customers. They should also provide certificates and incentives to the user as the guardian of the mother Earth. If these companies appreciate the consumer's environmental awareness and consciousness it will definitely expand their market. Health is the second most significant factor which these companies can use as a reform in the fashion industry. Due to the havoc created by the pandemic people now days are more health conscious. These companies can use proper health benefit information in their labelling and advertisement to gain maximum profit. There is still scope for new innovations in the field of green cosmetics. Go Green is the mantra for the present generation if they want a sustained life than why not for GO BEAUTIFULY GREEN.

References

1. Azila Jaini, Farzana Quoquab, Jihad Mohammad, Nazimah Hussin, 2020, "I buy green products, do you. . .?" The moderating effect of eWOM on green purchase behavior in Malaysian cosmetics industry, International Journal of Pharmaceutical and Healthcare Marketing, Vol. 14

2. Rebeka-Anna Pop , Zsuzsa Saplacan and Mónika-Anetta Alt, 2020, Social Media Goes Green—The Impact of Social Media on Green Cosmetics Purchase Motivation and Intention
3. Rachita Kapoor, Anurupa B Singh, Richa Misra, 2019, Green Cosmetics - Changing Young Consumer Preference and Reforming Cosmetic Industry, International Journal of Recent Technology and Engineering, Volume-8, Issue-4

4. Nora Amberg and Csaba Fogarassy, 2019, Green Consumer Behavior in the Cosmetics Market,MDPI, Basel, Switzerland

5. S. Bom, J. Jorge, H.M. Ribeiro, J. Marto, 2019, A Step Forward on Sustainability in the Cosmetics Industry: a review, Journal of Cleaner Production

6. Jacky Chin, Bernard C. Jiang, Ilma Mufidah, Satria Fadil Persada and Bustanul Arifin Noer, 2018, The Investigation of Consumers' Behavior Intention in Using Green Skincare Products: A Pro-Environmental Behavior Model Approach

7. Yifeng Lin, Shaohua Yang, Haniruzila Hanifah and Qaisar Iqbal, 2018, An Exploratory Study of Consumer Attitudes toward Green Cosmetics in the UK Market

8. Genovait Liobikien, Jurga Bernatonien, 2017, Why determinants of green purchase cannot be treated equally? The case of green cosmetics: Literature review, Journal of Cleaner Production

9. Nicholas Wilson, Evan Theodorus, Pauline Tan, 2017, Analysis of factors influencing green purchase behavior: A case study of the cosmetics industry in Indonesia, Jurnal Muara Ilmu Sosial, Humaniora, dan Seni, Vol. 1

10. Aagerup, U., & Nilsson, J. 2016. Green consumer behavior: being good or seeming good?. Journal of Product & Brand Management

11. Bruno Fonseca-Santos, Marcos Antonio Corrêa, Marlus Chorilli, 2015, Sustainability, natural and organic cosmetics: consumer, products, efficacy, toxicological and regulatory considerations, Brazilian Journal of Pharmaceutical Sciences, vol. 51

12. Eftimiya Salo, 2014, Consumer behavior towards green skin care cosmetic products in Finland, Bachelor's thesis

13. Consumer Behavior 2013. [Web page] Sustainable Review

14. Luiela Magdalena CSORBA, Vanina Adoriana BOGLEA, 2011, Sustainable Cosmetics: A Major Instrument In Protecting The Consumer's Interest, Regional and Business Studies

15. Prof Surya Rashmi Rawat, Prof Dr. Pawan K. Garga, Understanding Consumer Behaviour towards Green Cosmetics, Social Science Research Network

16. B, P. K. (2008). Herbal cosmetics in ancient india. Indian journal of plastic surgery Cervellon, M. C., Rinaldi, M. J., & Wernerfelt, A. S. 2011. How Green is Green? Consumers' understanding of green cosmetics and their certifications'. In Proceedings of the 10th International Marketing Trends Conference

17. D'Souza, C., Taghian, M., Lamb, P., & Peretiatko, R. 2007. Green decisions: demographics and consumer understanding of environmental labels. International Journal of Consumer Studies

International Journal of Enhanced Research in Science, Technology & Engineering
ISSN: 2319-7463, Vol. 12 Issue 12, December-2023, Impact Factor: 7.957

Phytochemical Examination (Qualitative Estimation) of Leafy Extract of *Hibiscus rosa sinesis*

Dr. Annu Bhardwaj

Assistant Professor, Sophia Girls'College (Autonomous) Ajmer

ABSTRACT

Medicinal plants have been used in healthcare since time immemorial. The empirical knowledge about their beneficial effects was transmitted over the centuries within human communities . Natural products play a pivotal role as a source of drug compounds and, currently, a number of modern drugs which are derived from traditional herbal medicine are used in modern pharmacotherapy .Medicinal plants still have a hopeful future, as the phytochemical composition and the potential health benefits of plants. Medicinal plants play vital roles in disease prevention and their promotion and use fit into all existing prevention strategies. A medicinal plant is any plant which, in one or more of its organs, contains substances that can be used for therapeutic purposes or which are precursors for the synthesis of useful drugs. A number of plants have been used in traditional medicine for many years. Such plants should qualify as medicinal plants. Each plant consists of several important ingredients that can be used in medical field, and can be involved in the development of different kind of drugs. The plant kingdom presents a wealth of chemical compounds of pharmaceutical nature. Health benefits of many species have not yet been studied or still need to be more deeply investigated .Medicinal plants contain some organic compounds which provide definite physiological action on the human body and these bioactive substances include tannins, alkaloids, carbohydrates, terpenoids, steroids and flavonoids. Medicinal plants contain some organic compounds which provide definite physiological action on the human body and these bioactive substances include tannins, alkaloids, carbohydrates, terpenoids, steroids and flavonoids.

Key Words: Phytochemicals, Organic, Medicinal, Therapeutic, Screening, Estimation

INTRODUCTION

Phytochemical the nonnutritive chemical compounds derived from plants, play a significant role in human disease prevention. Phytochemicals such as secondary metabolites and anti oxidants have important medicinal properties, phytochemicals present in medicinal plants such as alkaloids, flavonoids, tannins, saponins, phenols, steroids etc have several disease prevention activities mainly anti inflammatory, antidiabetic, antiaging, antimicrobial, antidepressant, anticancer, etc Medicinal plants gaining popularity in usage due to a large number of people in search of health remedies with little or no side effects which is the problem of most chemically synthesized drugs. Medicinal plants are very rich in chemical compounds which they produce for their own defence and are known as secondary metabolites(phytochemicals). A medicinal plant may contain a mixture of different phytochemicals, the ability to identify these biologically active compounds in a medicinal plants serve as a guide in its quality control and dose determination.

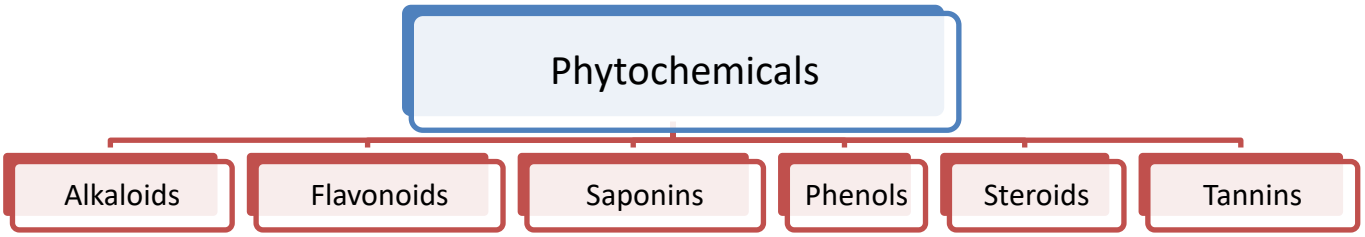


Fig 1: Types of Phytochemicals

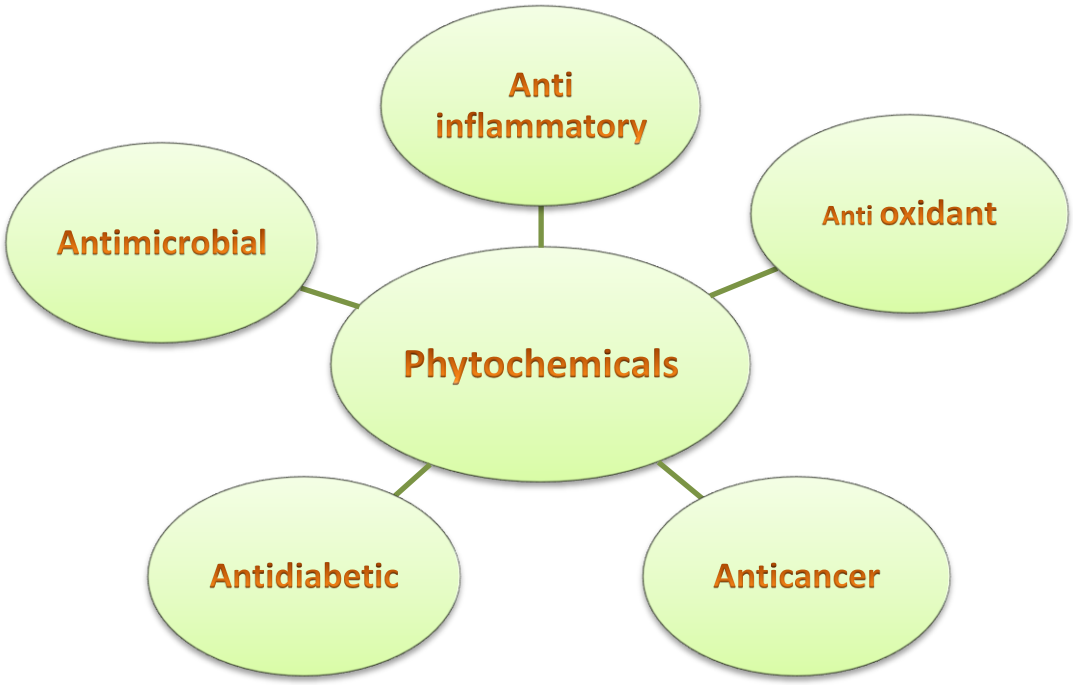


Fig 2: Properties of Phytochemicals

Material and Methodology

Medicinal plant for Qualitative Estimation (Phytochemical Estimation)

Hibiscus rosa sinesis

Classification of *Hibiscus rosa sinesis*

Kingdom- Plantae
Division- Angiosperms
Class- Dicotyledons
Order - Malvales
Family - Malvaceae
Genus- *Hibiscus*
Species- *rosa sinesis*

Fig 3: Plant of *Hibiscus rosa sinesis*

Hibiscus, genus of numerous species of herbs, shrubs, and trees in the mallow family (Malvaceae) that are native to warm temperate and tropical regions. Several are cultivated as ornamentals for their showy flowers, and a number are useful as fibre plants. *Hibiscus rosa sinensis* is a bushy, evergreen shrub or small tree growing 2.5–5 m (8–16 ft) tall and 1.5–3 m (5–10 ft) wide, with glossy leaves and solitary, brilliant red flowers in summer and autumn. The 5- petaled flowers are 10 cm (4 in) in diameter, with prominent orange-tipped red anthers The root is a branched tap root. The stem is erect, green, cylindrical and branched. The leaf is simple, with alternate phyllotaxy and is petiolate. The leaf shape is ovate, the tip is acute and margin is serrated. Venation is unicostate reticulate. (Venation is branched or divergent.) Free lateral stipules are present. Cultivated varieties have red, white, yellow, or orange flowers.

Collection of Plant Material

Fresh leaves of *Hibiscus* plant is collected from medicinal garden of Sophia Girls' College when the vegetative growth of plant favourable. The plant materials were taxonomically identified and authenticated by The Department of Botany of the college. The plant materials were shade dried until all the water molecules evaporated and plants became well dried for grinding. After drying, the plant materials were ground well using mechanical blender into fine powder and transferred into airtight containers with proper labelling for future use.

Preparation of Plant Extract

The solvent (250 ml of ethanol) is added to a round bottom flask, which is attached to a Soxhlet extractor and condenser on an isomantle. The crushed plant material is loaded into the thimble, which is placed inside the Soxhlet extractor. The side arm is lagged with glass wool. The solvent is heated using the isomantle and will begin to evaporate, moving through the apparatus to the condenser. The condensate then drips into the reservoir containing the thimble. Once the level of solvent reaches the siphon it pours back into the flask and the cycle begins again then extract was kept in refrigerator when not in use.

Qualitative Estimation (Phytochemical Analysis)

S.No	Phytoconsituents	Test for Phytoconsituents
1.	Test for Alkaloids	Dragendroff's test- To the sample, few drops of potassium bismuth iodide solution was added Dragendorff reagent. Mayer's Test: Filtrates were treated with Mayer‟s reagent Wagner's Test: Filtrates were treated with Wagner reagent
2.	Tests for Flavonoids	NaOH test: A small amount of extract was treated with aqueous NaOH and HCl H_2SO_4 test: A fraction of the extract was treated with Conc.H_2SO_4
3.	Tests for Steroids and Terpenoids	Liebermann - Burchard test 4mg of extract was treated with 0.5ml of acetic anhydride and 0.5ml of acetic acid. Then concentrated $H_2SO_4$was added slowly
4	Tests for Saponins	Foam test: About 2g of the plant extract was mixed with 10ml of distilled water and shaken vigorously for a stable persistent froth.
5	Test of Tannins	Ferric chloride test: 0.5g of the dried powdered sample was boiled in 20ml of water in a test tube and then filtered. A few drops of 0.1% $FeCl_3$ Lead acetate test: 2ml plant extract was combined with 2ml of distilled water. 0.01g lead acetate was added to this combined solution and shaken well.
6	Test for Phenols:	Ferric chloride test: About 2ml plant extract was taken to water and warmed at 45-500C. Then 2 ml of 0.3% $FeCl_3$ was added.
7	Test for Glycosides	Fehling's test: 8 drops of plant extract was added. After that it was mixed with 1ml of Fehling‟s solution and boiled in a water bath for 5 min.

Table 1: Test for phytochemicals

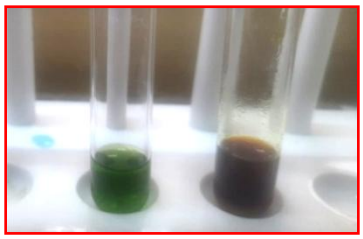
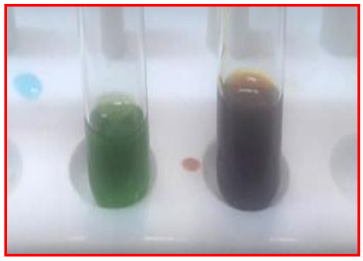
S.No	Phytoconsituents	Test for Phytoconsituents
1.	Test for Alkaloids	Dragendroff's test- Formation of red colour Wagner's Test: Formation of reddish brown colour
2.	Tests for Flavonoids	NaOH - White ppt is formed H_2SO_4 test: Reddish Brown ring is formed
3.	Tests for Steroids and Terpenoids	Liebermann - Burchard test – No positive result
4	Tests for Saponins	Foam test: - No Foam formation
5	Test of Tannins	Ferric chloride test: Green Brown colour is formed .
6	Test for Phenols:	Ferric chloride test: No ppt formation.

RESULT AND DISCUSSION

Table 2: Result of Phytochemical Analysis of *Hibiscus rosa sinesis*

S.No	Phytochemical	Result
1	**Tests for alkaloids**	+ + +
2	**Tests for Flavonoids**	+ ++
3	**Tests for steroids**	++
4	**Test for saponins**	- -
5	**Test for Tannins**	++
6	**Tests for Phenols**	- -
7	**Test for Glycosides**	- -

Table 3: Result of Phytochemicals Estimation

S.No.	Phytochemicals	Result
1.	**Alkaloids** **Dragendroff Test**	
	Wagner Test	

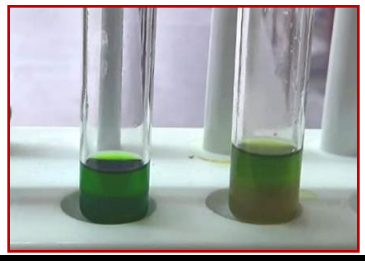
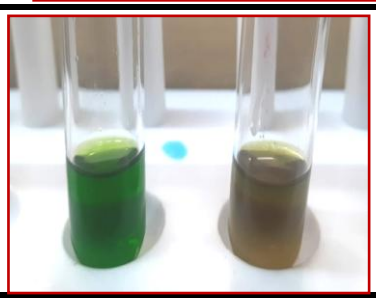
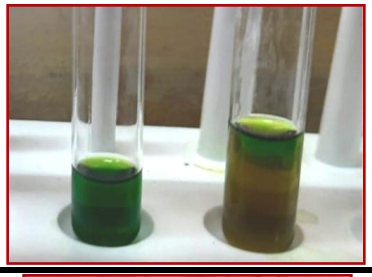
2.	**Flavonoids NaOH Test**	
	H_2SO_4 Test	
3.	**Tannin**	
4.	**Steroids**	

Table 3: Observation of Phytochemicals in Extract of *Hibiscus rosa sinesis*

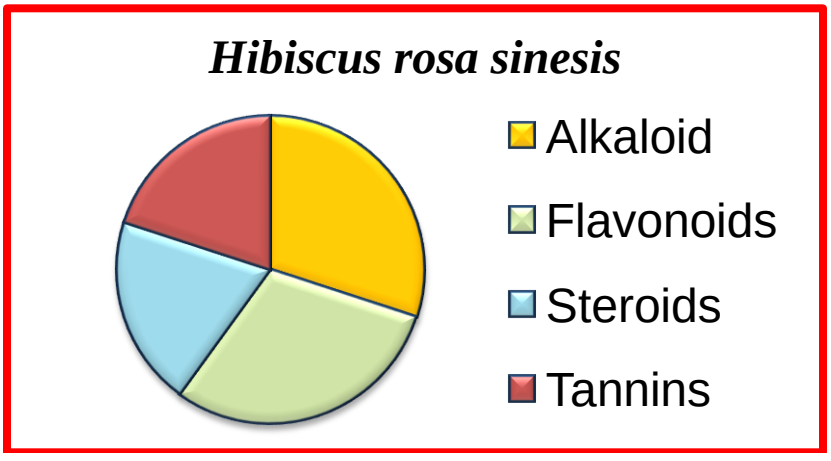


Fig 10: Pie diagram showing phytochemicals in *Hibiscus rosa sinesis*

DISCUSSION

The study of *Hibiscus rosa sinesis* plant revealed that plant having presence of phytochemicals constituents and showed the presence of alkaloids, flavonoids, steroids and tannins. Results showed that plant contains more amount of alkaloids and flavonoids which is mainly responsible for better medicinal properties. Secondary metabolites which present in this plant shows antioxidant, anticancer, anti microbial, anti bacterial properties which make this plant a better medicinal plant. The various phytochemical compounds detected from hibiscus are known to have beneficial importance in medicinal sciences. Results revealed the presence of alkaloids, flavonoids and tannins. The crude ethanol extract of hibiscus leaves showed very good antibacterial activity against the bacterial species. Since, hibiscus plant is commonly grown in the country; it can serve as cheap source of effective antibacterial agent.

REFERENCES

[1]. Khan, H. Medicinal plants in light of history: Recognized therapeutic modality. *J. Evid. Based Integr. Med.* **2014**, *19*, 216–219.]
[2]. Patwardhan, B.; Vaidya, A.; Chorghade, M.; Joshi, S. Reverse pharmacology and systems approaches for drug discovery and development. *Curr. Bioact. Compd.* **2008**, *4*, 201–212.
[3]. Jamshidi-Kia, F.; Lorigooini, Z.; Amini-Khoei, H. Medicinal plants: Past history and future perspective. *J. Herbmed Pharmacol.* **2018**, *7*, 1–7.
[4]. Agarwal, S. and Prakash, R. 2014. Evaluation of antibacterial activity of Hibiscus rosa-sinensis flower extract against E. coli and B. subtilis. Biological Forum. 6(2):194-196.
[5]. Rahul, C., Pankaj, P., Sarwan, S. K. and Mahesh, J. K. 2010. Phytochemical screening and antimicrobial activity of Albizzia lebbeck. J. Chem. Pharm. Res. 2: 476 – 484.
[6]. Ruban, P. and Gajalakshmi, A. 2012. In vitro antibacterial activity of Hibiscus flower against human pathogens. Asian Pac. Journal of Tropical Biomedicine. 2(5): 399-403

Humanities and Social Science Studies

ISSN : 2319-829X

CERTIFICATE OF PUBLICATION

This is to certify that the article entitled

A COMPARATIVE STUDY ON THE PREFERENCE OF YOUTH CONSUMER BETWEEN TRADITIONAL COMMERCE AND M-COMMERCE WITH THE SPECIAL REFERENCE TO AJMER CITY.

Authored By

Dr. JYOTI JAGWANI
Assistant Professor Sophia Girls College (Autonomous), Ajmer

Published in
Humanities and Social Science Studies journal
: ISSN 2319-829X with IF=7.28
Vol. 13, Issue 01, No. 10, January - June : 2024
UGC Care Approved, Group I,
Peer Reviewed, Bilingual, Biannual, Multi-disciplinary Referred Journal

Abhishek Sharma
Editor In Chief, HSSS

Change Management: An International Journal
ISSN: 2327-798X (Print) ISSN: 2327-9176 (Online)
Volume 23 No. 2, 2023

An Empirical Study on Demographic Elements of Work Life Balance with Reference to Women Academicians in Higher Education in Rajasthan

Professor Sister Pearl[1], Dr. Surbhi Mehra[2]

[1]Principal, Sophia Girls' College (Autonomous)

Ajmer, Rajasthan, India

[2]Assistant Professor, Department of Management, Sophia Girls' College (Autonomous)

Ajmer, Rajasthan, India

Abstract

Our lives revolve around work. It gives us a sense of success, recognition, and most importantly, a way to get money to meet our basic necessities. Work can interfere with family life and family can interfere with work, causing conflict and making work-life balance difficult. The line separating family life from work is becoming increasingly hazy. Combining family obligations with paid work presents major difficulties, according to research on work-life balance (WLB). The purpose of this study is to examine the demographic components of academicians' work-life balance (WLB) in higher education sector. This study aims to determine how work-life balance is affected by several factors, like Age Group, Marital status, Employment of Spouse, Spouse's highest qualification, Nature of Spouse's work, working hours of spouse, No. of children, Age group of children, Nature of respondent's employment, Income group, Nature of organization, Designation, Tenure of working in the current organization, Overtime working, paid for overtime working etc.

This study uses an explanatory research approach and collects primary data from 500 respondents via questionnaires. This study identified that demographic factors affecting work-life balance have immense impact on academicians working in the higher education sector.

[1]First Author

[2]Corresponding Author, email: mehra.Surbhi115@gmail.com

Acceptance: 07July2023, Publication: 10July2023

DOI: https://doi.org/10.5281/zenodo.8130853

Keywords

Work-life balance, Demographic factors, Tenure of working, Overtime working, Employment of Spouse, paid for overtime working, etc.

Introduction

During the past ten years, India underwent wide statistical, social, economic and technological changes. These developments have had a significant impact on Indian delegates' ability to manage their work and personal lives, especially for female academicians. In India, today there are essentially more working couples than ever before. Their numbers are constantly rising because both young men and women expect that the potential life partner must be well-off. They understand that keeping the family on one paycheck is not enough. Together, work and family take on a crucial role in their life, and maintaining them both is a challenge. If a person has children or other dependent family members, their personal life may be even more difficult. In the home, women are more heavily involved in the work. Women are the primary caterers for both domestic and childcare duties everywhere in the world, regardless of family structure or culture. As they work to advance their careers, they realize the responsibilities associated with having and raising children. But today, no working, educated woman wants to give up her job for child rearing.

In India, mothers or other relatives help women take care of their infants while they are at work. Sometimes they are forced to enlist the assistance of certain employees, such as Aya or the caretaker. But the mothers keep their minds are occupied at home. Every now and again, they contact through phone calls to check on their infants and provide important directions. When a child is ill or requires their mother's attention, they withdraw from their jobs and stay at home. The stress of job and parenthood might occasionally turn into their worst nightmare. They do not, however, dare quit their jobs. In the Indian market, employment is scarce. They make every effort to keep up with both of their obligations. Careerists either avoid getting married or put off becoming mothers. The major change in family structure can be attributed to economical factors. The majority of India's urban communities now have their roots in the concept of a single child or tiny family. The result is that many more women are enrolling in colleges and institutions. In every facet of their lives, they are in conflict with their relationships. The Indian society is becoming less and less conservative. Female entries are now being accepted by Indian associations, which was previously impossible. Among Indian women, teaching is their preferred profession.

Specific resources like land, labour, capital, and business enterprise can help an association function properly but employees are a company's most valuable asset out of all the production-related factors. At the moment, the employees find it extremely difficult to balance work and family. Work-life balance is becoming more important in today's changing workplace because it can have a huge impact on an association's revenue and performance. A healthy work-life balance helps employees create better relationships with management, reduce workplace anxiety, and increase morale and productivity for the organisation as a whole. Many businesses are attempting to provide favourable working circumstances so that employees can perform better at work. Work and family are the two major contending areas for employees. When there is conflict between work and family, it has an adverse effect on both the employees and the company. Work-life balance can be defined as the absence of conflict between work and family, or between an individual's various roles. Contrarily, work-life conflicts arise when involvement in one area, such as job or personal life, intrudes on the other. Work-life balance creates a link between a person's professional life and personal obligations. Working women simultaneously balance their emotional, behavioural, and time demands in both spheres of life. Work-life balance has become more difficult in today's reality for those who work as educators. Along with verifying students' assignments, maintaining their records, and attending to many organization-related servicing needs, the significant responsibility of an instructor also extends to their homes, where they must prepare for the next day.

Research Objectives

The research examines the demographic variables affecting work life balance in the Higher Education Sector. This would assist organisations in the higher education sector in creating strategies for the efficient growth of academics, improving performance, ensuring the retention of talented employees and lowering total expenditure.

Literature Review

Adame C (2018) revealed that contention among employees' family and work obligations is related with pressure and poor prosperity, which have negative outcomes for firms and their representatives. The study breaks down the job of two inward and two outer drivers that energize organisations to embrace and actualize work-life balance approaches. The job of outer monetary help and particular laws, together with budgetary arrangement for work-life balance approaches and administrators' observations with regard to issues due to work-life strife (inside drivers), are analysed. Assessment of information recommends that financial issues (outer

monetary help or potentially a specific budget inside the organization) are key components for the execution or absence of usage of work-life balance approaches. In addition, to execute these approaches, managers not really perceive issues due to work-life struggle. At last, work- life balance legislation appears not to assume an explicit job in the connections examined.

Anuradha et al. (2015) explained that work-life balance has turned into a vital issue in the twenty first century. Work and family life are two sides of an indistinguishable coin for both are interconnected and meddle with each other. Expanded work requests meddle with family life, and then again, family requests meddle with the work-life of representatives. In this way, clashes happen, which adversely influence a representative's execution at job and home. Taking a step towards this trend, organisations have progressively begun to take a functioning enthusiasm for introducing practices that empower representatives to adapt to the work-life balance issues. The investigation endeavoured to investigate the work-life adjust practices of chosen open area endeavours and their effect on authoritative execution. The finding recommended that open part organisations in India have understood that work-life adjust rehearses are critical for hierarchical execution.

Hilbrecht M et al. (2014) identified how independently employed people who have children living at home build their work-life balance. Work-life balance was portrayed regarding time, action or experience. Most members agree that self-employment work contributes, yet some doubt regardless of whether work-life balance is conceivable or not. Parents generally pursued customary job designs. A few opposed this course of action and perceived self-employed work as an approach to take an interest all the more effectively in family life.

Maiya S and Bagali MM (2014) provided a deep insight of work-life balance of working mothers in public and private sector. An experimental survey of equal number of public and private sector employees were carried out. Both the sectors were evaluated on 6 sub scales viz. personal factors, balancing factors, organizational support, motivational factors, career advancement and psychological factors. The results revealed the picture of difficulties faced in balancing the work demand and the life (family) responsibility. There was high correlation between the difficulties faced and the balancing act to be performed significantly in the areas of career advancement factors, organizational support and psychological factors.

Sundaresan Shobha et al. (2014) demonstrated that a large number of working females are experiencing inconvenience in adjusting work and family in view of too less time for themselves, the need to fulfil others necessities and superfluous work pressures. Due to long work hours high proportion of the female workforce comes across work overflow into the

home. Elevated amounts of stress and apprehension, friction at home, experiencing work burnout and inability to utilise maximum capacity are all outcomes of poor work-life balance. They often feel peevish and furious because of their helplessness to balance work and family life. This study explored the components influencing work-life balance among women workforce and the outcomes of poor-work life balance. The study provides suggestions for working women for keeping up sound work-life balance. The literature review identified with the subject has revealed that working females experience more noticeable issue than men in balancing family and work pressures. Correspondingly they experience conflict as there is more inundation of work in personal life, than inundation of home life into work. Also, working women are regularly called upon to make forfeits in another as every other situation make diverse requests on them and have distinctive standards to follow.

Tajlili MH et al (2014) revealed a noteworthy issue of work-life integration for the present working females, as the requests of today's work strife with the social components of family life. Females feel they need to settle on troublesome choices that forfeit their career or family, with little comprehension of the impacts that influence basic decision-making. Career instructors may not be talking about the strain of work- life joining with female college students, leading them to think "having everything" is feasible.

Trehan R. et al. (2014) investigated nature of working life differentials among urban and rural teachers; to think about the urban and rural instructing condition based on occupation performance criterion like educating and welfare offices. Performance is a central point influencing conduct. The examination uncovered that in the event of urban instructors, the components distinguished as critical in nature of working life incorporate brilliance and fulfillment at work, intra-institutional fulfillment, peer pressures, bring down confidence, institutional and social pressures, in general hierarchical fulfillment and socio-authoritative conduct. Then again, on account of country instructors, seven components have been recognized as elements deciding of nature of work, which not the same elements are as identified on account of urban educators. This study suggested that the education foundations which centre on variables deciding the nature of work life will have more chances to rise as effective organisations.

Thomas KJ (2014) clarified how work-life balance and working environment technology connect to influence the lives of employees. The article prescribes that thoughtfulness regarding work-life balance move towards becoming some part of training when human resource development experts outline virtual learning or help create working environment

technologies and policies. Noteworthy, advances in technology and the expanding ways by which employees utilize it in their work and individual lives have prompted a domain in which employees can work about whenever and wherever. Although virtual human resource development (VHRD) carries with it helpful efficiencies and expanded opportunities for learning, the possibility of day in and day out learning i.e. 24/7 learning can deleteriously affect work- life balance for workers.

Poulose S et al. (2014) uncovered that individual view of high work-life balance and feeling of prosperity among employees has turned out to be basic for any organisation keeping in mind the end goal to guarantee improved execution productivity, especially in this period of profoundly aggressive business condition. It is no big surprise that the work-life balance has pulled in various commitments from specialists and human resource experts that endeavour to explore on different variables impacting work-life balance, their interrelationship and conceivable results of various levels of work life balance, winning among representatives, predominantly because of regularly expanding requests of work alongside expanded family requests inferable from the need of life partners to be utilized and mission for individual accomplishments in individual life.

Methodology

The questionnaire used to study that Demographic characteristics influence the work life balance of women academicians in higher education in the present research was included various factors like:

Demographic Variables	
1	Age Group
2	Marital status
3	Employment of Spouse
4	Spouse's highest qualification
5	Nature of Spouse's work
6	Working hours of spouse
7	No. of children
8	Age group of children
9	Nature of respondents employment
10	Income group
11	Nature of organization

12	Designation
13	Tenure of working in the current organization
14	Overtime working
15	Paid for overtime working

To examine whether work life balance of female academics in higher education are affected by demographic variables. Respondents were asked to tick the most appropriate option. Data were collected from female academics in the higher education sector. Some female academicians go to public universities, others go to private colleges and universities. The sample size for the current study is 500.Statistical tools were used to measure the effect of demographic variables on female academicians' work-life balance.

Analysis and Interpretation

Demographic Characteristics and Work Life Balance of Women Academicians

Ho₁: *Demographic characteristics do not influence the work life balance of women academicians in higher education.*

Ha₁: *Demographic characteristics influence the work life balance of women academicians in higher education.*

The relationship of demographic characteristics and work life balance of women academicians in higher education is measured by separate scores based on various dimensions stated and grouped in the questionnaire. The relationship is analyzed with different statistical tools hereunder:

- **Descriptive Statistics and Correlation**

Table 5.3.1: Descriptive Statistics

	Mean	Std. Deviation	N
Score-WLB	2.85	.169	500
Score-Demo	2.11	.288	500

The Work Life Balance (Score-WLB) is depicting the mean of 2.85 and standard deviation is 0.169. Demographic variables (Score-Demo) compositely have mean of 2.11 and standard deviation of 0.288.

Table 5.3.2: Correlations

		Score-WLB	Score-Demo
Pearson Correlation	Score-WLB	1.000	.095
	Score-Demo	.095	1.000
Sig. (1-tailed)	Score-WLB	.	.017
	Score-Demo	.017	.
N	Score-WLB	500	500
	Score-Demo	500	500

The correlation between Work Life Balance (Score-WLB) and Demographic variables (Score-Demo) was 0.095 which was significant at 0.01 level of significance with the p-value of 0.017.

Table 5.3.3: Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Score-Demo[b]	-	Enter

a. Dependent Variable: Score-WLB

b. All requested variables entered.

There is only one model with Work Life Balance (Score-WLB) as dependent variable and Demographic variables (Score-Demo)as independent variable and for the duration of fitting the regression line no variable was removed and the method was Enter.

Table 5.3.4: Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics	
					R Square Change	F Change
1	.095[a]	.009	.007	.168	.009	4.548

Model	Change Statistics		
	df1	df2	Sig. F Change
1	1[a]	498	.033

a. Predictors: (Constant), Score-Demo

b. Dependent Variable: Score-WLB

The above Table 5.3.4 of Model Summary is providing the information such as R, R^2, adjusted R^2, and the standard error of the estimate while fitting the regression line between Work Life Balance (Score-WLB) and Demographic variables (Score-Demo). As demonstrated in the table, 0.9% of the total variance in the Work Life Balance (Score-WLB) is explained by the regression model. Here, R explains the association between the experiential and expected values of Demographic variables (Score-Demo). The standard error of the estimate measures the scattering of the Demographic variables (Score-Demo) around its means which is 0.168. This is the standard deviation of the inaccuracy and it is the square root of the Mean Square Residual stated in the ANOVA table which is given below:

Table 5.3.5: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	0.129	1	.129	4.548	.033[b]
	Residual	14.175	498	.028		
	Total	14.304	499			

a. Dependent Variable: Score-WLB

b. Predictors: (Constant), Score-Demo

The ANOVA is given in the Table 5.3.5 and the significance value is 0.033 which is less than critical value of 0.05, therefore the Work Life Balance (Score-WLB) has significantly different mean than Demographic variables (Score-Demo), and consequently, null hypothesis that Demographic characteristics do not influence the work life balance of women academicians in higher education, is rejected. The Sum of Squares associated with the three causes of variation, Total, Regression and Residual which are possibly explained by the Demographic variables (Score-Demo) (Regression) i.e. 0.129 and the variance which is not explained by the Demographic variables (Score-Demo) (Residual) i.e. 14.175.

Table 5.3.6: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.736	.056		48.930	.000
	Score-Demo	.056	.026	.095	2.133	.033

The beta value in the unstandardized column for Constant is quite higher than the Demographic variables (Score-Demo) that means the constant makes the strong unique contribution in explaining the dependent variable. The t values for both Demographic variables (Score-Demo) and constant is statistically significant being less than 0.05 represents the change in the mean response for one unit of change in Work Life Balance (Score-WLB), while the supplementary terms in the model are remain invariable. The relationship between Demographic Variables (Score-Demo) and Work Life Balance (Score-WLB) can be expressed in the equation form as:

Work Life Balance (Score-WLB) = **2.736** + **0.056** Demographic Variables (Score-Demo)…….....…… (1)

Where, in equation (1), Work Life Balance (Score-WLB) is representing the value or Magnitude of Work Life Balance, when Demographic Variables (Score-Demo) are measured on ordinal Scale.

Model		Correlations			Collinearity Statistics	
		Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)					
	Score-Demo	.095	.095	.095	1.000	1.000

a. Dependent Variable: Score-WLB

The variance inflation factor (VIF) indicates the magnitude of variation of a coefficient is overstated due to the correlations among the predictors in the model. Furthermore, the Tolerance value is presenting the changeability of the Dependent Variable: Score-WLB. If this value is very low (less than 0.10), it specify that the multiple correlation with other variables is high, suggesting the possibility of Multicollinearity. A VIF of greater than 5 is generally considered evidence of multicollinearity.

In Table 5.3.6, in the tolerance column, values are not less than 0.10 i.e. 1.000 which is indicating that the multiple correlation with other variables is low or absent and the VIF is also 1.000 which is showing absence of multicollinearity (correlation among predictors). The Part Correlation Coefficient is representing the quantum of the total variance in the Work Life Balance (Score-WLB) which is uniquely explained by the Demographic variables (Score-Demo) i.e. 0.095.

The Histogram and Normal P-P Plot of Regression Standardized Residual ensures normality in the Work Life Balance (Score-WLB) and the dotted points of dependent variable are following the straight line as shown below. The scatter-plot of standardized residuals against predicted values is an arbitrary pattern concentrated around the approximate line of zero standard residual value. Moreover, the scatter-plot depicts no clear relationship between the residuals and the predicted values which is steady with the assumption of linearity.

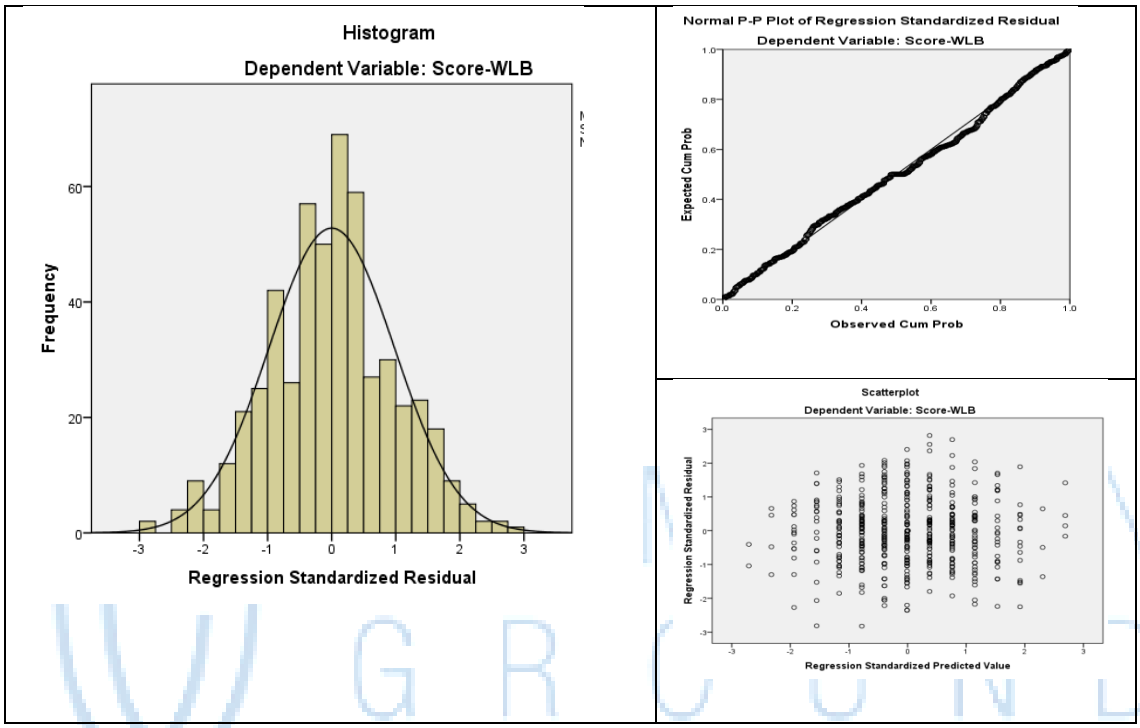


Figure 5.3.1: Histogram, Normal Residual Plot and Scatter Plot

Conclusion

On the professional front, women are growing: organizations and in institutions. This study has looked at some of the issues that women face at home and at work, as well as how they manage to balance work and family life. The research's findings are based on actual responses from the women, and the following inferences can be made from them: In terms of work orientation, a distinct new pattern has emerged. The organization attracts more female members from financially stable families. They are focused on their jobs and enjoy positions with a lot of responsibility, but they struggle with mobility and moderate promotions because they have to work long hours and have family responsibilities. They also have problems with their male subordinates. The study demonstrates that female liberation is being influenced in part by a shift away from organized relationships and toward inter-caste and inter-religious marriages as a result of this shift. The age of marriage is shifting from 22 to 26 to 30. In any case, society

and married women have to accept that their jobs are subordinate to "spouse," "home," and "youngsters" as they have lot of responsibilities. Females who are not married have fewer problems, but their ability to hang out with friends and other people is limited. Although there hasn't been a lot of change in Indian culture, females have definitely started moving in the right direction for social change by bravely moving away from the norms of society and towards advancement. Women juggle work and family life with the help of a "mother" or other relatives, accepting the idea of having one child and considering having a child subsequent to settle in job. They prioritize spending quality time with their children over career advancement. Women who are not married can grow because they do not have to take care of the house. It goes without saying that women are taught by their parents that "her home" is the most important responsibility of a woman and that it is difficult for them to perform their jobs as housewives or mothers. In India, men are barred this duty. In India, it will take a long time to achieve sexual equality. Additionally, all of this intensifies the issue of women's work-life balance. Work-life balance is an important factor in an organization's success because it helps employees become more productive, motivated, and committed. The employee will not be satisfied in his position unless he can maintain a healthy work-life balance. In today's competitive business environment, an organization can only survive if its employees have a healthy work-life balance.

Bibliography

1. Adame-Sánchez, C., Caplliure, E. and Miquel-Romero, M. (2018). Paving the way for coopetition: drivers for work–life balance policy implementation. [online] Available at: https://link.springer.com/article/10.1007/s11846-017-0271-y [Accessed 10 Jan. 2023].
2. KshirsagarSonali (2018); ‘Work-Life Balance of Women Employees in Service Sector’, International Journals of Advanced Research in Computer Science and Software Engineering, Vol-8 (1)
3. Nizam Ismail and KamChrystinne(2018); ‘The Determinants of Work-Life Balance in the Event Industry of Malaysia’,International Journal of Management, Accounting and EconomicsVol. 5(3)
4. Amal Krishna Saha, Sumita Chaudhuri &SharadSoumyaMazumdar (2016); ‘Work-Life Balance of Women Teachers in West Bengal’, The Indian Journal of Industrial Relations, Vol. 52 (2) : 217-230

5. Anuradha, Mrinalini Pandey (2015); 'A Review of Work-Life Balance Practices Prevalent in Public Sector Undertakings in India', Prabhandan: Indian Journal of Management, Vol. 8 (2): 0-0
6. Maiya S and Bagali MM (2014); 'An Empirical Investigation on Work - Life Balance Among Working Mothers: Emerging HRM Interventions', International Journal of Business and Administration Research Review, Vol. 1 (5).
7. Shobha Sundaresan (2014); 'Work-life balance–implications for working women', International Conference on Sustainable Development, At Ontario, Canada. Vol. 07.
8. Shobitha Poulose, Sudarsan N (2014); 'Work Life Balance: A Conceptual Review', International Journal of Advances in Management and Economics, Vol. 3 (2)
9. Theresa J. Brown and Christine Clark (2017); 'Employed Parents of Children with Disabilities and Work Family Life Balance: A Literature Review', Child Youth Care Forum, Vol. 46 : 857–876.
10. Tracey Warren (2004); 'Working part-time: achieving a successful 'work-life' balance, The British Journal of Sociology, Vol. 55 (1) : 99-122.
11. Tracey Warren, Elizabeth Fox and Gillian Pascall (2009); 'Innovative Social Policies : Implications for Work–life Balance among Low-waged Women in England', Gender, Work and Organization, Vol. 16 (1) : 126-150.

IJRAR.ORG E-ISSN: 2348-1269, P-ISSN: 2349-5138

INTERNATIONAL JOURNAL OF RESEARCH AND ANALYTICAL REVIEWS (IJRAR) | IJRAR.ORG

An International Open Access, Peer-reviewed, Refereed Journal

Prioritization Of Macro-Watershed for Soil and Water Resource Management Using Morphometric Parameters and Geo-Spatial Tools - A Case Study of Arain Watershed, Ajmer District, (Raj.)

MRS. SHILPI YADAV[1], PROF. SHYAM S. KHINCHI[2]

1. Research Scholar, Maharaja Ganga Singh University (MGSU), Bikaner, Rajasthan (India).
2. Professor, Head, Department of P.G. Studies in Geography, Dr. BR Ambedkar Government P.G. College, Sri Ganganagar, Rajasthan (India).

ABSTRACT

The quantitative analysis of morphometric parameters is found to be of immense utility in Sub-watershed prioritization for soil and water conservation and natural resources management at micro level. The present work is an attempt to carry out a detailed study of linear and shape morphometric parameters in 19 Macro-Watershed of Arain Watershed and their prioritization for soil and water resource management. The Watershed area of Arain Watershed is 1189 sq kms and located between **$25^0 55^{"}$ N to $26^0 30^{'}$ N** latitude and **$74^0 50^{"}$ E to $75^0 15^{'}$ E** longitudes. Topographic maps of 1972 on 1:50000 scale was utilized to delineate the drainage system, thus to identify precisely water divides using Geographic Information System (GIS). Following Strahler's stream ordering scheme, it has been found that in Arain Watershed the total number of streams is 1711 belonging to different stream orders with the highest order of 7. The study has shown that the Arain Watershed is in conformity with the Horton's law of stream numbers and stream lengths. The prioritization was carried out by assigning ranks to the individual indicators and a compound value (Cp) was calculated. Watersheds with highest Cp were of low priority while those with lowest Cp were of high priority. Thus, an index of high, medium and low priority was produced. The highest priority zone consists of 9 macro-watersheds, medium of 8 and low of 02 Sub-Watershed. High priority indicates that these macro-watersheds are susceptible to greater degree of erosion and application of soil conservation measures becomes inevitable to preserve the land from further erosion and to alleviate natural hazards.

Key Words: Arain Watershed; Macro Watershed; Morphometric Analysis; Prioritization; Remote Sensing: Geographical Information System.

1. Introduction

Given India's burgeoning population, the water crisis has reached critical levels. Growing demands for water resources from industrial, domestic, and environmental sectors, along with increasing quality and quantity issues because of rapid urbanization, have made water resource management imperative in India (Das, A.K.and Mukherjee, S., (2005)). As the opportunity costs of water increase, and management of water resources and their allocation among competing demands assumes vital importance, demand management must indubitably receive preference over traditional supply management (Rajagopal, 2007). Drainage basins, catchments and sub catchments are the hydrological units for planning purposes to conserve natural resources. The watershed management concept recognizes the interrelationships and the linkages between the

topography, landuse, geomorphology, slope and soil. Soil and water conservation is the key issue in watershed management. However, while considering watershed conservation work, it is not feasible to take the whole area at once. Thus the whole basin is divided into several smaller units, as sub watersheds or micro watersheds, by considering its drainage system (Sangita Mishra and Nagarajan, 2010).

The morphometric analysis of the drainage basin and channel network play a vital role in understanding the geo-hydrological behaviour of drainage basin and expresses the prevailing climate, geology, geomorphology, structural, etc. antecedents of the catchment. The relationship between various drainage parameters and the aforesaid factors are well recognized and recently, the availability of remote sensing (RS) data and enabling Geographical Information System (GIS) platform for understanding the morphometric properties of the catchment area and surface drainage characteristics of many river basins in different parts of the globe. (Horton, 1945; Strahler, 1957; Morisawa, 1959; Krishnamurthy et.al., 1996; Agarwal, 1998; Gangalakunta, et.al. , 2004; Nag, 1998; Das and Mukherjee, 2005).

2. Description of the Study Area

The Watershed area of Arain Watershed is 1189 sq kms and located between **25^{0}55$^{"}$ N to 26^{0}30$^{'}$ N** latitude and **74^{0}50$^{"}$ E to 75^{0}15$^{'}$ E** longitudes. The climate of the study area is semi-arid and very hot in sum1mer and extremely cold in winter. The monsoon is of very short duration. The Aravali Mountain range (one of the oldest in the world) in western India runs approximately 482 km from northeast to southwest across the State of Rajasthan. The study area has an average elevation of 312 mtr. Arain Watershed is the part of Ajmer District and covers Ajmer City. Ajmer district is spread over an area of 8,481 sq. kms and it is bounded by Nagaur district to the north, Jaipur and Tonk to the east and Bhilwara district to the south and Pali district to the east. The Population of Ajmer District 2011 census is approximately 2, 58,491. The watershed is well connected by National Highway No-8 and State highways making all the important places of the district easily accessible.

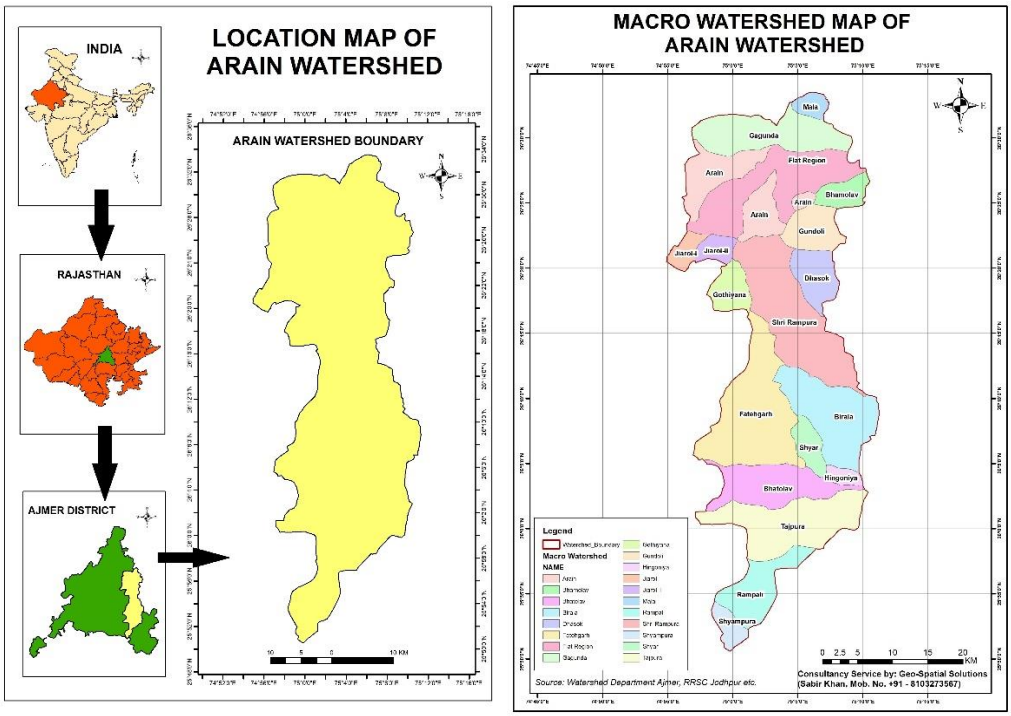


Fig. 1 Location Map of Study Area

3. Material and Methodology

The Study was carried out on watershed level utilizing SOI toposheets, (1972). All the streams were digitized from Survey of India Toposheets, 1961 on 1:50,000 scale. The study was carried out in GIS environment utilizing ArcGis 10.5 for digitization and Erdas Imagine 9.2 Software. Strahler's system of stream analysis is probably the simplest, most used system and same has been adopted for this study.

S. No.	Type of Data	Sources of Data	Utility
1	Remote sensing data	Landsat 8 and Aster Dem (Advanced Space borne Thermal Emission and Reflection Radiometer) Satellite Images	Thematic mapping, vegetative cover factor for sediment yield estimation Erosion -intensity zoning, slope map, Digital elevation map of the study area.
2	Topographical data	Survey of India Toposheet on the scale of 1:50,000 (No., 45i/6, /7, /10, /11, /15, /16)	Base map, contour map, drainage map.
3.	Socio Economic Data	Ground Truth Survey	For Soil and Water resource Conservation
4.	Secondary Data	Soil and Watershed Department of Ajmer.	Watershed Map

Table 1: Sources of Data Required

S No.	Morphometric Parameters	Formulas	Reference
1	Stream Order	Hierarchical rank	Strahler (1964)
2	Stream Length (Lu)	Length of the Stream	Horton (1945)
3	Mean Stream Length (Lsm)	Lsm=Lu/Nu Where, Lu=Total stream length of order 'u' Nu=Total number of stream segments of order 'u'	Strahler (1964)
4	Stream Length Ratio (RL)	RL=Lu/lu-1 Where, Lu= Total stream length of order 'u' Lu-1= Total stream length of its next lower order	Horton (1945)
5	Bifurcation Ratio (Rb)	Rb=Nu/Nu+1 Where, Nu=Total number of stream segments of order 'u' Nu+1= Total stream length of its next higher order	Schumn (1956)
6	Mean Bifurcation Ratio (Rbm)	Rbm=Average of bifurcation ratios of all orders	Strahler (1957)
7	Drainage Density (D)	D=Lu/A Where, Lu= Total stream length of all orders A=Area of the basin(km2)	Schumn (1956)
8	Basin Length (Lb)	Lb=1.312*A0.568 Where, Lb=Length of the basin(km) A=Area of the basin(km2)	Horton (1932)
9	Stream Frequency (Fs)	Fs=Nu/A Where, Nu=Total number of stream segments of all orders A=Area of the basin(km2)	Horton (1932)
10	Texture Ratio (Rt)	Rt=Nu/P Where, Nu=Total number of stream segments of all orders P=Perimeter of the basin(km)	Horton (1932)
11	Form Factor (Rf)	Rf=A/Lb2) Where, A=Area of the basin(km2) Lb2 =Sq of basin length	Horton (1932)
12	Circularity Ratio (Rc)	Rc=4*Pi*A/P^2 Where, Pi='Pi' value i.e.,3.14 A=Area of the basin(km2) P2 = Sq of the perimeter(km)	Miller (1953)
13	Elongation Ratio (Re)	Re=(2/Lb)*(A/Pi)^0.5 Where, Lb=Basin length(km) ,A=Area of the basin(km2)	Schumn (1956)

14	Compactness Ratio (Cc)	Cc=0.2821*P/A^2 Where, P=Perimeter of the basin(km) A=Area of the basin(km2)	Horton (1945)

Table 2: Morphometric Parameters

3.1.WATERSHED CHARACTERSTICS

- The arrangement of streams in a drainage system constitutes the drainage pattern, which in turn reflects mainly Geomorphology, structural/ or lithologic controls of the underlying rocks. The drainage network shows dendritic to sub-dendritic pattern, Parallel & Sequent streams system.
- Drainage ordering represent the number of streams presents in each order defined i.e. 1, 2, 3, 4, 5, 6 and 7 stream orders.
- **Stream Order (Su):** For every watershed, stream ordering is the first and foremost analysis. The observation illustrates the maximum frequency is in the first order it has been also notified that, as the stream order increases there is decrease in stream frequency.
- **Stream Number (Nu):** The total number of streams carried out in an order is known as Stream order.
- **Stream Length (Lu):** The total stream length of various orders has been computed with the help of ArcGIS-10.5 software.

S. No.	Stream Order	Number of Streams	Length(kms)
1	1	878	859.63
2	2	429	412.63
3	3	217	204.45
4	4	101	72.78
5	5	27	23.27
6	6	40	28.58
7	7	19	16.14
	Total	**1711**	**1617.48**

Table 3: Stream Order of Arain Watershed

3.2.Generation of Thematic Maps

- To prepare thematic map first base map has been generated. A base map is a map shows only essential geographic references (such as rail, road, main drainage (double line) on which additional information is plotted; e.g., a topographic map on which geologic information is recorded. A map designed for the presentation and analysis of data; it usually includes only the coordinate, geographical and major political outlines. To prepare base map identify permanent features from georeferenced FCC images and rectify all features from SOI toposheet with scale of 1:50000. After rectification digitization of permanent features (metaled road, rail line, canal, political boundaries and forest boundary) has been done.
- To generate various theme maps of study area information has been extracted from Kharif season satellite images taken by LANDSAT 8 2023.These Satellite imageries had been georeferenced and merged using image processing software ERDAS IMAGINE 9.2. These remotely sensed data were geometrically rectified with respect to survey of India toposheets on 1:50,000 scale. These merged data were used in the present study. Image enhancement techniques were applied for better interpretation of the study area. In this way different layers like, drainage, soil, land use/ landcover have been generated for corresponding theme maps. To compare and interpret all these theme maps overlay analysis has been done. The entire procedure of theme map generation from georeferenced data have been done in ArcGIS 10.3 environment. After completion of map generation field verification or ground truth survey has been done for area estimation. After that final theme maps have been prepared of the present study.
- Drainage has been digitized as separate segments for every stream order.
- Delineation of watershed, and macro watershed have been done.

- Digital Elevation Model is derived from Aster Data from the USGS website. The Digital Elevation Model of Arain Watershed shows the areas elevation (height) at a class of
- Slope map is created with the help of Digital Elevation Model (Aster Data) using ArcGIS-10.5 software. DEM is the basic input for generation of slope map. Slope map is created in spatial analysis tool.
- A land use/land cover map has been prepared with the help of Remote Sensing Data i.e. LANDSAT 8 Satellite imagery, shows the comprehensive information on the spatial distribution of land use/land cover categories and the pattern of their change is a prerequisite for management and utilization of the land resources of the study area.

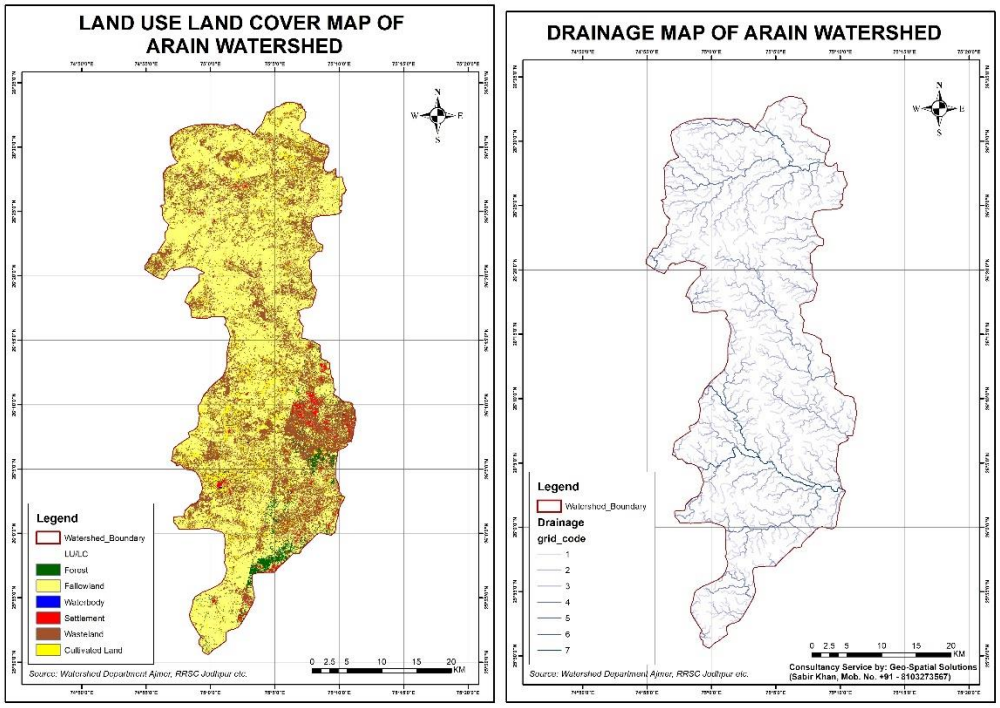


Fig. 2 LULC and Drainage Map of Arain Watershed

4. RESULTS AND DISCUSSION

4.1.STREAM NUMBER AND ORDER:-

The first and most important parameter in the drainage basin analysis is ordering, whereby the hierarchal position of the streams is designated. Following Strahler's scheme, it has been found that in Arain watershed the total number of streams is 1711, out of which 878 belong to 1st order, 429 are of 2nd order, 217 are of 3rd order, 101 are of 4th order, 27 of 5th, 40are of 6th order, and 19 is of 7^{th} order. The Watershed wise number and order is given in the table 3 and depicted in fig. 3. It reveals that the highest number of streams is found in Fatehgarh (232), followed by Shri Rampura (209) and Tajpura (190), where as the smallest number of streams is found in Mala (17) followed by Jiarol-II (19) and Hingonia (25). It is also revealed that the first order streams are highest in number in all watersheds which decreases as the order increases and the highest order has the lowest no of streams. It is revealed that the drainage network of the Arain Watershed is characterized by total length of (1617.48 km). The watershed wise drainage length given in the table reveals that Fatehgarh constitutes the highest proportion of drainage length of (215.98 km), followed by Shri Rampura which is (205.37 km), while the lowest contributors are Mala contributing 13.07 km. Hingonia (15.29 km) and Jiarol-II (16.76 km).

4.2.LINEAR PARAMETERS:-

The Linear Parameters include Drainage Density (Dd), Stream Frequency (Fs), Bifurcation Ratio (Rb), Drainage Texture (Rt), Length of overland flow (Lg).

4.3.DRAINAGE DENSITY:-

The drainage density in the Arain Watershed exhibits a wide range in its values from Mala 0.98 (lowest) in Nand to 1.70 (highest). The high value of drainage density (1.70) indicates that the region is composed of impermeable sub-surface materials, sparse vegetation and high mountainous relief.

4.4.STREAM FREQUENCY

In Arain Watershed the lowest stream frequency is in Bhamolav (1.10), followed by Gundoli (1.11) and Dhasok (1.14). The highest stream frequency is found in Hingonia (2.50). High stream frequency is indicative of high relief and low infiltration capacity of the bedrock pointing towards the increase in stream population with respect to increase in drainage density. The watersheds having large area under dense forest have low drainage frequency and the area having more agricultural land have high drainage frequency. High value of drainage frequency produces more runoff in comparison to others.

4.5.EAN BIFURCATION RATIO

The mean bifurcation ratio of the Arain Watershed is 3.10. The lowest Rbm is found in Jiarol - I (1.72) whereas highest Rbm of 8.13 is in Arain. Low Rbm value indicates less structural disturbance and the drainage patterns have not been distorted whereas high Rbm value indicates high structural complexity and low permeability of terrain.

4.6.DRAINAGE TEXTURE

The lowest Drainage Texture of 1.14 is in Jiarol-II, while as the highest is in Fatehgarh (3.44). The Drainage Texture of the sub-watersheds in Arain Watershed ranges from very course to course.

4.7.LENGTH OF OVERLAND FLOW

The Length of overland flow of Pisangan Watershed is 1.57. It is highest in Mala (2.05), while as lowest is found in Jiarol - I (1.17). Higher value of Lg is indicative of low relief and where as low value of Lg is an indicative of high relief.

4.8.SHAPE PARAMETERS

The shape parameters include Form Factor (Rf), Shape Factor (Bs), Circulatory Ratio (Rc), Elongation Ratio (Re) and Compactness Coefficient (Cc).

4.9.FORM FACTOR

Form Factor is highest in Hingonia (0.18), and lowest in Fatehgarh and Shri Rampura (0.01), indicating them to be elongated in shape and suggesting flatter peak flow for longer duration.

4.10. SHAPE FACTOR

Shape Factor is lowest in Hingonia (5.54), while as it is highest in Shri Rampura (85.99). Pisangan Watershed has a Shape Factor of 34.97. Hingonia has the lowest Circulatory Ratio of 4.68, and it is highest in Fatehgarh (14.38) indicating that all the watersheds represent an elongated shape. Hingonia has the highest Elongation Ratio of 0.48 and the lowest of 0.12 is found in Shri Rampura and Fatehgarh. Arain Watershed has an Elongation Ratio of 0.25 which indicates moderate relief and gentle ground slope.

S.NO	NAME OF THE WATERSHED	STREAM ORDER NUMBER	TOTAL STREAM ORDER	TOTAL STREAM LENGTH (Lu)	PERIMETER (P)(KM)	BASIN LENGTH OF THE WATERSHED	BASIN AREA
1	Arain	IV	117	127.3	80.02	67.44	90.502
2	Bhamolav	II	26	26.14	21.26	17.55	23.554
3	Bhatolav	VI	133	115.56	55.45	58.26	78.180
4	Birala	III	132	142.09	49.14	77.86	104.474
5	Dhasok	III	45	47.61	27.30	29.37	39.411
6	Fatehgarh	VI	232	215.98	67.51	115.17	154.548
7	Flat Region	V	187	167.24	77.02	89.01	119.447
8	Gagunda	V	123	117.85	51.93	68.12	91.416
9	Gothiyana	III	37	36.45	23.21	21.89	29.376
10	Gundoli	III	45	48.55	25.51	30.18	40.493
11	Hingoniya	V	25	15.29	13.39	7.44	9.983

12	Jiarol-I	IV	35	26.65	18.15	11.66	15.650
13	Jiarol-II	III	19	16.76	16.65	12.17	16.327
14	Mala	II	17	13.07	14.28	9.98	13.397
15	Rampali	IV	83	81.62	41.12	43.72	58.670
16	Shri Rampura	IV	209	205.37	68.47	115.40	154.848
17	Shyampura	III	28	18.43	18.86	12.99	17.438
18	Shyar	III	28	26.41	22.52	17.00	22.810
19	Tajpura	V	190	169.11	58.98	86.44	115.992

Table 4: Characteristics of Arain Watershed

S.NO	**NAME OF THE WATERSHED**	**(Re)**	**(Rt)**	**(Rbm)**	**(D)**	**(Fs)**	**(Rf)**	**(Rc)**	**(Lg)**	**(Cc)**	**(S)**
1	Arain	0.16	1.46	8.13	1.41	1.29	0.02	7.10	1.42	0.00	50.26
2	Bhamolav	0.31	1.22	2.84	1.11	1.10	0.08	6.96	1.80	0.01	13.08
3	Bhatolav	0.17	2.40	2.46	1.48	1.70	0.02	8.85	1.35	0.00	43.42
4	Birala	0.15	2.69	2.21	1.36	1.26	0.02	13.35	1.47	0.00	58.02
5	Dhasok	0.24	1.65	2.98	1.21	1.14	0.05	9.07	1.66	0.00	21.89
6	Fatehgarh	0.12	3.44	3.56	1.40	1.50	0.01	14.38	1.43	0.00	85.83
7	Flat Region	0.14	2.43	1.74	1.40	1.57	0.02	9.74	1.43	0.00	66.33
8	Gagunda	0.16	2.37	1.91	1.29	1.35	0.02	11.05	1.55	0.00	50.77
9	Gothiyana	0.28	1.59	2.93	1.24	1.26	0.06	7.95	1.61	0.01	16.31
10	Gundoli	0.24	1.76	1.84	1.20	1.11	0.04	9.97	1.67	0.00	22.49
11	Hingoniya	0.48	1.87	7.98	1.53	2.50	0.18	4.68	1.31	0.04	5.54
12	Jiarol-I	0.38	1.93	1.72	1.70	2.24	0.12	5.42	1.17	0.02	8.69
13	Jiarol-II	0.37	1.14	6.08	1.03	1.16	0.11	6.16	1.95	0.02	9.07
14	Mala	0.41	1.19	2.06	0.98	1.27	0.13	5.89	2.05	0.02	7.44
15	Rampali	0.20	2.02	2.63	1.39	1.41	0.03	8.96	1.44	0.00	32.58
16	Shri Rampura	0.12	3.05	1.92	1.33	1.35	0.01	14.20	1.51	0.00	85.99
17	Shyampura	0.36	1.49	2	1.06	1.61	0.10	5.81	1.89	0.02	9.68
18	Shyar	0.32	1.24	2.22	1.16	1.23	0.08	6.36	1.73	0.01	12.67
19	Tajpura	0.14	3.22	1.84	1.46	1.64	0.02	12.35	1.37	0.00	64.42

Table 4.5 Computation of Morphometric Parameters

4.11. PRIORITIZATION ANALYSIS

The Watersheds have been broadly classified into three priority zones according to their compound value (Cp): -, High (5.30-7.30), Moderate (7.31 – 8.30), and Low (8.31-12.30).

The watershed wise prioritization ranks are given in this table and the final prioritized map of the study area.

S.NO	WATERSHED NAME	SHAPE PARAMETERS					LINEAR PARAMETERS						FINAL RANKING
		(Cc)	(Rc)	(Re)	(Rf)	(S)	(Rt)	(Fs)	(D)	(Rbm)	(Lg)	(CP)	
1	Arain	1.00	1.00	16.00	0.02	13	15.00	10.00	5.00	1	14.00	12.3	16
2	Bhamolav	2.00	2.00	10.00	0.08	7	17.00	17.00	15.00	7	4.00	8.8	14
3	Bhatolav	1.00	1.00	6.00	0.02	12	6.00	3.00	3.00	9	16.00	5.9	3
4	Birala	1.00	1.00	3.00	0.02	15	4.00	12.00	8.00	11	11.00	6.8	6
5	Dhasok	1.00	1.00	8.00	0.05	9	12.00	15.00	12.00	5	7.00	7.5	9
6	Fatehgarh	1.00	1.00	1.00	0.01	18	1.00	7.00	6.00	4	13.00	5.3	1
7	Flat Region	1.00	1.00	2.00	0.02	17	5.00	6.00	6.00	17	13.00	7	7
8	Gagunda	1.00	1.00	5.00	0.02	14	7.00	9.00	10.00	15	9.00	7.3	8
9	Gothiyana	2.00	2.00	9.00	0.06	8	13.00	12.00	11.00	6	8.00	7.7	10
10	Gundoli	1.00	1.00	8.00	0.04	10	11.00	16.00	13.00	16	6.00	8.6	13
11	Hingoniya	4.00	4.00	16.00	0.18	1	10.00	1.00	2.00	2	17.00	5.8	2
12	Jiarol-I	3.00	3.00	14.00	0.12	3	9.00	2.00	1.00	18	18.00	8.1	11
13	Jiarol-II	3.00	3.00	12.00	0.11	4	19.00	14.00	17.00	3	2.00	8.6	13
14	Mala	3.00	3.00	15.00	0.13	2	18.00	11.00	18.00	12	1.00	9.4	15
15	Rampali	1.00	1.00	7.00	0.03	11	8.00	8.00	7.00	8	12.00	6.6	5
16	Shri Rampura	1.00	1.00	1.00	0.01	19	3.00	9.00	9.00	14	10.00	6.8	6
17	Shyampura	3.00	3.00	13.00	0.10	5	14.00	5.00	16.00	13	3.00	8.3	12
18	Shyar	2.00	2.00	11.00	0.08	6	16.00	13.00	14.00	10	5.00	8.6	13
19	Tajpura	1.00	1.00	2.00	0.02	16	2.00	4.00	4.00	16	15.00	6.3	4

Table 4.6 Prioritization Analysis of Morphometric Parameter

4.11.1. Prioritization Analysis of Morphometric Parameter

1. **HIGH PRIORITY**: The watersheds which fall in high priority category are Bhatolav, Birala, Fatehgarh, Flat Region, Gagunda, Hingoniya, Rampali, Shri Rampura and Tajpura. These watersheds generally consist of steep slopes, high drainage density, high stream frequency, low form factor and low elongation ratio. These can be classified under very severe erosion susceptibility zone Thus need immediate attention to take up mechanical soil conservation measures gully control structures and grass waterways to protect the topsoil loss.
2. **MODERATE PRIORITY:** There are five watersheds falling in moderate priority. These include Bhamolav, Dhasok, Gothiyana, Gundoli, Jiarol-I, Jiarol-II, Shyampura and Shyar. These watersheds consist of moderate slopes, moderate values of drainage density, stream frequency, drainage texture and moderate to high form factor, circulatory ratio, and elongation ratio.

3. **LOW PRIORITY:** This category has been attained by Arain and Mala. These watersheds consist of lower slopes, very low drainage density, stream frequency, texture ratio, high form factor, circulatory ratio and elongation ratio. These watersheds can be categorized under very slight erosion susceptibility zone and may need agronomical measures to protect the sheet and rill erosion.

S. No.	Macro - Watershed	Compound Value	Erosion Susceptibility Zone
1.	Arain	12.8	Low
2.	Bhamolav	8.8	Moderate
3.	Bhatolav	5.9	Severe
4.	Birala	6.8	Severe
5.	Dhasok	7.5	Moderate
6.	Fatehgarh	5.3	Severe
7.	Flat Region	7	Severe
8.	Gagunda	7.3	Severe
9.	Gothiyana	7.7	Moderate
10	Gundoli	8.6	Moderate
11	Hingoniya	5.8	Severe
12	Jiarol-I	8.1	Moderate
13	Jiarol-II	8.6	Moderate
14	Mala	9.4	Low
15	Rampali	6.6	Severe
16	Shri Rampura	6.8	Severe
17	Shyampura	8.3	Moderate
18	Shyar	8.6	Moderate
19	Tajpura	6.3	Severe

Table 4.7 Macro -watershed wise Erosion Susceptibility Zone of the Morphometric Analysis

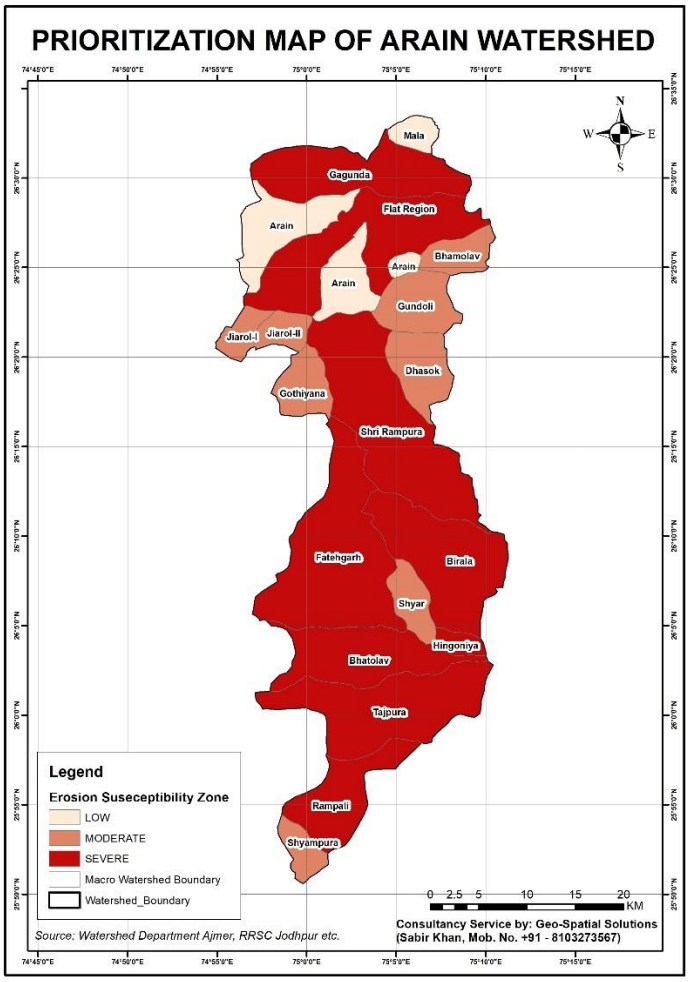


Fig. 4.12.1 Prioritization map of Morphometric Analysis the study of Arian Watershed

4.11.2. Validation through Ground Truth

Conclusion

Watershed prioritization is one of the most crucial parts of planning for the execution of its development and management programs, according to the morphometric approach. The current study shows how effective GIS is for morphometric analysis and Arain Watershed macro-watershed prioritizing. The morphometric features of various watersheds demonstrate their respective traits about the watershed's hydrologic response. According to the study, the Arain Watershed complies with Horton's legislation about the quantity and length of streams. Due to the region's impermeable subsurface materials, scant vegetation, and high mountainous relief, which increase surface runoff and degree of dissection, the drainage density value of 1.70 shows that the area is highly mountainous. The watersheds that fall into the high-priority category are Bhatolav, Birala, Fatehgarh, Flat Region, Gagunda, Hingoniya, Rampali, Shri Rampura, and Tajpura. These watersheds are mostly composed of steep slopes, high drainage density, high stream frequency, low form factor, and low elongation ratio. High priority indicates the greater degree of erosion in the watersheds and it becomes a potential candidate for applying soil conservation measures. As a result, immediate attention to soil conservation measures is required in these watersheds

4.12. Recommendation

It is evident from all the outputs that the Arain watershed has the capacity to carry out its drainage role more successfully. In addition to satisfying the needs of agriculture, the home, and industry, improving the water-holding capacity of the sub-basins through the rehabilitation and standardization of the channels will increase the water bodies' storage capacity. To control soil erosion for the study area's development, we need to use certain conservation measures and practices, such as contour bunding, crop rotation, ditches, strip cropping, reforestation, and the proper use of fertilizers and ploughing systems.

Acknowledgement

Authors are thankful to State Remote Sensing Application Centre (Jodhpur) in Collaboration with the Department of Watershed Development & Soil Conservation (Govt. Of Rajasthan, Jaipur), Indian Meteorological Department (IMD), National Bureau of Soil Survey and Land Use Planning (NBSS-LUP) from where I received all kinds of resource support.

5. References

- Agarwal, C.S., (1998), Study of drainage pattern through aerial data in Nahagarh area of Varansi district, U.P. J. Indian Soc. remote sensing 26 (4), pp 169 – 175.
- Biswas, S., Sudhakar, S. and Desai, V. R., (1999), Prioritisation of subwatersheds based on morphometric analysis of drainage basin: A remote sensing and GIS approach, Journal of Indian society of remote sensing, 27(3), pp 155-166.
- Chopra, R., Dhiman, R., and Sharma, P. K., (2005), Morphometric analysis of subwatersheds in Gurdaspur district, Punjab using remote sensing and GIS techniques, Journal of Indian society of remote sensing, 33(4), pp 531539.
- Chorley, R.J., E.G. Donald Malm and H.A. Pogorzelski., (1957), A new standard for estimating drainage basin shape, Amer. Jour. Sci., 255, pp 138-141.
- Clarke, J.I., (1966), Morphometry from Maps. essays in geomorphology. Elsevier Publ. Co., New York, pp 235-274.
- Das, A.K.and Mukherjee, S., (2005), Drainage morphometry using satellite data and GIS in Raigad district, Maharashtra. Jour. Geol. Soc. India 65, pp 577 – 586.
- Gangalakunta, P, Amal, K and Kothiram, S., (2004), Drainage morphometry and its influence on landform characteristics in a basaltic terrain, Central India – a remote sensing and GIS approach. Inter. Jour. Appl. Earth and Geoinformation, 6, pp 1-16.
- Kuldeep pareta and upasana pareta (2011), Quantitative morphometric analysis of a watershed of yamuna basin, India using ASTER (DEM) data and GIS, International journal of Geomatics and Geosciences, 2(1), pp 248-269.
- Krishnamurthy, J., G. Srinivas, V. Jayaram and M.G. Chandrasekhar., (1996), Influence of rock types and structures in the development of drainage networks in typical hardrock terrain. ITC J., 3-4, pp 252-259.
- Morisawa, M.E., (1959), Relation of morphometric properties to runoff in the Little Mill creek, Ohio, drainge basin. Tech. rep. 17. Columbia University, Department of geology, ONR, New York.
- Nag, S.K., (1998), Morphometric analysis using remote sensing techniques in the Chaka sub-basin, Purulia district, West Bengal. J. Indian Soc. remote sensing, 26 (1&2), pp 69-76.
- Nag.S.K.,(1998): 'Morphometric Analysis Using Remote Sensing Techniques in the Chaka Sub-basin", Journal of the lndian society of Remote Sensing, Vol. 26(1&2), (P.69-75).
- Pandey, V. M. Chowdary and B. C. Mal, “Morphological analysis and watershed management using GIS,” Journal of Hydrology (India), vol. 27 (3-4), pp. 71-84, 2004.
- Sangita Mishra.S, Nagarajan.R., (2010), Morphometric analysis and prioritization of sub-watersheds using GIS and Remote Sensing techniques: a case study of Odisha, India international journal of geomatics and geosciences, 1(3), pp 501-510.
- Schmid B. H., (1997), Critical rainfall duration for overland flow an infiltrating plane surface. Journal of hydrology, 193, pp 45-60.
- Schumm, S.A., (1954), The relation of drainage basin relief to sediment loss. Internat. Assoc. Sci.Hyd. Pub., 36, pp 216-219.
- Schumm, S.A., (1956), Evolution of drainage system and slope in badlands of Perth Amboy, New Jersey. Bull.Geol.Soc.Am. 67, pp 597-46.
- Schumm, S.A., (1963), Sinuosity of alluvial rivers on the great plains, Geol. Soc. Amer. Bull. 74, pp: 1089-1100.
- Strahler, A.N., (1957), Quantitative analysis of watershed geomorphology. Trans. Am. Geophys. Union, 38, pp 913-920.
- Strahler AN., (1964), Quantitative geomorphology of drainage basin and channel network. In: VT Chow (ed), Handbook of applied hydrology McGraw Hill, New York sec-4-II.
- Strahler, A.N., (1964), Quantitative geomorphology of drainage basin and channel network, Handbook of applied hydrology, pp 39-76.
- T.A.Kanth and Zahoor ul Hassan(2012), Morphometric Analysis And Prioritization Of Watersheds For Soil And Water Resource Management In Wular Catchment Using Geo-Spatial Tools, pp.30-41.

Khoj - *A Peer Reviewed International Journal of Geography*
Vol. 10, January-December, 2023, 86-107
DOI: 10.5958/2455-6963.2023.00007.3

Impact of Urbanisation on Urban Climate Change the Urban Heat Island Effect: A Case Study of Ajmer City

Shilpi Yadav[1]*, Sabir Khan[2] and Himanshi Parashar[1]*****

[1,3]*Assistant Professor, Department of Geography, Sophia Girls' College (Autonomous), Ajmer, Rajasthan, India*
[2]*GIS Expert, Department of Forest, Working Plan Office, Betul, Madhya Pradesh, India*
*(*Corresponding author) email id: *shilpi@sophiacollegeajmer.in, **sabirkhan89.gis@gmail.com, ***himanshi@sophiacollegeajmer.in*

Received: 16-02-2023; Accepted: 13-12-2023

ABSTRACT

Transformation has brought about negativity, and urbanization has adverse environmental effects, such as the rising surface temperatures of cities and urban areas compared to the surrounding rural areas. This phenomenon is popularly known as the Urban Heat Island (UHI) effect. UHI is a prominent feature of urban climates and is mainly caused by dark, non-reflective surfaces such as shopping complex parking lots, pavements, rooftops, and skyscraper buildings replacing open spaces and vegetation cover as a result of urban sprawling. This increased land surface temperature within urban areas affects material and energy costs, air pollution levels, and mortality. It also contributes to global warming, which further exacerbates climate change. This study analyzes the relationship between the urban heat island (UHI) intensity and land cover and land use characteristics of Ajmer city. There is significant diversity in the temporal and spatial pattern of temperature distribution in the Ajmer District. The region has experienced dramatic land use and land cover conversions caused by both human activities and natural disasters. The southwest part of the Ajmer District has a significantly lower temperature compared to other areas due to the presence of forestland. Forestland exhibits a lower temperature compared to other categories, except for water bodies. The city center of Ajmer has a lower temperature due to the presence of the Anasagar lake. In conclusion, the spatial layout of land use/land covers in the area has a significant impact on surface temperature.

Keywords: Climate change, Urban Heat Island (UHI), Land cover and land use, Urban sprawling

INTRODUCTION

The world has experienced major urbanization, and by 2050, about 66% of the world population is expected to be urbanized. Therefore, urban spaces have become crucial areas for environmental

changes that would disturb biodiversity, the water cycle, and climatic conditions (Grimm et al., 2008). Cities, where administrative offices and centers of economic activity are located, always attract people as they act as growth poles. The growth of urban areas, which is accompanied by a large population, will require a larger area. The past few decades have seen remarkable demographic, socioeconomic, and environmental transformations, mainly attributable to global urbanization (Malik, 2010). This dynamic phenomenon has sweeping implications, leading to significant LULC (land use and land cover) alterations, as revealed by (Bobrinskaya, 2012). The transition from natural and pastoral areas to built-up environments significantly contributes to biodiversity loss and ecosystem service depletion. Due to urban sprawl, the Urban Heat Island (UHI) phenomenon has expanded (Tiwari *et al.*, 1990). The Intergovernmental Panel on Climate Change (IPCC) publishes a global temperature trend formed from the local warming of UHI. The data compiled by the Climatic Research Unit (CRU) and the UK Met Office CRU, and cited by the IPCC, claim that the atmosphere has warmed by 0.6 to 0.8°C since the 19th century (Singh, 1989).

The rise in urbanization (including both natural increase and migration) and rapid industrialization is one of the major causes of climate change worldwide. Today, the most pressing problem in urban areas is the increasing surface temperature due to the dramatic alteration of the natural surface. Natural vegetation is being removed and replaced by non-evaporating, non-transpiring surfaces such as stone, metal, and concrete.

Understanding Urban Heat Island

The Urban Heat Island (UHI) is a phenomenon where hot surface air is concentrated in urban areas, causing surrounding temperatures in suburban and rural areas to progressively decrease (Figure 1). The UHI phenomenon, which is based on the analysis of incoming and outgoing energy flux from an urban surface system, has been explained (Ahmad, 2014). The energy absorbed

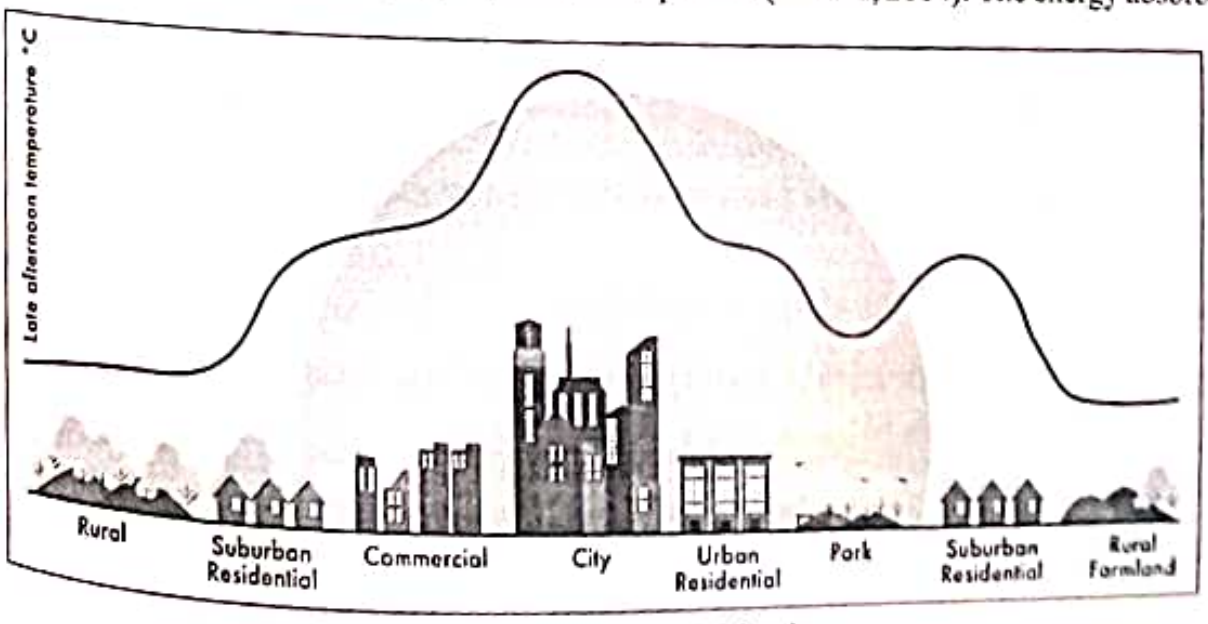


Figure 1: Urban Heat Island

by this urban surface system from solar radiation and anthropogenic activity is physically balanced by warming the air above the surface through convection and radiation, evaporation of moisture, and heat storage in surface materials. The partitioning of this energy balance determines the nature of the urban climate, which in turn affects how cities use energy and the comfort and well-being of citizens. The formation of a UHI depends on several climatic processes.

The phenomena occurring in either the Urban Boundary Layer (UBL) or the Urban Canopy Layer (UCL) can explain this formation. The UBL is governed by processes relevant to the mesoscale, with the higher altitude thermal inversion dominant during the daytime, while the UCL is governed by processes at the microscale, with the lower altitude inversion dominant during night-time (Figure 2).

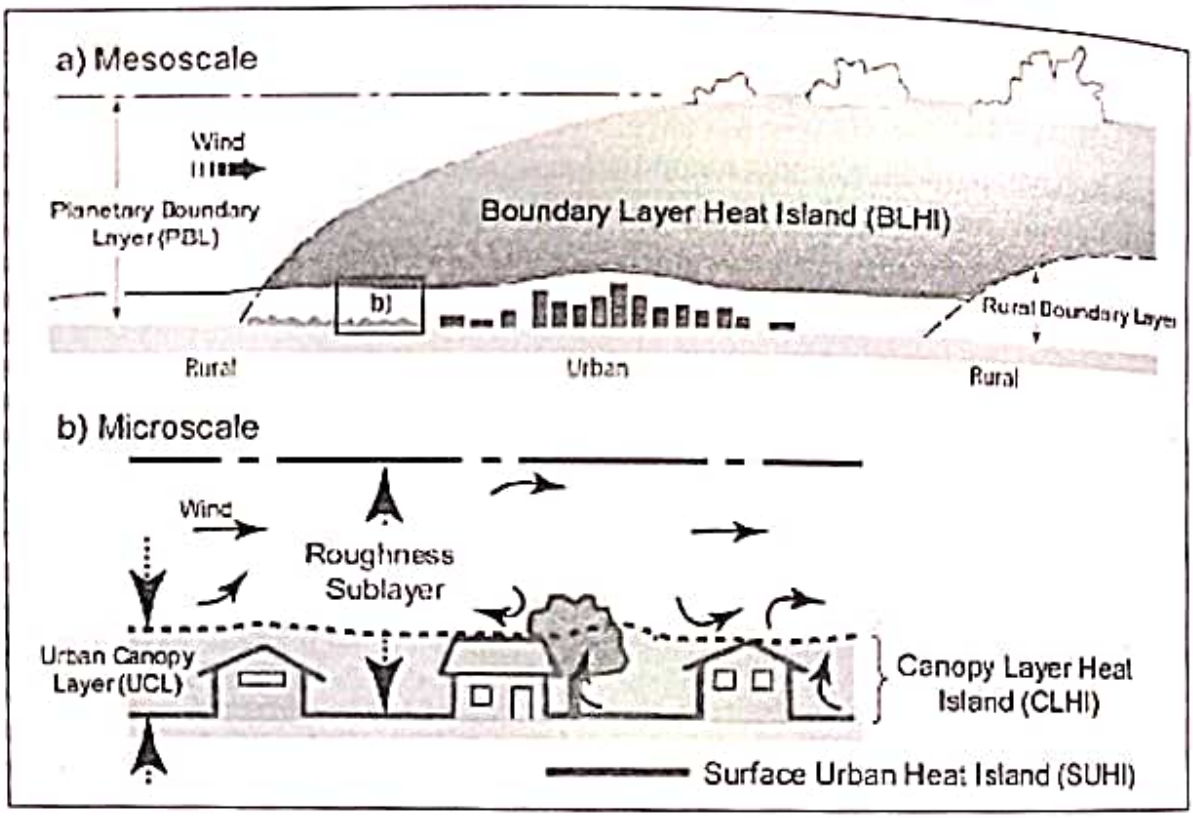


Figure 2: (a) Boundary Layer Heat Island and (b) Surface Urban Heat Island

Causes and Effects of the Urban Heat Island

The causes of the UHI are not limited to one factor. They may differ from city to city. However, some main factors considered to cause the UHI are:

1. Dark-colored pavement surfaces made up of bitumen, which absorb more radiation from the sun due to their color.
2. Decline in water resources like streams, lakes, or ponds, which reduces heat accumulation.

5. Drastic loss of green cover due to encroachment of forest areas, parks, illegal construction, and road widening, among other factors.

Effects of the UHI

The UHI not only affects air quality in cities due to pollution generated by industrial and automobile exhaust, but also leads to a higher extent of particulate matter and greater amounts of dust compared to rural areas. The higher temperature in urban areas caused by the UHI promotes the colonization of species that prefer warm temperatures, such as lizards and geckos. Insects, such as ants, are more abundant in urban areas than in rural areas. These are referred to as ectotherms. Furthermore, cities tend to experience heatwaves, which have adverse effects on human and animal health, resulting in heat CRS, sleep deprivation, and increased mortality rates. The UHI also impacts nearby water bodies, as warmer water from the city's pavements, rooftops, etc., is transferred to drains and sewers, and eventually released into nearby lakes and creeks, thus impairing their water quality. Impact on temperature, urban heat islands (UHIs) can have secondary effects on local meteorology. These include altering local wind patterns, promoting cloud and fog formation, impacting humidity levels, and influencing precipitation rates. The additional heat generated by UHIs creates greater upward motion, which can trigger additional shower and thunderstorm activity.

Furthermore, UHIs create a local low-pressure area during the day, where relatively moist air from surrounding rural areas converges. This convergence can potentially lead to more favorable conditions for cloud formation. Rainfall rates downwind of cities have increased by 48% to 116%. This warming effect also contributes to a monthly rainfall increase of approximately 28% between 20 miles (32 km) and 40 miles (64 km) downwind of cities, compared to upwind areas. Some cities have experienced a total precipitation increase of 51%.

Here are several effects of UHIs

1. Increased city temperature.
2. Thermal discomfort.
3. Higher pollution levels.
4. Increased electricity demand.
5. Uneven rainfall distribution.
6. Increased flood risk.

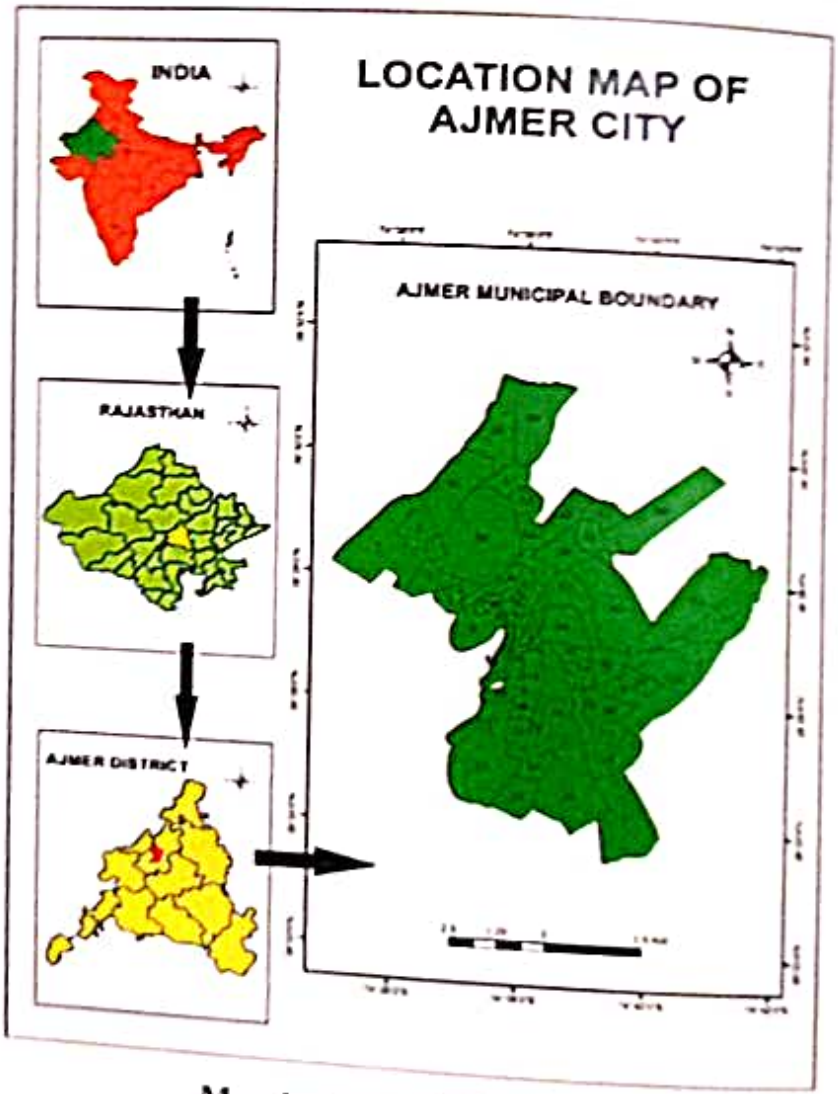
To mitigate urban heat islands, consider the following measures:

1. Increase shade around your home by planting trees and other vegetation, as they can reduce surface and air temperatures through shading and evapotranspiration. Additionally, installing green roofs can help.

2. Install cool rooftops, as they reflect sunlight and reduce rooftop temperatures. Using energy-efficient appliances and equipment is also recommended.
3. Implement urban relief strategies, such as planting trees in cities.
4. Raise awareness and implement heat reduction policies and regulations.
5. Consider installing green rooftops.
6. Utilize energy-efficient appliances and equipment.

Study Region

The historic city of Ajmer is situated in the geographic center of Rajasthan and lies about 131 km southwest of the state capital, Jaipur. It stretches from 26°26' north to 26°23' north and 74°36' east to 74°40' east. The strategic position of this city has been the key to its long and rather turbulent history (Map 1). It has a long history of about 1400 years. Ajmer has witnessed



Map 1: Study Region Map

many changes that have been significant in shaping the urban morphology of the city. The city is strategically located between the important tourist routes of the state, i.e., Jaipur-Jodhpur and Jaipur-Udaipur. Besides, Ajmer has been an important education center in the region. Mayo College (1875), Sophia School (1919), Government College (1836) are premier institutes in the city imparting knowledge since the last century. Ajmer city has an area of 81.70 sq. km and a population of 572,589 (2011 census).

OBJECTIVES OF THE STUDY

The main aim of the study is to analyze the population growth and growth direction of the urban area and its impact on urban climate. The study has the following objectives:

- To analyze the population growth direction (Urban Sprawling).
- To identify the Land Surface Temperature distribution pattern based on LU/LC of Ajmer City.
- To predict the effects of Environmental Change and Promote Future Sustainable Planning Agendas.

RESEARCH METHODOLOGY

The research explores the changes in the land use and land cover pattern, population growth, and impact on the land surface temperature, which includes 60 municipal wards, by using empirical inquiry, a Municipality report, and the use of Remote Sensing and GIS techniques. The Supervised classification method is applied in ArcGIS 10.2 software. Supervised classification, as the name signifies, involves the supervision of the user to carry out the process where a signature set will define which corresponds to a particular class, such as water bodies, urban land, vegetation, buildup, wasteland, and forest, etc. The LST can be derived from the thermal bands of the Landsat TM, ETM+, and Landsat 8 satellite imagery products. The methodology involves, firstly, the correction of different atmospheric noises that have been minimized using the ENVI Fast Line-of-sight Atmospheric Analysis of Hypercubes (FLAASH) atmospheric correction module. Secondly, the extraction of the land surface emissivity (LSE) of the study area to derive LST. Thirdly, biophysical indicators were derived from the different band combinations (Amiri *et al.*, 2009; Fu and Weng, 2016; Li, Zhou and Ouyang, 2013; Owen, Carlson and Gillies, 1998). The non-spatial data is acquired from the census report and master plan of the city. Maps are drawn by combining the spatial and non-spatial data.

Sources of Data

The satellite imagery of Ajmer from the years 2003, 2013, and 2023 has been collected through the USGS site.

The master plan of Ajmer City is taken into consideration.

Ward-wise maps and data have been collected from Ajmer Nagar Nigam and ADA.

RESULTS AND DISCUSSION

Land Use/Land Cover Classification Result and Accuracy Assessment

Image classification is not valid without an assessment of its accuracy. The source of errors does not only come from the classification itself, but also from image registration, badly selected training areas, etc. Accuracy assessment assumes that all differences between the classification results and reference data originate from the classification errors. One of the most common methods of classification accuracy assessment is the error matrix or confusion matrix. This matrix contains a category comparison of the relationship between known, ground-truth data and the classification results for the same category. Overall accuracy is measured in percent and represents the number of pixels correctly classified divided by the total number of pixels. The Kappa coefficient is a measure of overall statistical agreement (Table 1).

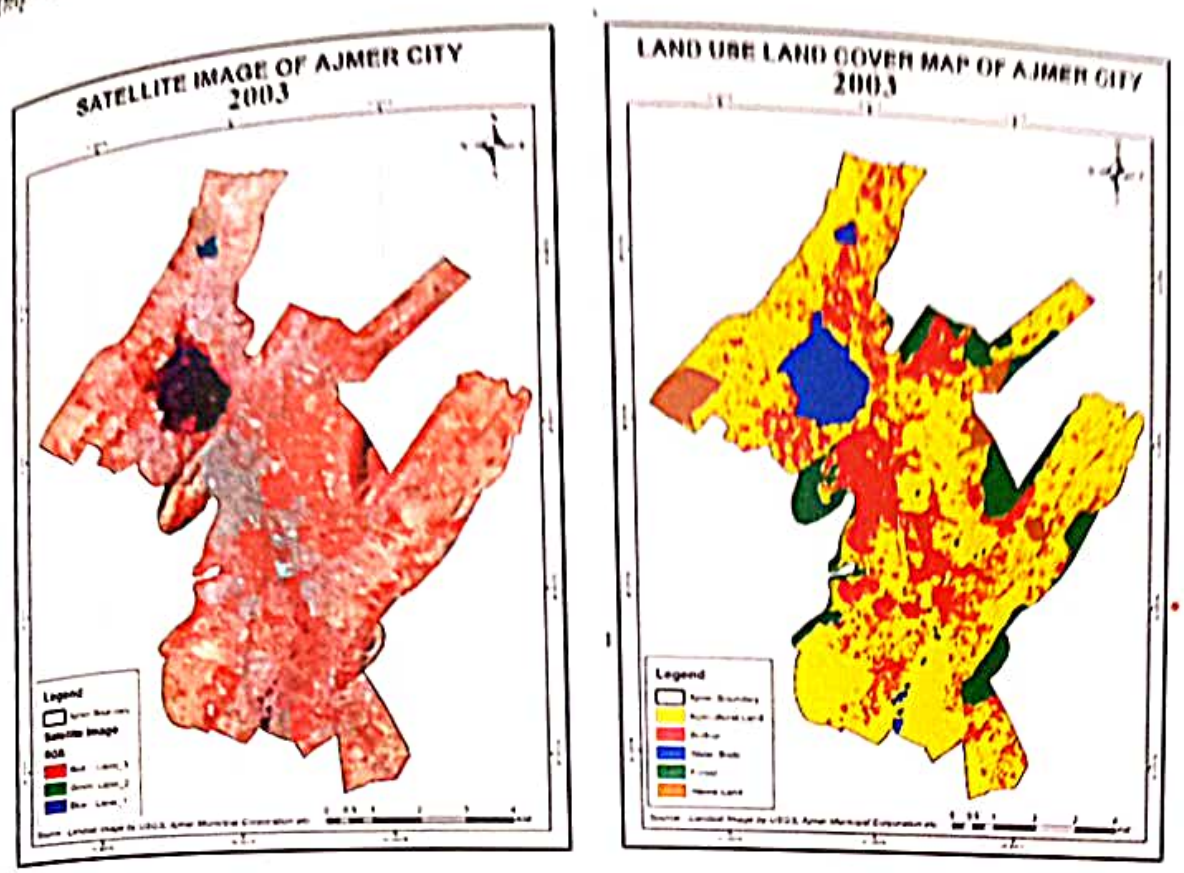
Table 1: Confusion Matrix of 2003 year LU/LC

Classified	Reference Data					
Class	Agriculture	Built - up	Water Body	Forest	Waste Land	Total
Agriculture	35	0	0	01	0	36
Built - up	0	32	0	0	0	32
Water Body	0	0	01	0	0	01
Forest	0	0	0	02	1	03
Waste Land	0	0	0	0	29	28
Total	35	32	01	02	30	100

Overall Classification Accuracy = 87.00%
Overall, Kappa Statistics = 0.7876

Land Use/ Land Cover Classification Result and Accuracy Assessment of Year 2003

In 2003, during our study on land use and land cover, we found that water body cover accounted for 3.49 sq. km., forestland cover accounted for 13.13 sq. km., agriculture cover accounted for 47.34 sq. km., wasteland cover accounted for 2.38 sq. km., and settlement cover accounted for 16.12 sq. km. These statistics show that agriculture and built-up land cover the highest areas, while forest land and wasteland cover the lowest areas of Ajmer City (Map 2).



(a) (b)

Map 2: (a) Satellite Image Map (2003) and (b) LULC Map of Ajmer city (2003)

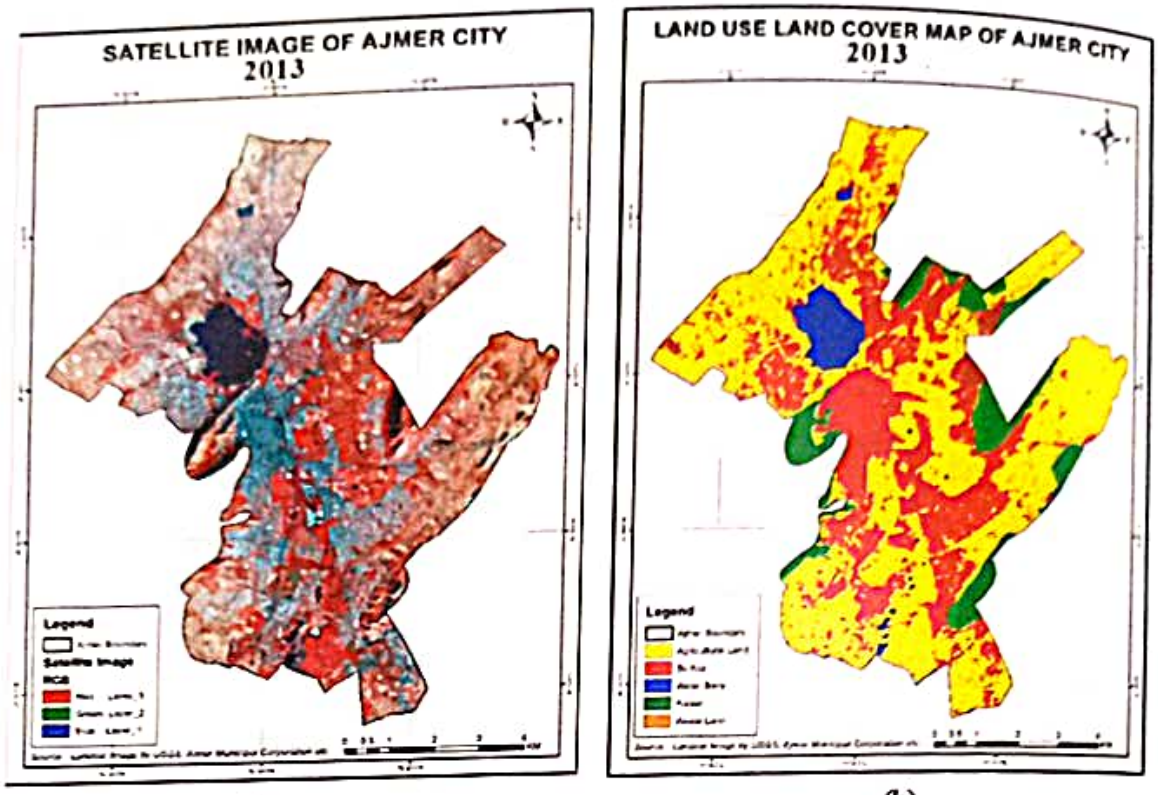
Land Use/ Land Cover Classification Result and Accuracy Assessment of Year 2013

In 2013, the land use and land cover analysis revealed the following areas: water body cover 2.44 Km Sq., forestland cover - 13.11 Km Sq., agriculture cover - 44.79 Km Sq., wasteland cover - 1.49 Km Sq., and settlement cover - 20.66 Km Sq. These statistics indicate that agriculture and built-up land cover the largest area, while forest land and wasteland cover the smallest area in Ajmer City (Map 3).

Table 2: Confusion Matrix of 2013 year LU/LC

Classified Class	Reference Data					
	Agriculture	Built - up	Water Body	Forest	Waste Land	Total
Agriculture	33	0	0	01	0	34
Built - up	0	36	0	0	01	37
Water Body	0	0	01	0	0	01
Forest	0	0	0	01	0	01
Waste Land	0	0	0	0	29	29
Total	33	36	01	02	30	100

Confusion Matrix for LU/LC in 2013
Overall Classification Accuracy: 83.00%; Overall Kappa Statistics: 0.7550



(a) (b)

Map 3: (a) Satellite Image Map (2013) and (b) LULC Map of Ajmer city (2013)

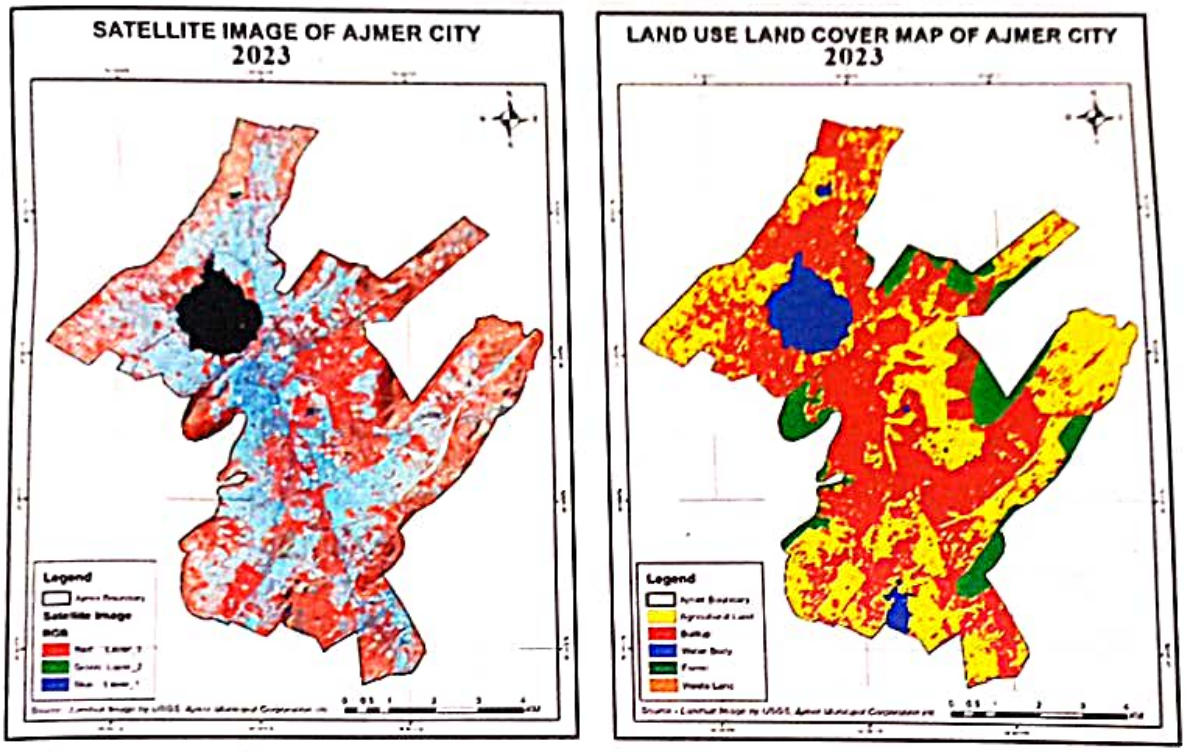
Table 3: Confusion Matrix of 2023 year LU/LC

Classified Class	Reference Data					
	Agriculture	Built - up	Water Body	Forest	Waste Land	Total
Agriculture	34	0	0	0	0	34
Built - up	0	38	0	0	0	38
Water Body	0	0	01	0	0	01
Forest	0	0	0	02	0	02
Waste Land	0	0	0	0	25	25
Total	34	38	01	02	25	100

Confusion Matrix of the 2023 year LU/LC
Overall Classification Accuracy = 89.00%; Overall, Kappa Statistics = 0.7976

Land Use/ Land Cover Classification Result and Accuracy Assessment of Year 2023

In 2023, Land use and Land cover, we found that Water body cover 4.71 Km Sq. area, Forestland cover 13.12 Km Sq. area, Agriculture cover 33.60 Km Sq. area, Wasteland cover 1.36 Km Sq. area, and Settlement cover 30.15 Km Sq. area. These statistics show that the agriculture and built-up land cover the highest area, while the forest land and wasteland cover the lowest area of the Ajmer City (Map 4).



(a) (b)

Map 4: (a) Satellite Image Map (2023) and (b) LULC Map of Ajmer city (2023)

Population Growth

Ajmer's population was 4.85 Lakh. According to the 2001 census, the population of Ajmer is growing at a decadal growth rate of 20% in comparison to the 1991 population. The population of Ajmer is now calculated to be around 572,589. The population of the Ajmer city has grown more than threefold from 1.47 Lakh in 1941 to 5.72 Lakh in 2011 over the last six decades as given in the Table 4 and 5.

Table 4: Land use/cover area in kilometre square

	2003	%	2013	%	2023	%
Agricultural land	46.58	57.01	44.00	53.85	33.22	40.66
Built-up	16.12	19.73	20.66	25.28	30.15	36.9
Water body	3.49	4.27	2.44	2.98	3.85	4.71
Forest	13.13	16.07	13.11	16.04	13.12	16.06
Waste land	2.38	2.91	1.49	1.82	1.36	1.66
Total	81.70	100%	81.70	100%	81.70	100%

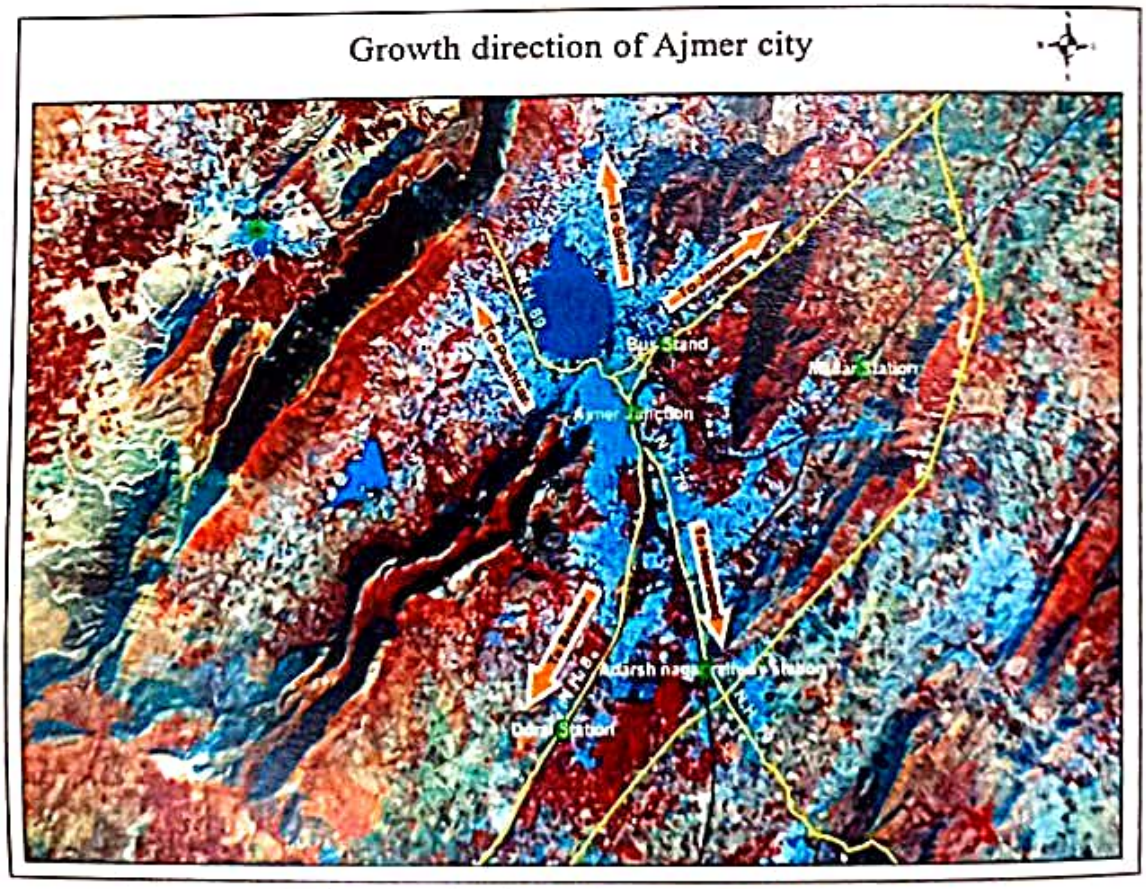
Table 5: Population Growth of Ajmer city

Year	Population	Average Decadal Growth	Growth rate (%)
1941	147,258	-	-
1951	196,633	49,375	33.5
1961	231,240	34,607	17.6
1971	264,291	33,051	14.3
1981	375,593	111,302	42.1
1991	402,700	27,107	7.2
2001	482,575	82,875	20.6
2011	572,589	90,014	18.66

Source: Census of India – 2011

Growth Direction of Ajmer City

Because of physical constraints, its development is in linear strip shape. The city was found to have a pattern for major expansion in three different directions: North, Northeast, and South. Presently, development is taking place along the major roads, namely Jaipur Road, Pushkar Road, Pushkar Bypass, and towards Nasirabad-Bhilwara Bypass (Map 5).



Map 5: Growth direction of Ajmer city

Table 6: Change Rate of LU/LC Since 2003 to 2023

Class	Area in Sq. Km Year 2003	%	Area in Sq. Km Year 2023	%	Changes	Change rate in Percent (%)
Water body	3.49	4.27	3.85	4.71	+0.36	+0.44
Forest	13.13	16.07	13.12	16.06	0.01	-0.01
Agriculture	47.34	57.94	33.60	41.12	13.74	-16.82
Wasteland	2.38	2.91	1.36	1.66	1.02	-1.25
Built - up	16.12	19.73	30.15	36.0	14.03	+16.27

Change rate of Land use/Land cover from 2003 to 2023

The above-mentioned Table 6 shows that Industry and Settlement have drastically increased by 19.73% and 36.0% respectively, from 2003 to 2023, while Agriculture land has drastically decreased by 57.94% and -41.12% respectively, from 2003 to 2023. These changes in Land use and Land cover categories affect the Land Surface Temperature pattern of the study area from 2003 to 2023.

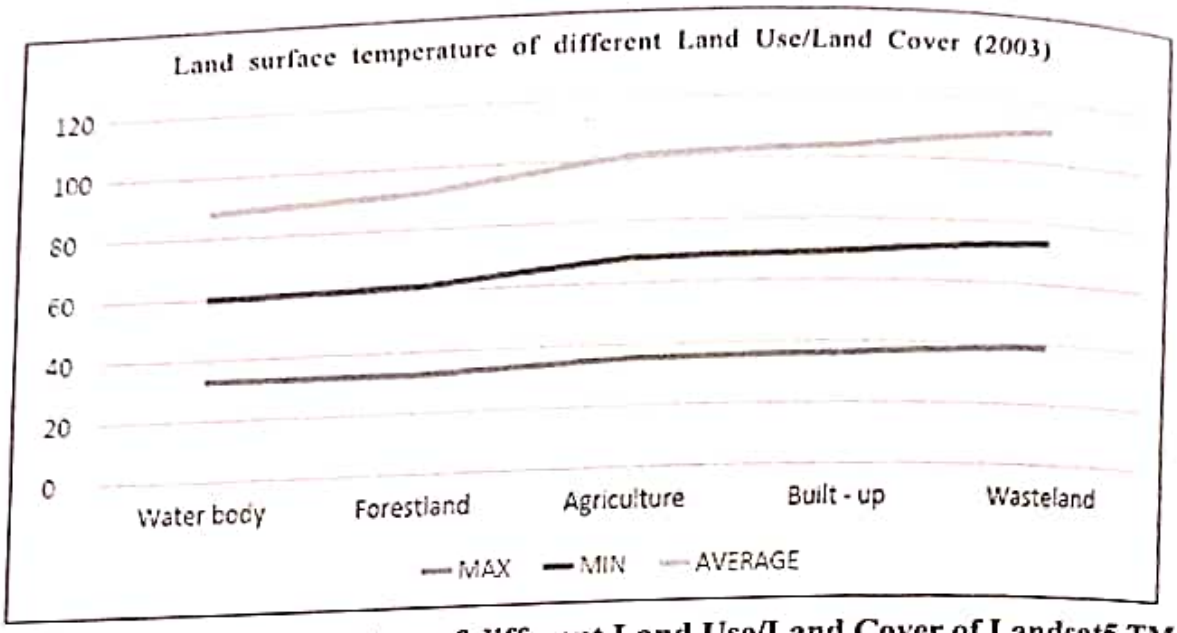
The Relationship is Based on Statistics and Graphical Analysis

50 sle points were randomly selected from different land use/cover types in the study area. Approximately 10 sles were selected from each land use/cover type, such as Forestland, Agriculture, Water body, built-up, and Wasteland. The maximum and minimum temperatures were recorded at each sle point within each category. The average temperature of each land use/cover category for each temporal LST was calculated using the formula for simple arithmetic mean. A linear graph was then plotted using the maximum, minimum, and average temperatures of each category. This process is very helpful for estimating the relationship between the LST map and the LU/LC map.

We found that when the land use/land cover category changes, the temperature also changes. The magnitude of temperature change from one place to another depends on the LU/LC category.

Table 7: Statistic of Land surface temperature of different Land Use/Land Cover of Landsat5 TM (2003)

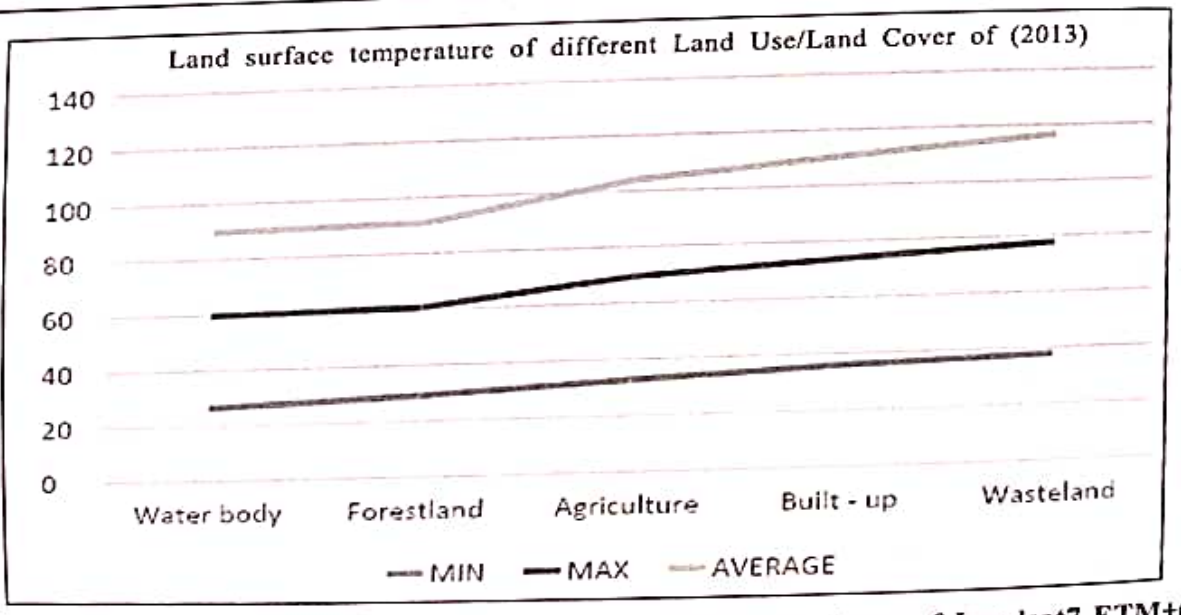
Classes	MAX	MIN	AVERAGE
Water body	32.923	26.816	28.3341
Forestland	32.378	28.85	30.3485
Agriculture	35.221	32.676	33.3726
Built - up	35.93	33.165	34.4283
Wasteland	38.96	34.63	37.0056



Graph 1: Land surface temperature of different Land Use/Land Cover of Landsat5 TM (2003)

Table 8: Statistic of Land surface temperature of different Land Use/Land Cover of Landsat5 TM (2013)

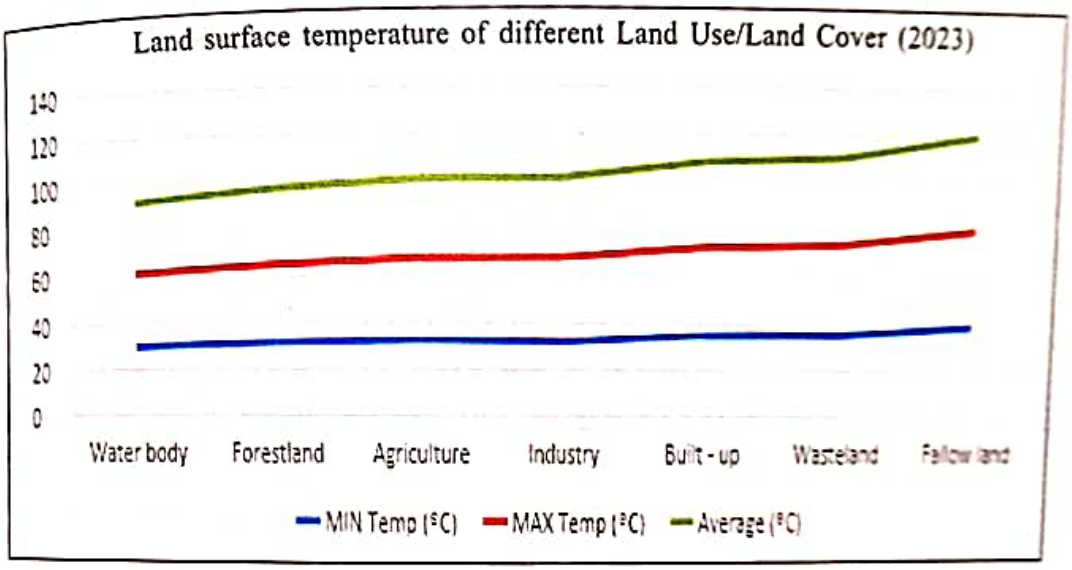
Classes	MAX	MIN	AVERAGE
Water body	26.475	33.269	29.872
Forestland	29.027	31.474	30.2505
Agriculture	32.58	36.716	34.648
Built - up	35.807	37.826	36.8165
Wasteland	37.799	39.843	38.821



Graph 2: Land surface temperature of different Land Use/Land Cover of Landsat7 ETM+(2013)

Table 9: Statistic of Surface temperature of different land use/Land cover of Landsat 8 OLI/TIRS (2023)

nd Use/Cover	MIN Temp (®C)	MAX Temp (®C)	Average (®C)
ater body	29.732	31.822	30.777
orestland	31.491	33.384	32.4375
griculture	32.439	35.124	33.7815
dustry	32.145	35.715	33.93
uilt - up	34.908	37.583	36.2455
asteland	35.345	38.624	36.9845
allow land	38.847	41.434	40.1405

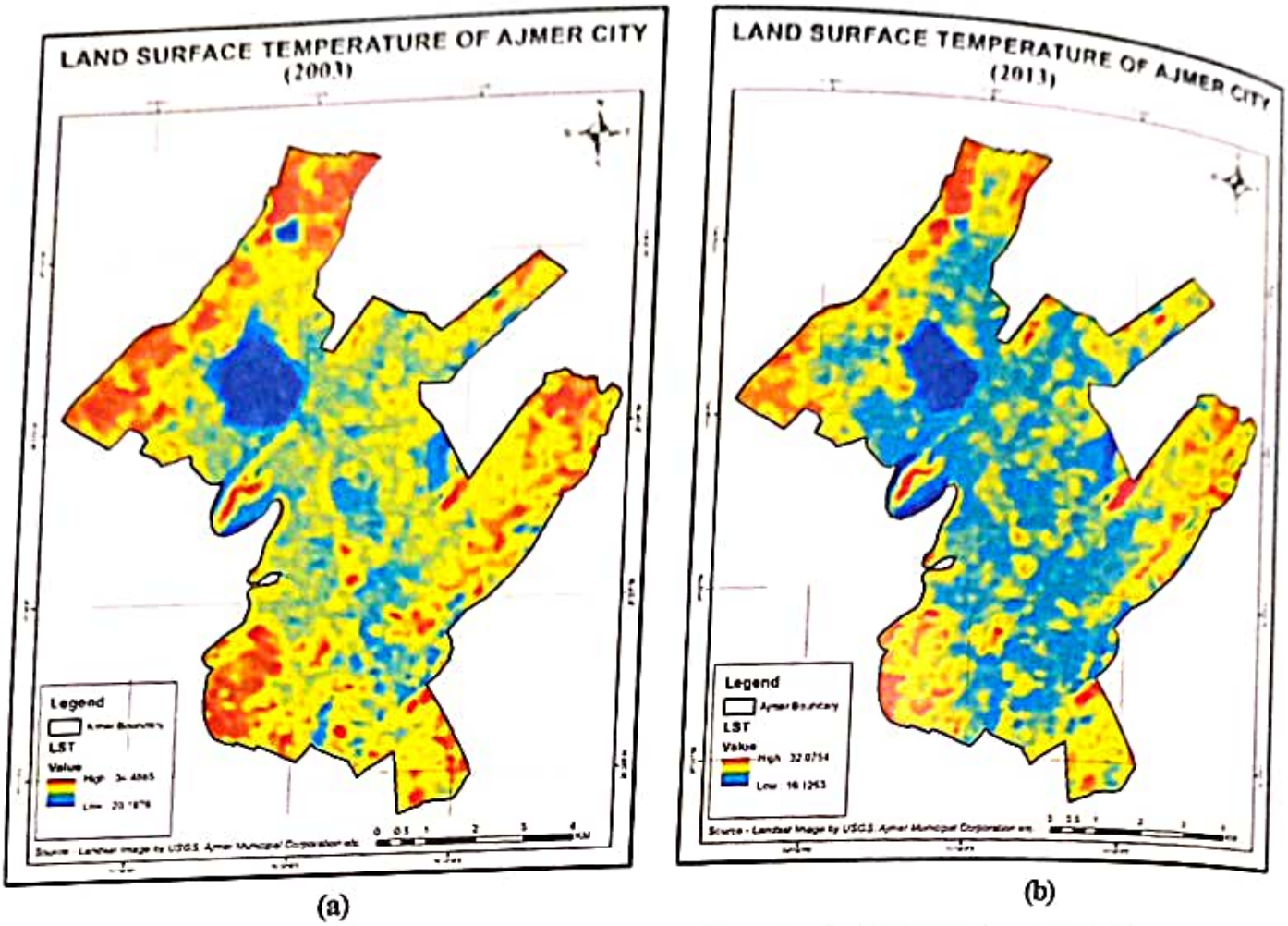


raph 3: Land surface temperature of different Land Use/Land Cover of Landsat7 ETM+(2023)

/e observed a sequence of LU/LC categories that are responsible for an increase in temperature a uniform manner, as shown below: Water body, Forestland, Agriculture, Industry, Settlement, Vasteland, and Fallow land. This sequence of LU/LC categories is responsible for a sustainable ncrease in temperature.

Vater bodies have temperatures ranging from 27 to 32 degrees Celsius, Forestland has mperatures ranging from 29 to 32 degrees Celsius, Agriculture has temperatures ranging from 2 to 36 degrees Celsius, built-up areas have temperatures ranging from 34.5 to 38 degrees elsius, and Wasteland has temperatures ranging from 38 to 40 degrees Celsius.

his means that the distribution pattern of Land Surface Temperature depends on the LU/LC ategories. Areas with water bodies, Forestland, and Agriculture have lower temperatures ompared to other LU/LC categories.



(a) (b)

Map 6: (a) and (b) These maps are showing the changes in Land Surface Temperature from 2003 to 2013

Changes in Land Surface Temperature from 2003 to 2013

When we analyze the LST maps for the years 2003 and 2013, we observe that the maximum temperature in the 2003 map is 42.78 degrees Celsius, while the minimum temperature is 22.7448 degrees Celsius. In comparison, the 2013 map has a maximum temperature of 48.36 degrees Celsius and a minimum temperature of 14.06 degrees Celsius. The reason for this

Table 10: The changes in land surface temperature for different land use and land cover categories

LULC Class	2003 Average	2013 Average	Changes in Degree Celsius
Water body	25.795	28.396	2.601
Forestland	28.688	29.43	0.742
Agriculture	31.969	32.283	0.314
Built - up	34.72	36.086	1.366
Wasteland	38.23	39.819	1.589

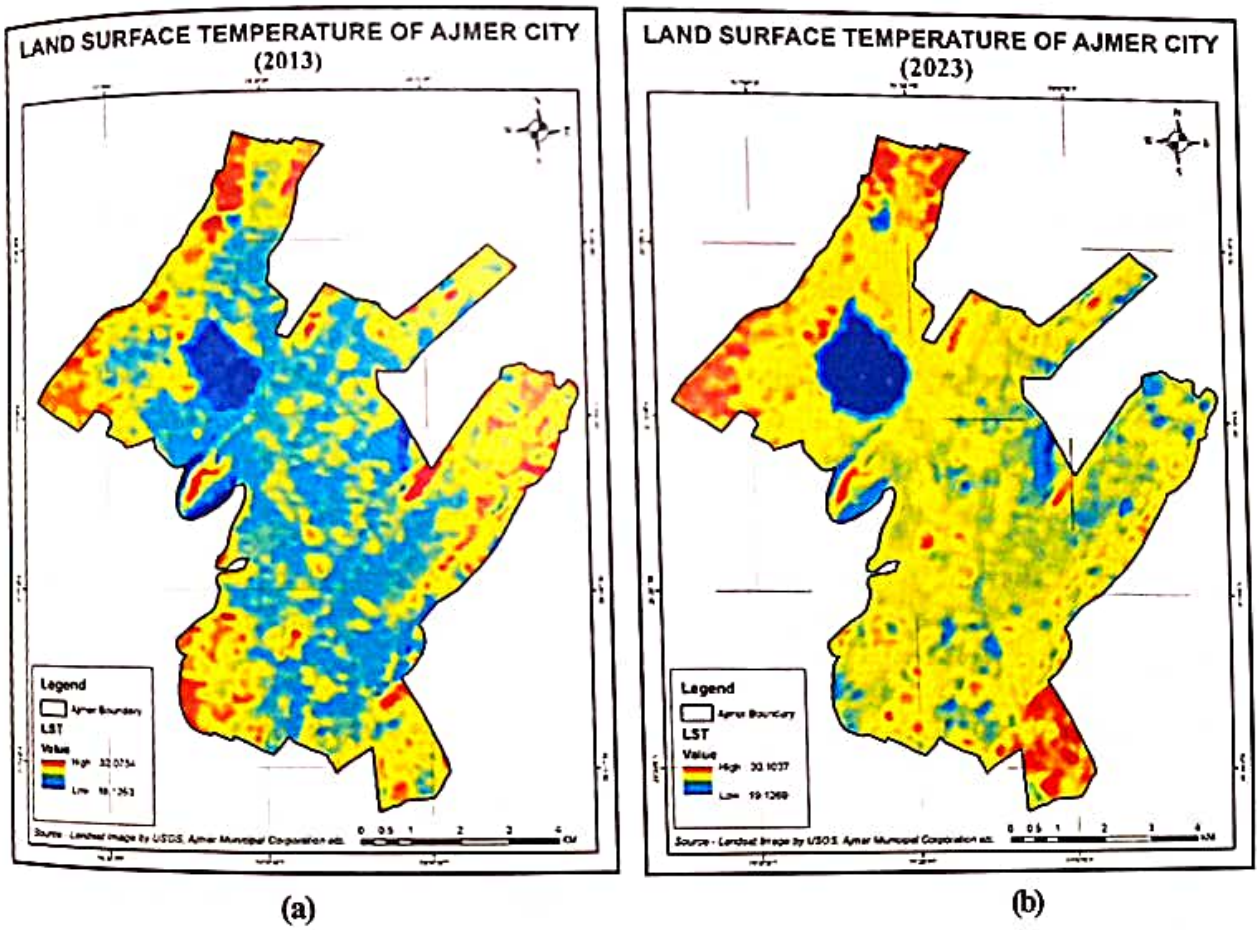
ifference is that the 2001 LST map recorded a minimum temperature of 14.06 degrees Celsius n this region. Additionally, the maximum temperature in the 2013 LST map is also higher due o the lower rainfall in September and October of that year compared to other time periods.

Ve also notice that the overall land surface temperature of the study area has increased by .5825 degrees Celsius from 2003 to 2013.

verage Temperature in 2003, 2013, and Changes in Temperature from 2003 to 2013

When calculating the statistics for each LU/LC category to determine changes in temperature, ve found that fallow land and water bodies experienced the highest increase in temperature rom 2003 to 2013, while agriculture and forestland experienced the highest decrease in emperature during that period. Settlements, industries, and wastelands showed a moderate ncrease in temperature. In conclusion, the temperature increased from 2003 to 2013.

Changes in Land Surface Temperature from 2013 to 2023



(a) (b)

Map 7: (a) and (b) These maps are showing the changes in Land Surface Temperature from 2013 to 2023

Display the LST maps for 2013 and 2023, and indicate the changes in temperature range

Upon analyzing the LST maps from 2013 to 2023, we observed that the LST map for 2013 had a maximum temperature of 48.36 degrees Celsius and a minimum temperature of 14.06 degrees Celsius. In comparison, the LST map for 2023 had a maximum temperature of 45.73 degrees Celsius and a minimum temperature of 28.31 degrees Celsius. The changes in temperature range between 2013 and 2023 can be attributed to certain areas of the 2013 data being covered by clouds, resulting in the minimum temperature of 14.06 degrees Celsius. Additionally, the maximum temperature of the 2013 LST map increased due to lower rainfall in September and October compared to other temporal datasets.

We observed that the overall land surface temperature of the study area decreased by -2.6299 degrees Celsius from 2013 to 2023.

Table 11: The changes in land surface temperature for different land use and land cover categories

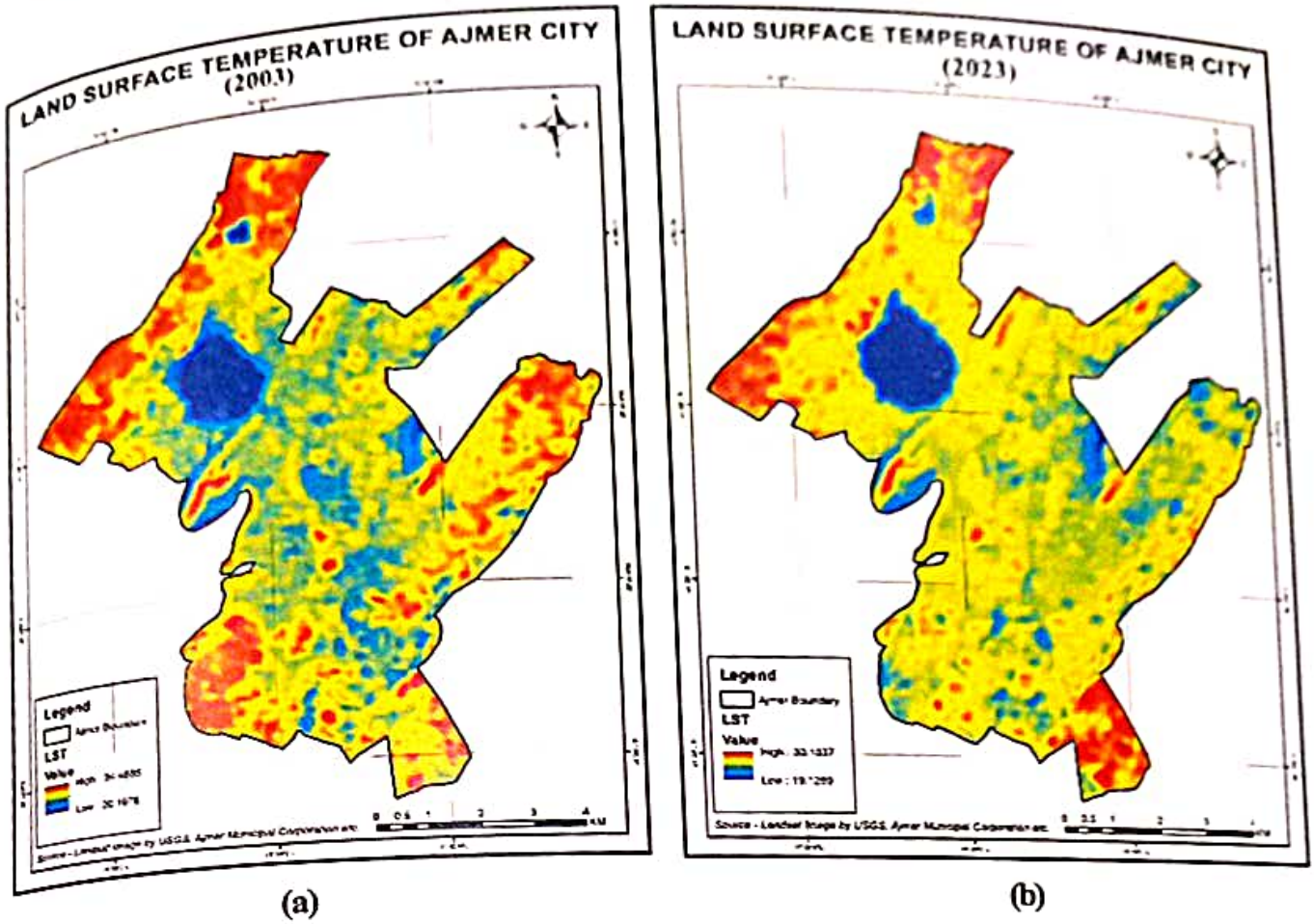
LULC Class	2003 Average	2013 Average	Changes in Degree Celsius
Water body	28.396	29.928	1.532
Forestland	29.43	32.956	3.526
Agriculture	32.283	34.566	2.283
Built - up	36.086	35.865	-0.221
Wasteland	39.819	39.412	-0.407

When we calculate the statistics of each LU/LC category to extract the changes in temperature, we found that the Forestland and Agriculture experienced the highest increment in temperature from 2013 to 2023 compared to Fallow land and industry, which experienced the highest decrement in temperature during the same period. Settlement and Wasteland experienced moderate decrement in temperature, while Water body experienced a moderate increment in temperature from 2013 to 2023.

Finally, we observed that the overall temperature of the study area decreased from 2013 to 2023. Some categories experienced an increase in temperature, while others experienced a decrease from 2013 to 2023.

Changes in Land Surface Temperature from 2003 to 2023

In the 2003 to 2023 LST maps, we observed that the 2003-year LST map had a maximum of 42.78 and a minimum of 22.74 degrees Celsius, while the 2023-year LST map had a maximum of 45.73 and a minimum of 28.31 degrees Celsius. The change in temperature range between 2003 and 2023 in the region is that the rainfall in the study area is very high from September to October in 2023. We observed that the Land Surface Temperature of the overall study area increased by 2.9526 degrees Celsius from 2003 to 2023 (Table 12).



(a) (b)

Map 8: (a) and (b) These maps are showing the changes in Land Surface Temperature from 2003 to 2023

Table 12: The changes in land surface temperature for different land use and land cover categories

LULC Class	2003 Average	2013 Average	Changes in Degree Celsius
Water body	25.795	29.928	4.133
Forestland	28.688	32.956	4.268
Agriculture	31.969	34.566	2.597
Built - up	34.72	35.865	1.145
Wasteland	38.23	39.412	1.182

Changes in Temperature from 2003 to 2023

When calculating the statistics of each LU/LC category to determine changes in temperature, it was found that Forestland and Water Bodies experienced the highest increase in temperature from 2003 to 2023, while the only industry showed a decrease in temperature during the same period. Agriculture, settlement, wasteland, and fallow lands experienced moderate increases in temperature from 2003 to 2023.

Overall, it was observed that the temperature in the study area has increased between 2003 and 2023. The temperature has increased in all LULC categories except for the industry.

To analyze the relationship between Land Surface Temperature (LST) and other corresponding LST maps, both the LST map and the corresponding LST maps were imported into ArcGIS. The LST map was then overlaid with the corresponding LST maps. ArcGIS was chosen for this analysis due to its superior data visualization capabilities. However, interpreting the results of this overlaying process can be challenging. Instead, a specific area with significant LULC (Land Use/Land Cover) transition was selected for each city. The LST and LULC maps of these areas provide insights into how the LST and corresponding LST slices have changed over time.

When examining the LST map of 2003 and its corresponding maps from different dates, it was observed that the LST values changed in the different temporal datasets. From 2003 to 2013, visual interpretation indicated an increase in temperature for both LST and their corresponding LST values. Similarly, from 2013 to 2023, visual interpretation revealed an increase in temperature for both LST and their corresponding LST values, with a decrease in some portions of the corresponding LST.

This is the only way to understand the changes in temperature between different temporal datasets. It means that through this method, we can obtain qualitative information about the different temporal datasets, but not quantitative information.

CONCLUSION

This research examines the significant role played by urban sprawl and land use changes in the development of urban societies. Specifically, it focuses on the urban growth of Ajmer city, one of India's most important historical, cultural, industrial, and commercial cities. The study utilizes remote sensing and GIS technologies, along with satellite data and census data, to monitor the dynamic process of urbanization.

The findings reveal that the expansion of Ajmer city's land area is driven by social factors such as migration, economic development, and population growth. In particular, there has been a recent trend of converting orchards and agricultural land into built-up areas. The study indicates that agricultural land has been the major source of land conversion in the study area. From 2003 to 2023, the agricultural land area has decreased by 25.59% (20.91 sq. km.).

Additionally, the study examines the growth of the built-up area. It is observed that the built-up area has increased by 28.97% (23.67 sq. km.) due to the conversion of agricultural land and wasteland. The population of Ajmer city has also witnessed significant growth, increasing from 1.47 lakh in 1941 to 5.72 lakh in 2011 over the span of six decades.

Furthermore, the study identifies that the major expansion of the city has occurred in three different directions: North, and South. This highlights the need for comprehensive planning and management of urban growth in these areas. The research demonstrates that GIS and remote sensing technologies play a crucial role in analyzing and quantifying spatial phenomena over time. These technologies offer more accurate and cost-effective change detection capabilities compared to conventional mapping techniques.

In conclusion, this study emphasizes the importance of using advanced technologies like GIS and remote sensing for monitoring and understanding urbanization processes. These tools enable researchers to analyze spatial data with better accuracy, lower costs, and faster turnaround times.

This research was conducted to assess the potential of satellite data in estimating surface temperature and to analyze the influence of land use/land cover and vegetation density on surface temperature. It also aimed to explore the relationships between different land use/land cover classes and land surface temperatures.

Temporal Changes and Spatial Patterns of Temperature Distribution

There is significant diversity in the temporal and spatial patterns of temperature distribution in Ajmer District. After studying the years from 2003 to 2023, we observed that the southwest part of Ajmer District has a much lower temperature compared to other areas of Ajmer District, mainly due to forestland. Forestland has a lower temperature compared to other categories, except for water bodies. The Ajmer city center also has a lower temperature due to the presence of the Anasagar lake.

In short, the conclusion is that the spatial layout of land use and land cover in the area greatly impacts surface temperature.

RECOMMENDATIONS

Coarser resolution satellite datasets do not provide sufficient information on surface temperature in heterogeneous and complex urban areas. Therefore, aerial thermal remote sensing with high spatial resolution is the preferred option for realistic assessment of surface temperature and its characteristics in such areas. Additionally, aerial thermal remote sensing offers temporal flexibility, allowing for a more normalized representation of the area and reducing apparent bias caused by solar and atmospheric distortion.

Based on the finding that surface temperature is negatively correlated with vegetation, it is advisable to afforest currently available regions, especially in highly built-up areas and barren land. This will help reduce the surface temperature of the region and to some extent influence the microclimate.

Further research could involve the utilization of more effective classification methods, such as neural networks, support vector machines, and decision tree control classification methods, to reduce classification errors and their impact on the results.

REFERENCES

Ahmad, A. (n.d.). Remote Sensing-GIS Evaluation of Urban Growth-Land Surface Temperature Relationships in Selangor, Malaysia. School for Social, Development and Environmental Studies

Ajmer-Wikipedia, the Free Encyclopedia. (n.d.). Ajmer Study Area Paper. Retrieved from http://en.wikipedia.org/wiki/Ajmer

Bobrinskaya, M. (2008). Remote Sensing for Analysis of Relationships between Land Cover and Land Surface Temperature in Ten Megacities. TRITA-GIT EX 12-008.

Ibrahim, A. A. (2008). Using Remote Sensing Technique (NDVI) for Monitoring Vegetation Degradation in Semi-Arid Lands and Its Relationship to Precipitation: Case Study from Libya. The 3rd International Conference on Water Resources and Arid Environments and the 1st Arab Water Forum.

Joshi, J. P., & Bhatt, B. (2011). Estimating Temporal Land Surface Temperature Using Remote Sensing: A Study of Vadodara Urban Area, Gujarat. *International Journal of Geology, Earth and Environmental Sciences, 5*(2), 1-11.

Kant, T., & Badarinath, K. V. S. (1998). Generation of Fraction Images from AVHHR Data Using Linear Mixing Model. *Journal of the Indian Society of Remote Sensing, 26*(1&2).

Krishna, T. M., Ravi Kumar, G., & Krishnaveni, M. (2009). Remote Sensing Based Agriculture Drought Assessment in Polar Basin of Tamil Nadu State, India. *Journal of Indian Society of Remote Sensing, 37*, 9-20.

Malik, J. (2004). Satellite Based Analysis of the Role of Land Use/Cover and Vegetation Density on Surface Temperature Regime of Delhi, India. International Science for Geo-Information Science and Earth Observation Enchedg.

Odindi, J. O., & Mhangara, P. (2012). Green Spaces Trends in the City of Port Elizabeth from 1990 to 2000 using Remote Sensing. *International Journal of Environmental Research, 6*(3), 653-662.

Rahman, A., Kumar, S., & Fazal, S. (2012). Assessment of Land Use/Land Cover Changes in The North-West District of Delhi Using Remote Sensing and GIS techniques. *Journal of Indian Society of Remote Sensing, 40*(4), 689-697.

Raja, D. R. (2012). Spatial Analysis of Land Surface Temperature in Dhaka Metropolitan Area. *Journal of Bangladesh Institute of Planners, 5*, 151-167.

Services International LTD. (n.d.). Ajmer Climate/Weather/Rainfall. Retrieved from http://www.delhitourism.com/climate-ajmer.html

Shetty, M. A., & Somashekar, R. K. (2014). Assessment of Vegetation Cover Through NDVI, Bangalore India. *Journal of Remote Sensing and GIS, 4*(3), 45-55

Singh, I. (1989). Monitoring of Forest Cover Type and Land Use Classes Through Remote Sensing Techniques (A Case Study in Ranikhet Tehsil, U.P.). *Journal of The Indian Society of Remote Sensing, 17*(2), 35-45.

Singh, R. B., Grover, A., & Zhan, J. (2014). Inter-Seasonal Variations of Surface Temperature in the Urbanized Environment of Delhi Using Landsat Thermal Data. *Energies, 7*, 1811-1828. doi: 10.3390/en7031811

Suribabu, C. R., Bhaskar, J., & Neelakantan, T.R . (2012). Land Use/Land Cover Change Detection of Tiruchirapalli City, India, Using Integrated Remote Sensing and GIS Tools. *Journal of Indian Society of Remote Sensing, 40*, 699-708.

The Yale Center for Earth Observation. (n.d.). Converting Landsat TM and ETM+ Thermal Bands to Temperature. Retrieved from http://www.yale.edu/eco

Tiwari, A. K., Kudrat, M., & Bhan, S. K. (1990). Vegetation Cover Classification in Sariska National Park and Surroundings. *Journal of Indian Society of Remote Sensing, 18*(3), 43-51.

Weng, Q., Lu, D., & Schubring, J. (2004). Estimation of Land Surface Temperature-Vegetation Abundance Relationship for Urban Heat Island Studies. *Remote Sensing of Environment, 89*, 467-483.

How to cite this article: Yadav, S., Khan, S., & Parashar, H. (2023). Impact of Urbanisation on Urban Climate Change the Urban Heat Island Effect: A Case Study of Ajmer City. *Khoj - A Peer Reviewed International Journal of Geography, 10*, 86-107.

Research Paper | Marketing Management | E-ISSN No : 2454-9916 | Volume : 10 | Issue : 5 | May 2024

AN IMPACT STUDY OF SOCIAL MEDIA MARKETING ON CONSUMER BEHAVIOR IN AJMER

Marcel Chaudhary[1], Dr. Varsha Maheshwari[2], Ms. Yuvnika Sogani[3]

[1,3] Research Scholar, Engineering College, Ajmer,
[2]Assistant Professor, Sophia Girls' College, Ajmer

ABSTRACT

In recent years, the proliferation of social media platforms has revolutionized marketing strategies, offering businesses unprecedented opportunities to engage with consumers. This study aims to investigate the impact of social media marketing on consumer behavior in Ajmer, a culturally rich city in India. Through a mixed-methods approach, combining qualitative interviews and quantitative surveys, this research explores how social media marketing practices employed by businesses in Ajmer influence consumer perceptions, attitudes, and purchasing decisions. A structured survey was conducted among a diverse sample of consumers in Ajmer to quantify the extent to which social media marketing influences their purchasing behavior across various product categories. Key variables such as demographic factors such as age, gender, and socioeconomic status will be examined to understand how they moderate the relationship between social media marketing and consumer behavior.

The findings of this study are expected to provide valuable insights for businesses in Ajmer and beyond, enabling them to optimize their social media marketing strategies to effectively target and engage consumers. Furthermore, the research contributes to the existing body of knowledge on the evolving dynamics between social media marketing and consumer behavior in the context of a culturally distinct city like Ajmer.

KEYWORDS: Social Media Platforms, Consumer Behavior, Purchasing Behavior

INTRODUCTION

The development of technology in the modern era has given rise to the ever-evolving trends and consumer dynamics with the help of social media. This modernization has shifted the dynamic of consumer behaviour to be more awareness and consciousness oriented. The focus of this study is to unravel the intricate relation between social media and its corresponding impact on the buying behaviour of consumers. While consumer behaviour has certainly been a well-explored area of study in first-tier urban settings, existing literature tends to miss the mark when it comes to understanding today's consumer needs and how technology plays a crucial role with respect to the population of Ajmer. Ajmer, the two-tier city of Rajasthan, is covered with a blend of tradition and modernity. Such factors make the city an ideal setting to study the relationship between social media and consumer behaviour.

With cutthroat competition, it is absolutely essential for companies to assess how consumers behave on social media and what they're looking for. This understanding would not only help companies get more sales but also would be made aware of intricacies of their product. By delving into the different ways people buy things and what drives their decisions, a clearer picture can be painted of just how much social media influences what they choose to purchase.

The way information gets shared, online interaction, sharing of thoughts, ideas and content in today's era has seen a drastic change due to the important contribution of social media to the field of communication. Society in general has unseemly included social media platforms like Instagram, Facebook, Pinterest, etc. into its everyday life. Hence, for business, it is crucial to capitalize on the fact that this force needs to be understood to the deepest level as it may unlock various factors about human behaviour and how it reacts to spending a portion of their wealth towards certain products that have not been uncovered earlier. Better understanding would ultimately lead to companies realizing the needs of consumers and working on their product to be more consumer friendly.

Ultimately, the importance of social media's relevance is crucial to be assessed not only for the benefit of businesses but also for consumers at the same level. Through social media, consumers can realise that they are voiced and heard, that their concerns are taken into consideration. The collective potential of consumers to bring about a change in the competitive environment of the market stays relevant in today's modern era and this study aims to bring about a clarity especially in tier 2 cities with special reference to Ajmer.

MATERIALS AND METHODS

Social Media Satisfaction Scores (SMSS) of users of different demographic profiles have been used to test the different attributes by following null hypotheses. The calculation of Social Media Satisfaction Scores (SMSS) is essential for obtaining a comprehensive understanding of social media users'

satisfaction to prioritize factors for improvement, facilitate comparative analysis and give a base to predict future trends. Composite scores can be used in predictive modeling to forecast future satisfaction levels or identify potential areas of concern. By analyzing historical data and trends, organizations can anticipate changes in satisfaction and take proactive measures to address emerging issues. It provides a holistic measure of satisfaction by considering multiple factors that contribute to the user experience on social media platforms. This comprehensive approach offers a more nuanced understanding of satisfaction levels compared to assessing individual factors in isolation.

Social Media Satisfaction Score – A Comparative Analysis

Social Media Satisfaction (SMSS) of users of different demographic profiles have been used to test the difference attributes by following null hypotheses-

H_0 01

There is no significant difference in mean score of social media satisfaction based on gender.

H_0 02

There is no significant difference in social media satisfaction scores based on age group of the users.

H_0 03

There is no significant difference in social media satisfaction scores based on the occupation of the users.

H_0 04

There is no significant difference in social media satisfaction score based on the annual income of the users.

H_0 05

There is no significant difference in social media satisfaction score based on the frequency of usage by the users.

Social Media Satisfaction Score – A Comparative Analysis

Hypotheses	Grouping Variable	t value	Significance 2 tailed	Results
H0 01	Gender	0.519	P > 0.05	Accepted
H0 02	Age Group	0.035	P < 0.05	Rejected
H0 03	Occupation	0.027	P < 0.05	Rejected
H0 04	Annual Income	0.347	P < 0.05	Rejected
H0 05	Frequency of Usage	0.740	P > 0.05	Accepted

- **Interpretation & Discussion**

From the table, as the test result of H0 01 - it is evident that t value is .519 , which is not significant at 0.05 level. It reflects that means value of social media satisfaction score of male and female users did not differ significantly. In this context the Null hypothesis "there no significant difference in social media satisfaction scores based on gender profile" is accepted, it implies that the statistical analysis did not find evidence to support the idea that there is a meaningful discrepancy in satisfaction levels between genders. In other words, the data suggests that both male and female users tend to have similar levels of satisfaction with their social media experiences. The null hypothesis H0 02 stating that there is no significant difference in social media satisfaction scores based on age group ($P < 0.05$) is rejected. This suggests that there is a statistically significant difference in satisfaction levels across different age groups. The H0 03 to test significant difference in social media satisfaction scores bases on occupation is rejected, it implies that occupation does have a statistically significant effect on social media satisfaction. The null hypothesis H0 04 stating that there is no significant difference in social media satisfaction scores based on annual income ($P < 0.05$) is rejected. This indicates that annual income does influence social media satisfaction levels significantly. The null hypothesis H0 05 stating that there is no significant relationship between frequency of usage and social media satisfaction scores ($P > 0.05$) is accepted. This suggests that the frequency of social media usage does not have a statistically significant impact on user satisfaction. This interpretation underscores the notion that frequency of usage does not appear to be a significant factor in determining satisfaction with social media platforms in the context of the study. In nullshell, the research findings indicate that while gender and frequency of usage do not significantly influence social media satisfaction, factors such as age group, occupation, and annual income do have a notable effect on users' satisfaction levels with social media platforms.

Understanding Association: Correlation Analysis of Social Media Metrics

- ***Quantification of the relationship between frequency of use of Social Media and Social Media Satisfaction Score***

H_0 06 There is no significant relationship between frequency of use of social media and social media satisfaction score.

Based on correlation analysis performed with the help of SPSS, the r-value is equivalent to -.106, it shows a weak negative relationship between the stated variables. This means that there is a slight tendency for the variables to move in opposite directions, but the relationship is not very strong. It shows that the frequency of use of social media is negatively correlated with the mean score of social media satisfaction. The significance value is 0.281 greater than the p value 0.01 (at the 1% level of significance) shows null hypothesis is accepted, it shows that changes in the frequency of social media use are not significantly correlated with the social media satisfaction and there is no meaningful relationship between these variables.

- ***Quantification of the relationship between Purchase Decision making and Social Media Satisfaction***

H_0 07 There is no significant relationship between purchase decision-making and social media satisfaction score.

Following correlation analysis conducted using SPSS, the obtained r-value equal to 0.917 shows a strong positive correlation between the customers' purchase decision-making and their social media satisfaction score. The obtained significance value is less than 0.01 shows that the null hypothesis is rejected that there is a significant relationship between

purchase decision-making and social media satisfaction score. It implies that customers have faith in various social media option for the purpose of decision-making and their satisfaction score is positively correlated with this.

- ***Quantification of the relationship between Trust and Social Media Satisfaction Score***

H_0 08 There is no significant relationship between trust and social media satisfaction score.

Based on correlation analysis performed with the help of SPSS, the r-value is equivalent to –

0.870. It shows a positive correlation between trust in social media and social media satisfaction scores. A positive correlation between trust in social media and social media satisfaction score suggests that as trust in social media platforms increases, users' satisfaction with their social media experiences also tends to increase. This implies that individuals who have higher levels of trust in the information, privacy, and overall functionality of social media platforms are more likely to report greater satisfaction with their usage. This positive relationship highlights the importance of trustworthiness in social media platforms for fostering user satisfaction. The significance value is less than 0.01 shows that the null hypothesis is rejected, it implies that there is a positive correlation between trust and social media satisfaction score.

CONCLUSION

The comprehensive analysis of social media satisfaction scores (SMSS) and their association with various demographic profiles and user behaviors provides valuable insights into the dynamics of user satisfaction on social media platforms in Ajmer. The findings offer important implications for businesses and marketers aiming to enhance their understanding of consumer preferences and optimize their social media marketing strategies.

Firstly, the study reveals that while gender and frequency of usage do not significantly influence social media satisfaction, factors such as age group, occupation, and annual income play a notable role in shaping user satisfaction levels. This underscores the importance of tailoring marketing efforts and content strategies to different demographic segments to better meet their preferences and needs.

Furthermore, the analysis highlights the weak negative relationship between the frequency of social media usage and social media satisfaction scores. While users may engage with social media platforms more frequently, this does not necessarily translate into higher satisfaction levels. This suggests that simply increasing user engagement metrics may not always lead to improved satisfaction and underscores the importance of focusing on quality interactions and content relevance.

Moreover, the strong positive correlation between purchase decision-making and social media satisfaction scores emphasizes the significant role that social media platforms play in influencing consumers' purchasing behavior. Businesses can leverage this insight to enhance their social media presence and capitalize on the platform's potential to drive sales and conversions.

Additionally, the positive correlation between trust in social media and social media satisfaction scores underscores the importance of building trustworthiness and credibility in social media platforms. Ensuring transparency, privacy protection, and reliable information can enhance user trust and ultimately contribute to higher satisfaction levels.

In conclusion, this study underscores the multifaceted nature of social media satisfaction and emphasizes the need for a nuanced understanding of user preferences and behaviors. By leveraging insights from this analysis, businesses can refine their social media strategies to better engage users, foster trust, and ultimately enhance overall satisfaction levels on social media platforms in Ajmer.

REFERENCES

1. Chaffey, D., & Ellis-Chadwick, F. (2019). Digital Marketing: Strategy, Implementation, and Practice (7th ed.). Pearson Education Limited.
2. Kotler, P., & Armstrong, G. (2018). Principles of Marketing (17th ed.). Pearson Education Limited.
3. Mangold, W. G., & Faulds, D. J. (2009). Social media: The new hybrid element of the promotion mix. Business Horizons, 52(4), 357-365.
4. Ryan, D., & Jones, C. (2009). Understanding digital marketing: Marketing strategies for engaging the digital generation. Kogan Page Publishers.
5. Smith, A. N., Fischer, E., & Yongjian, C. (2012). How does brand-related user-generated content differ across YouTube, Facebook, and Twitter? Journal of Interactive Marketing, 26(2), 102-113.
6. Strauss, J., & Frost, R. (2016). E-Marketing (7th ed.). Routledge.
7. Tuten, T. L., & Solomon, M. R. (2017). Social media marketing (2nd ed.). Sage Publications.
8. Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). Multivariate Data Analysis (8th ed.). Cengage Learning.
9. Hair, J. F., Celsi, M. W., & Ortinau, D. J. (2017). Marketing Research (4th ed.). McGraw-Hill Education.
10. Kothari, C. R. (2004). Research Methodology: Methods and Techniques (2nd ed.). New Age International.
11. Malhotra, N. K., & Birks, D. F. (2007). Marketing Research: An Applied Approach (3rd European ed.). Pearson Education.
12. Sekaran, U., & Bougie, R. (2016). Research Methods for Business: A Skill Building Approach (7th ed.). Wiley.

Proposed Model to Investigate Organizational Culture Profile of Indian Banks -Tri- Factor Approach

Dr. Varsha Maheshwari

Assistant Professor

Department of Management

Sophia Girls' College (Autonomous), Ajmer, Rajasthan, India

ABSTRACT

Review of various studies has supported the view of understanding culture as dynamic and predictor of the organizational success & performance. It is important that an organization understands the current status of its culture and the best way to gain this understanding is by measuring the culture. The intent of this research is to derive distilled organizational culture traits in Indian banking Industry particularly. To measure organizational culture with a structured instrument consisting of 40 question-items that sought to evaluate different aspect of the organizational culture. The questionnaire was circulated among 300 bank's employees of selected public and private sector banks of India for the purpose of study. Factor analysis has been used to explore the distinct organizational cultural traits in Indian banking industry. Furthermore, the explored factors have been grouped to propose a Tri-Factor approach to investigate organizational culture of banking Institution using Path Analysis.

Keywords – Organizational Culture, Artefacts, Banking Institutions, Path analysis

BACKGROUND OF THE STUDY

The banking sector in India is highly competitive and it is important for banks to retain their competitiveness and increased global competition places further pressure on banks to perform financially in order to satisfy the demands of shareholders. Culture sets the boundaries and supports an organization's ability to function. Culture can be studied as an integral part of the adaptation process of organizations and that specific culture traits may be useful predictors of performance and effectiveness (Denison, 1995). All organizations have cultures or sets of values which influence the way people behave in a variety of areas, such as treatment of customers, standards of performance, innovation etc (Flamholtz, 2001). Organizational culture has a significant effect on organizations' long-term sustainability and economic performance. Organizations with a deeply entrenched culture had greater revenue increases, larger workforce expansions, larger increases in share prices, and larger improvements in net income than their counterparts with weaker cultures (Kotter and Heskett ,1992). The literature reviewed and previous studies both suggest that organizational culture is an important variable that influences organizational performance. In the context of competitive scenario, it's imperative to measure organizational culture to diagnose it and to link it with the long term sustainability of the organization.

CONCEPUTAL FRAMEWORK OF ORGANIZATIONAL CULTURE

Defining organizational culture is important, as the concept of organizational culture has been central in the developmental work on organizational effectiveness. To date, there is still no consensus regarding the definition of organizational culture due to culture being presented from various points of view. A widely accepted definition of organizational culture is offered by Schein (1992): "A pattern of basic assumptions—invented, discovered, or developed by a given group as it learns to cope with its problems of external adaptation and internal integration—that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems."

Culture is regarded as the software of mind. (Hofstede, 2005) Organizational culture is based on relatively enduring values embodies in organizational norms, rules, standard operating procedures and goals. The values in an organization's culture are important shaper of members'

behavior and responses to situations, and they increase the reliability of members' behavior (Weick, 1984).These cultural values can smooth interactions among members. People who share an organization's value may come to identify strongly with the organization, and feeling of self-worth may flow from their membership in it (Etzioni, 1975). This is because organizational culture controls the way members make decisions; they interpret and manage the organizational environment and their behavioral patterns. (Cook & Yanow, 1993). Culture is arrangement of different attributes that express an organization and differentiate the firm from other one (Forehand and von Gilmer, 1964). According to Hofstede (1980), culture is the collective thinking of minds which create a difference between the members of one group from another. As per Schein (1990), defines culture is set of different values and behaviors that may considered to guide to success. According to the Kotter and Heskett (1992), culture means fairly established set of beliefs, behaviors and values of society contain generally. In simple words we can understand that culture is gained knowledge, explanations, values, beliefs, communication and behaviors of large group of people, at the same time and same place. corporate culture can be seen as the implicit shared understandings, assumptions and beliefs held in common by an organization's members; that guide their behaviors and understanding of the organizational environment (Olena,2008).

MEASUREMENT OF ORGANIZATION CULTURE

It is important that an organization understands the current status of its culture. The best way to understand the organizational culture is measurement and assessment of the culture. The various Models for assessment of organization culture are available in literature. The Denison Organizational Culture Model was developed from a range of studies on organizational culture and effectiveness (Denison, 1984; 1990; Denison & Mishra, 1995; Denison & Fey, 2003; Denison, Haaland, & Goelzer,2004). This model includes four major aspects of organizational culture, which are called cultural traits i.e. involvement, consistency, adaptability, and mission. The OCAI (Cameron &Quinn, 2006) focuses on some core attributes like dominant characteristics, management of employees, organizational leadership and organizational glue of an organization that reflect its overall culture. The OCTAPACE culture is characterized by the occurrence of openness, confrontation, trust, authenticity, pro-activity, autonomy, collaboration and experimentation. It deals with the extent to which these values are promoted in the

organization. These values help in fostering a climate of continuous development of human resources. (Pareek, 2002). Shared perceptions of daily practices should be considered the core of an organization's culture. (Hofstede, 2001). GLOBE (Global Leadership and Organizational Behavior Effectiveness) empirically established nine cultural dimensions that make it possible to capture the similarities and differences in norms, values, beliefs and practices among societies (House, 2004).

Since culture is a complex phenomenon ranging from underlying beliefs and assumptions to visible structures and practices, healthy skepticism also exists as to whether organizational culture can be measured and assessed.

LITERATURE REVIEW

Aboramandan & Albashiti et. al. (2020) examined the links between organizational culture, innovation and banks' performance in Palestine. Cheung, Wong & Wu (2011) has done a study to develop organizational culture framework in construction. Through a principal component factor analysis, artifacts are arranged into a seven-factor organizational culture framework. Kansal (2011) explored the nature of organization culture across Indian banking sector. Data was collected from 100 managers across public and private sector banks in India with the help of scenario based questionnaire. Human Factors International (2011) has developed 'Organizational Culture Questionnaire' (OCQ) comprising thirteen dimensions of organizational culture viz. Individual Performance, leadership, customer focus, organization structure, communication, conflict management, human resource management, participation, innovation, decision making, professionalism, organizational goal integration & fun to assess organizational culture profile of the firm. Lather, Puskas, Singh, Gupta (2010) has measured the perceived organizational culture and its various dimensions in the selected companies in the manufacturing sector 70 responses to a 4 point scale questionnaire based on the OCTAPACE profile developed by Udai Pareek were obtained from 2 organizations in the NCR. Gholizadeh, Ebrahimzadeh (2010) investigated 164 managers, employees & workers of Iran's steel industry. The questionnaire was developed according to Freeman and Cameron model of organizational culture to investigate the dominant culture and the alignment of the organizational culture. Donnell & Boyle (2008) examined the interaction between organizational culture and the agenda for change in the public sector. This

study reviews evidence that shows why managing culture is important to effectively enhancing both organization performance and, in macro terms, the public service modernization programme. Viljoen & Waveren (2008) explored the concept of culture, organizational culture and quality culture.. Zwaan (2006) assessed the organizational culture of a private hospital in the Western Cape. For the purpose of this study a quantitative methodology adopted used utilizing purposive sampling. Geldenhuys (2006) has investigated the possible relationship between organizational culture and performance among four departments within liberty life's operations division. Information from the administration of Wallach's organizational culture index questionnaire to measure the existing organizational culture in the various departments was obtained from a sample of 170 employees in Liberty life.. Racelis (2005) has described and characterized, at an exploratory level, the culture in Philippine organizations. The study uses the construct of Deshpande, Farley and Webster, who in turn develop their model based on Cameron and Freeman (1991), and Quinn (1988). Deshpande, Farley and Webster have shown that a model of culture types can be derived. Reiman & Oedewald (2002) has examined the assessment and development of organizational culture in complex organizations. Gani and Shah (2001) conducted a study in the banking industry in Kashmir covering three large banking organizations. The total size of the sample was restricted to 125. The study indicates that the banking industry, as a whole, has a poorly perceived organizational climate and that the situation in the private sector banks is worse than that in the public sector ones. Maull, Brown, Cliffe (2001) has presented the theoretical underpinnings for the development of a cultural analysis model that companies should undertake prior to embarking on a TQM programme. The PCOC model (Personal, Customer orientation, Organizational and Cultural issues) which is derived from the Hofstede approach to cultural analysis, was used to determine whether the development of a questionnaire to measure the culture and the organizational environment could be achieved. Muijen et.al. (1999) put their efforts to develop internationally useful questionnaire for measuring organizational culture on the basis of Quinn's (l988) competing values model. The questionnaire is called FOCUS, and it was developed by an international research group from twelve countries. In nutshell, all the researcher have tried to develop an instrument which can measure the organizational culture addressing its key issues & by assimilating all items of observable culture and inferable culture to get a clear picture of organizational culture.

OBJECTIVES OF THE STUDY

The basic objective of the study is to explore the key dimensions of organizational culture in Indian banking institution that can be considered as the predictor of organizational success and performance.

RESEARCH METHODOLOGY

Exploratory followed by descriptive research design has been used for this purpose. To measure organizational culture with a structured instrument consisting of 40 question-items that sought to evaluate different aspect of the organizational culture. The questionnaire was circulated among 300 bank's employees of selected banks for the purpose of study. Respondents are asked to rate these items on 5 point Likert scale ranging from highly agree to highly disagree. The responses so received where converted in quantitative figures by assigning value from 5 to 1 respectively. Reserve coding has been done for negative worded statements. The scores of all the statements related organizational culture of the banks have been added to calculate aggregate score of Organizational Culture Score. To eliminate the problems in analyzing large number of variables i.e. 40, closely related variables have been clubbed using factor analysis.

SAMPLE SELECTION

The Indian banking can be broadly categorized into nationalized (government owned), private banks, foreign banks and specialized banking institutions. For the purpose of research, public and private sector banks have been taken into consideration. As Indian banking sector is dominated by the public and private sector banks, the analytical exploration of organizational culture would pave the way of comparative framework of public and private sector banks in India. For this purpose, 3 public sector banks – Bank of Baroda, Bank of India, Punjab National Bank and 3 private sector banks – ICICI Bank, Axis Bank and HDFC bank have been selected for the purpose of study.

RELIABILITY OF INSTRUMENT

To measure the internal consistency and reliability of the instrument, Cronbach's Coefficient α was calculated for the instruments. Cronbach's alpha is widely believed to indirectly indicate the degree to which a set of items measures a single uni dimensional latent construct. By using SPSS 16 the values of

Cronbach $\alpha = 0.911$ has been attained. The value is above the thresh hold limits of 0.75 of Cronbach α values. From the above discussion and cross examining the reliability of the instrument developed can be claimed.

TESTING OF THE APPROPRIATENESS OF FACTORS MODEL

The Kaiser Meyer Olkin (KMO) has been used to test the appropriateness of factor model. The value of KMO statistics 0.849 was found which is greater than the desirable value 0.5. Thus the correlations between pairs of variables are explained by other variables and the factor analysis appropriate. A value lesser than 0.5 statistics indicate that correlation between variables cannot be explained by other variables thus the factor analysis may not be appropriate (Malhotra, 2005). Thus this also supports appropriateness of factor analysis.

IDENTIFICATION OF FACTORS

To investigate the underlying factors of 40 organizational culture artifacts, factor analysis has been performed. The technique of factor analysis provides a fascinating way of reducing number of variables in a research problem to a smaller or more manageable number by combining selected ones in to factors (Nargundkar, 2005). Furthermore, to achieve a simpler and pragmatically more meaningful factor solution for interpretation, the commonly used VARIMAX rotations were performed (Hair et al., 1998; Sharma, 1996). Factors having Eigen values greater than 1 are considered significant. For the purpose of this study, the factorized artifacts are grouped and termed as organizational culture factors. These factors were taken by using Rotated Component matrix in which the factors were clubbed according to their largest loading values. The factor analysis yielded a 9 factor solution with 70.43% variance. The highly inter correlated variable has been grouped under one factor. Involvement, performance orientation, integration, risk management, strategic orientation, agreement, value orientation, customer orientation & adaptability are identified as organizational cultural artefacts in banking sector.

EXPLORING THE RELATIONSHIP AMONG ORGANIZATIONAL CULTURE ARTIFACTS IN BANKS – PATH ANALYSIS

In the present research, it is imperative to study the relationship among the cultural traits and the effect of cultural traits on the organizational culture. For this purpose, path analysis (AMOS SPSS 21) has been used to explore the relationship status among the cultural traits and the degree of impact on the overall organizational culture. It helps researchers disentangle the complex interrelationship among variable and identify the most significant pathways involved in predicting an outcome.

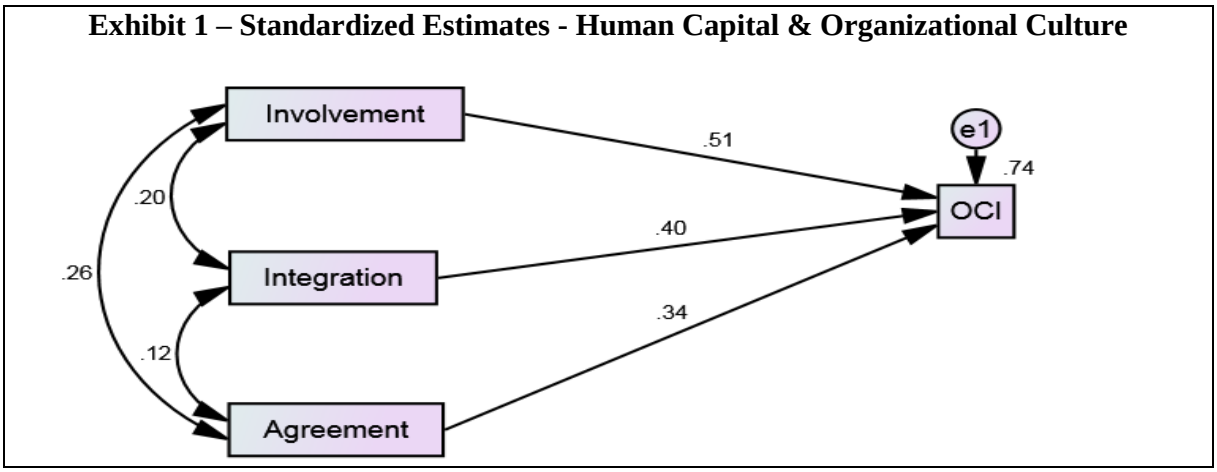
In order to portray distilled results, identified dimensions (with the help of factor analysis) have been grouped into 3 building blocks. So that, the researcher can examine to what extent the different building blocks of organizational culture are affecting the overall organizational culture in selected banking institution in India. The detailed analysis of three models have been given in following section –

Model Implementation

Model 1 – Impact of Human Capital Factors on Organizational Culture

First model has been developed to measure the interrelationship between human capital factors and organizational culture in selected Indian banks. For this purpose, path coefficients have been calculated with the help of AMOS SPSS 21. The pictorial presentation of the case is as follows -

Exhibit 1 – Standardized Estimates - Human Capital & Organizational Culture



The values marked on single headed arrows towards 'Organizational Culture Index' (OCI) are Standardized regression weight (.51, .40, .34) and the value marked on double headed arrows among all predictor variables are correlation score (.26, .20, .12) and the value (.74) attached with the endogenous variable along with error term is – square multiple correlation. Detailed analysis of these value is presents in following section-

- **Model Results**

Table 1 : Path Coefficients Output for the Path Model specified in Exhibit 1

Path	Parameter Estimate	Standard Error	C.R.	Result
OCI<- Involvement	.305	.019	16.322	Significant Effect
OCI<- Integration	.232	.017	13.285	Significant Effect
OCI<- Agreement	.173	.016	10.915	Significant Effect

The value shown in the above table can be used to test whether the constituting factor of human capital is affect the organizational culture or not. In this case, since all the values of the critical ratio are greater than 1.96 thus the effect of exogenous variable is significant.

Table 2: Standardized Regression Weights

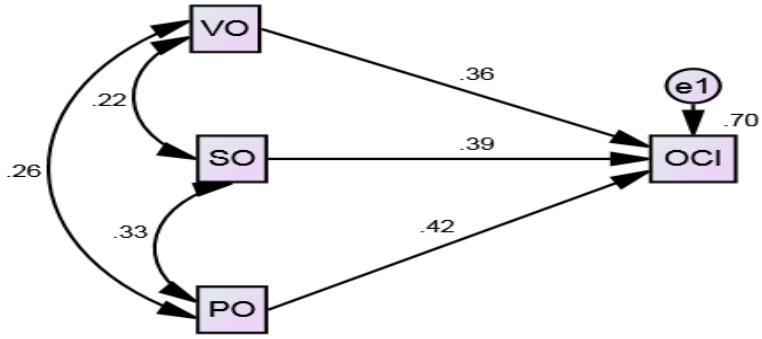
Path			Estimate
OCI	<---	Involvement	.511
OCI	<---	Integration	.405
OCI	<---	Agreement	.337

Standardized regression weights represent the average amount of change in the dependent variable (Y) in Y standard deviations, given a standard deviation unit increase in the predictor variable (controlling for the other predictors in the model). (AMOS 16.0, User guide Manual). Thus by critically examining the above mentioned value, it can be inferred that involvement is the major contributing predictor variable among the all predictor variable in 'Human capital Model' carrying the standardized regression weight 0.511 further followed by integration and agreement.

Model 2 – Principle Factors & Organizational Culture

This model has been developed to measure the interrelationship between principle factors and organizational culture in selected banks in India.

Exhibit 2 – Standardized Estimates – Principle Factors & Organizational Culture



Here,

VO – Value Orientation, SO – Strategic Orientation, PO – Performance Orientation

- **Model Results**

Table 3 - Path Coefficients Output for the Path Model specified in Exhibit 2

Path	Parameter Estimate	Standard Error	C.R.	Result
OCI<- VO	.224	.021	10.601	Significant Effect
OCI<- SO	.196	.017	11.369	Significant Effect
OCI<- PO	.256	.021	12.102	Significant Effect

As shown in the above table, all the critical ratio (CR) is > 1.96 for a regression weight, that path is significant at the .05 level or better (that is, its estimated path parameter is significant). It can be inferred that all predictor variable (constituting principle factors) affects the organizational culture significantly.

Table 4: Standardized Regression Weights

Path	Estimate
OCI <--- VO	.356

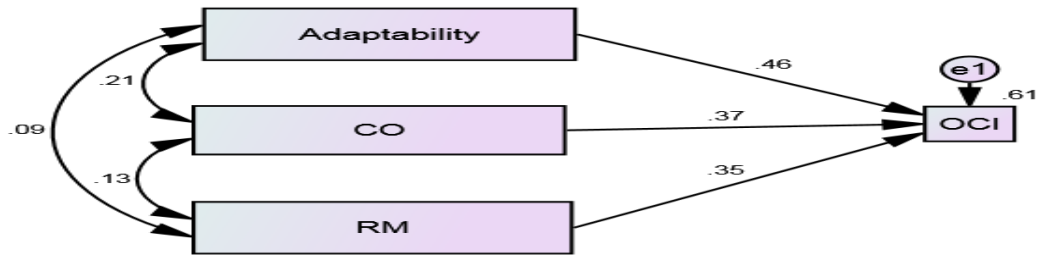
Path	Estimate
OCI <--- SO	.391
OCI <--- PO	.420

Standardized regression coefficients allow comparing theintensity of effects of the different predictor variables on the dependent variable within the same group of respondents. As it is clear from the above table, the effect of performance orientation is stronger than the effect of strategic orientation and value orientation on organizational culture. The standardized regression weights represent the amount of change in the dependent variable that is attributable to a single standard deviation unit's worth of change in the predictor variable (AMOS 16.0 User Guide Manual). Performance orientation produce a change of .42 to a single standard deviation units' change in organizational culture, high among all the predictor variable.

Model 3 – Peripheral Factors & Organizational Culture

To measure the interrelationship among peripheral factors and organizational culture, following path model has been developed.

Exhibit 3– Standardized Estimates – Peripheral Factors & Organizational Culture



Here,

CO – Customer Orientation, RM – Risk Management

- **Model Results**

Table 5 - Path Coefficients Output for the Path Model specified in Exhibit 3

Path	Parameter Estimate	Standard Error	C.R.	Result
OCI<- Adaptability	.259	.021	12.224	Significant Effect
OCI<- CO	.225	.023	9.697	Significant Effect

OCI<- RM	.202	.022	9.347	Significant Effect

In addition to the estimates displayed on the path diagrams, Amos also provides the same information in tabular form. The tabular output also displays standard errors and tests of statistical significance. The Critical ratio is the estimate divided by the standard error. Values greater than 1.96 tend to indicate an estimate that is statistically significantly different from zero at the .05 level. As shown in the above table, all the path coefficient are significant at the level of 0.05 level of significance. It implies that all the predictor variable of peripheral factors has significant effect on organization culture.

Table 6: Standardized Regression Weights

Path			Estimate
OCI	<---	Adaptability	.463
OCI	<---	CO	.369
OCI	<---	RM	.349

Standardized estimates allow evaluating the relative contributions of each predictor variable to each outcome variable. The standardized estimates for the fitted model appear above. The standardized regression weights viz .463, .369 and .349 represent the amount of change in the dependent variable that is attributable to a single standard deviation unit's worth of change in the endogenous variable – organizational culture. It implies that adaptability is affecting high among all the exogenous variable carrying the standardized regression weight 0.463, producing approx 50 % change in the organizational culture attributable to a single standard deviation change in organizational culture.

Assessing Model Fit

Table 7: Fit Measures

Fit Measures	***Human Capital Model***	***Principle Factors Model***	***Peripheral Factors Model***
Normal fit Index (NFI)	1.000	1.000	1.000
Root mean Square (RMR)	0.000	0.310	0.482
Parsimonious NFI (PNFI)	0.000	0.000	0.000

Akaike Info. Criterion (AIC)	20.00	28.00	28.00
Comparative Fit Index (CIF)	1.000	1.000	1.000
Chi Square	Chi-square = .000, Degrees of freedom = 0		

To report overall model fit, above mentioned parameters in the table has been considered. The value of ***Normal fit Index*** varies in the range of 0 (no fit) to 1 (perfect fit) (Arbuckle, 2003). As shown in the above table, all the value of NFI stands at 1 that implies that on this basis, model is fit.. ***Root Mean Square Error of Approximation (RMSEA)*** is related to residual in the model. RMSEA values range from 0 to 1 with a smaller RMSEA value indicating better model fit. RMSEA (Root Mean Square Error of Approximation) takes into account the population error of approximation and the number of degrees of freedom in the model (adjusts for model complexity). Acceptable model fit is indicated by an RMSEA value of 0.06 or less (Hu & Bentler, 1999). In the present case, model 1's RMSEA value is 0.00 <.05, hence it is perfect model fit but in model 2 and 3, it is not up to the mark. As per studies literature, the value of ***Parsimonious adjusted Normal fit Index (PNFI)*** 0 = poor and close to 1 resembles good fit (Arbuckle, 2003). The value of PNFI in all models is equal to 0.000; which reveals that on the basis of PNFI, the presented models are not adequately fit.The value of ***Akaike Information Criterion (AIC)*** can vary in the range of [-∞;+∞]. According to Byrne (2001), the high value resembles the poor fit. On the basis of comparative evaluation of all models, AIC value is minimum in Human capital model (AIC = 20) that implies in comparison to all models, Human capital model is good model. The ***Comparative Fit Index (CFI)*** is equal to the discrepancy function adjusted for sample size. CFI ranges from 0 to 1 with a larger value indicating better model fit. Acceptable model fit is indicated by a CFI value of 0.90 or greater (Hu & Bentler, 1999). As mentioned in the above table, CIF is 1 in the entire model; hence fitness of good model is validated.

The ***chi-square value*** is a measure of the extent to which the data were incompatible with the hypothesis. A chi-square value of 0 would ordinarily indicate no departure from the null hypothesis (Bollen, 1990). But in the present case, the 0 value for degrees of freedom and the 0 chi-square value merely reflect the fact that there was no null hypothesis in the first place. This line indicates that Amos successfully estimated the variances and co variances. If the implied co

variances had been identical to the sample covariance, the chi-square statistic would have been 0. You can use the chi-square statistic to test the null hypothesis that the parameters required to have equal estimates are really equal in the population. However, it is not simply a matter of checking to see if the chi-square statistic is 0. (AMOS 16.0)

Model Findings

Table 8: Squared Multiple Correlation

Predictor Factor	Endogenous Variable	Square Multiple Correlation
Human Capital	Organizational Culture	0.745
Principle Factors	Organizational Culture	0.702
Peripheral Factors	Organizational Culture	0.606

Interpretation

To study the comparative effect of different building block of organizational culture on overall culture of banking institution, the value of squared multiple correlation has been placed under one preview. The squared multiple correlation of a variable is the proportion of its variance that is accounted for by its predictors. In the present case, Human Capital account for 74% of the variance of organizational culture, 70% of variance is accounted by Principle factors and Peripheral factors account for 60.6% variance on the basis of implementation of their respective model individually. It implies that constituting factors of Human capital, accounts highest variance in organizational culture followed by principle factor and then peripheral factors.

Human capital is primed to become a more dominant variable affecting the organizational culture as a key driver of productivity and profits embodying the dimensions related to involvement, integration and agreement personified in personnel of the organization, thus it bearing a higher impact on organizational culture. At the second level, principle factor i.e. the factors related to the internal focus of the banks, basically to value orientation, performance orientation and strategic orientation derive change in the status of organizational culture. Peripheral factor are as the end level, explaining 60% of variance in organizational culture. The remaining variances in organizational culture in the respective model are due unexplained variance i.e. the error term. Human capital model explaining 74.5% variance in overall organizational culture, rest 25.5% variance is due to unexplained factors i.e. error terms.

Similarly, in case of principle factors, 29.8% variance of the total is due to error terms. In case of Peripheral factors, by putting all the factors related to external focus i.e. adaptability, customer orientation and risk management, these clubbed factors are explaining only 60.6 % variance in the overall organizational culture, rest of the variance i.e. 39.2 % is due to unexplained variance i.e. error term.

To sum up, path analysis can be used to describe the directed dependencies among a set of variables in order to explore the relationship among the variable with the help of integrated graphical representation.

SYNTHESIS

Culture sets the boundaries and supports an organization's ability to function. Culture can be studied as integral part organizations and critical organizational culture traits can be traced that can be use as predictor of organizational success and sustainability. All organizations have cultures or sets of values which influence the way people behave in a variety of areas, such as treatment of customers, standards of performance, innovation etc. Despite the considerable body of organizational literature that has been conducted to examine the relationship between corporate culture and firm performance in various countries as well as industries, there is very little literature that recognizes organizational culture studies within the context of the Indian Banking industry. In order to develop a holistic model to measure and diagnose the organizational culture specifically in Indian banking institution, a tri-factor model has been proposed assimilating explored nine factors of organizational culture linked with organizational performance. A more sophisticated understanding of the tie between culture and organizational outcomes can be developed by establishing link between explored organizational cultural traits and performance.

REFERENCES

Aboramadan, M., Albashiti, B., Alharazin, H. and Zaidoune, S. (2020), "Organizational culture, innovation and performance: a study from a non-western context", Journal of Management Development, Vol. 39 No. 4, pp. 437-451.

Cameron K.S., Quinn, R.E. (2006). *Diagnosing Changing Organizational Culture : Based on the competing values framework*. Jossey Bass, A Wiley Imprint, San Francisco, CA

Cook, S., & Yanow, D. (1993). Culture and Organizational Learning. *Journal of Management* , 373-390.

Denison, D.R. (1990). *Corporate culture and organizational effectiveness.* New York, Wiley Publishing House.

Denison, D.R., Fey, C.F. (2003). Organizational Culture and effectiveness: can American theory be applied in Russia? *Organization science, 14 (6),* 686-706

Denison, D.R., Mishra, A.K. (1995). Toward a Theory of Organizational Culture and Effectiveness. *Organization Science*, *6(2),* 204-223.

Donnell, O.O., Boyle, R. (2008). Understanding and Managing Organizational Culture *CPMR Discussion Paper*, Institute of Public, Dublin, Ireland

Ebrahimzadeh, R. (2010).An Analytical model of the organizational culture evaluation in Iran steel industry: a survey research of Tuka Steel Investment Holding Company. *International Journal of ISSI, 7 (1)* 1-10

Etzioni, A. (1975). *A Comparative Analysis of Organizations.* New York: The Free Press.

Faerman, L.B. (2009). The relationship between organizational culture and effectiveness in university residence hall association.. *ProQuest Dissertations and Theses.* The Humanities and Social Sciences Collection

Flamholtz, E.(2001).Corporate Culture and the Bottom Line .European Management Journal, *Elsevier Science Ltd, 19(3)* 268–275.

Forehand, G. A., Von Gilmer, (1964). Environmental Variations in Studies of Organizational Behavior. *Psychological Bulletin*, 62, 361-382.

Gani, Shah, F.A. (2001). Correlates of Organizational Climate in Banking Industry. Indian Journal of Industrial Relations, *Shri Ram Centre for Industrial Relations and Human Resources, 36(3),* 301-322.

Geldenhuys, T.(2006).Organizational culture as a predictor of performance: a case study in liberty life, *Research Project*. Gordon Institute of Business Science, University of Pretoria

Hofstede, G. (1980). *Culture's Consequences: International Differences in Work-Related Practices*. Beverly Hills, CA: Sage.

Hofstede, G. (2001). *Culture Consequences: Comparing Values, Behavior, Institutions and Organization*. Sage Publication, USA

House R.J. et al. (2004). *Culture, Leadership, and Organizations: The GLOBE Study of 62 Societies*. Thousand Oaks, CA: Sage.

Human Factors International (2011). *Report Organizational Culture Assessment Instrument*. Public administration

Kansal, Purva , Effects of Organization Culture in the Dynamic Context of the Indian Banking Industry (2011). *Quest-Journal of Management and Research, II (I),* 43-56.

Kotter, J.P. &Heskett, J.L. (1992).*Corporate culture and performance*. New York: Macmillan.

Lather, A.S., Puskas, J., Singh, A.K., Nisha, Gupta (2010). Organizational culture: A study of selected organizations in the manufacturing sector in the NCR. *Agriculture Economics, 56, 2010 (8),*349–358

Mahotra, K.N. (2005). *Marketing Research : An Applied Orientation.* Pearson Education, Singapore, pp. 560-65.

Maull,R., Brown, P., Cliffe, R. (2001). Organizational Culture and Quality Improvement. *International Journal of Operations & Production Management,* 21 (3) 302 – 326

Nargundkar, R. (2005). *Marketing Research : Text and Cases.* Tata McGraw Hill Publishing Company Limited., Delhi, pp. 194-200.

Olena, H.M. (2008). The importance and the influence of the corporate culture in a merger and acquisition context. Master´s Programme in Leadership and Management in International Context, Baltic Business School

Pareek U (2002), “Training instruments in HRD and OD”, Tata McGraw –Hill, New Delhi

Racelis, A.D. (2005). An Exploratory Study of Organizational Culture in Philippine Firms. *Philippine Management Review, 12,* 72-86.

Reiman, T., Oedewald P. (2002).The assessment of organizational culture: A methodological study, ESPOO 2002 VIT Research Notes 2140

Schein (1990). Organizational Culture, *American Psychologist*, 45, 2, 109-119.

Schein, E.H. (1992). *Organizational Culture and Leadership*. .Jossey Bass, A Wiley Imprint, San Francisco, CA

Viljoen, S.J., Waveren, C.C.V.(2008). An Improved Model for Quantifying an Organizational Quality Culture. *PICMET 2008 Proceedings*, 27-31 July, Cape Town, South Africa

Weick, K. (1984). Organizational Culture as a Source of High Reliability. *California Management Review* , 57-91.

Zwaan, L. (2006). Assessing Organizational Culture in A Private Hospital in The Western Cape, *Mini-thesis*, Department of Industrial Psychology, Faculty of Economic and Management Science, University of the Western Cape.

Research Paper | Marketing Management | E-ISSN No : 2454-9916 | Volume : 10 | Issue : 5 | May 2024

AN IMPACT STUDY OF SOCIAL MEDIA MARKETING ON CONSUMER BEHAVIOR IN AJMER

Marcel Chaudhary[1], Dr. Varsha Maheshwari[2], Ms. Yuvnika Sogani[3]

[1,3] Research Scholar, Engineering College, Ajmer,
[2]Assistant Professor, Sophia Girls' College, Ajmer

ABSTRACT

In recent years, the proliferation of social media platforms has revolutionized marketing strategies, offering businesses unprecedented opportunities to engage with consumers. This study aims to investigate the impact of social media marketing on consumer behavior in Ajmer, a culturally rich city in India. Through a mixed-methods approach, combining qualitative interviews and quantitative surveys, this research explores how social media marketing practices employed by businesses in Ajmer influence consumer perceptions, attitudes, and purchasing decisions. A structured survey was conducted among a diverse sample of consumers in Ajmer to quantify the extent to which social media marketing influences their purchasing behavior across various product categories. Key variables such as demographic factors such as age, gender, and socioeconomic status will be examined to understand how they moderate the relationship between social media marketing and consumer behavior.

The findings of this study are expected to provide valuable insights for businesses in Ajmer and beyond, enabling them to optimize their social media marketing strategies to effectively target and engage consumers. Furthermore, the research contributes to the existing body of knowledge on the evolving dynamics between social media marketing and consumer behavior in the context of a culturally distinct city like Ajmer.

KEYWORDS: Social Media Platforms, Consumer Behavior, Purchasing Behavior

INTRODUCTION

The development of technology in the modern era has given rise to the ever-evolving trends and consumer dynamics with the help of social media. This modernization has shifted the dynamic of consumer behaviour to be more awareness and consciousness oriented. The focus of this study is to unravel the intricate relation between social media and its corresponding impact on the buying behaviour of consumers. While consumer behaviour has certainly been a well-explored area of study in first-tier urban settings, existing literature tends to miss the mark when it comes to understanding today's consumer needs and how technology plays a crucial role with respect to the population of Ajmer. Ajmer, the two-tier city of Rajasthan, is covered with a blend of tradition and modernity. Such factors make the city an ideal setting to study the relationship between social media and consumer behaviour.

With cutthroat competition, it is absolutely essential for companies to assess how consumers behave on social media and what they're looking for. This understanding would not only help companies get more sales but also would be made aware of intricacies of their product. By delving into the different ways people buy things and what drives their decisions, a clearer picture can be painted of just how much social media influences what they choose to purchase.

The way information gets shared, online interaction, sharing of thoughts, ideas and content in today's era has seen a drastic change due to the important contribution of social media to the field of communication. Society in general has unseemly included social media platforms like Instagram, Facebook, Pinterest, etc. into its everyday life. Hence, for business, it is crucial to capitalize on the fact that this force needs to be understood to the deepest level as it may unlock various factors about human behaviour and how it reacts to spending a portion of their wealth towards certain products that have not been uncovered earlier. Better understanding would ultimately lead to companies realizing the needs of consumers and working on their product to be more consumer friendly.

Ultimately, the importance of social media's relevance is crucial to be assessed not only for the benefit of businesses but also for consumers at the same level. Through social media, consumers can realise that they are voiced and heard, that their concerns are taken into consideration. The collective potential of consumers to bring about a change in the competitive environment of the market stays relevant in today's modern era and this study aims to bring about a clarity especially in tier 2 cities with special reference to Ajmer.

MATERIALS AND METHODS

Social Media Satisfaction Scores (SMSS) of users of different demographic profiles have been used to test the different attributes by following null hypotheses. The calculation of Social Media Satisfaction Scores (SMSS) is essential for obtaining a comprehensive understanding of social media users'

satisfaction to prioritize factors for improvement, facilitate comparative analysis and give a base to predict future trends. Composite scores can be used in predictive modeling to forecast future satisfaction levels or identify potential areas of concern. By analyzing historical data and trends, organizations can anticipate changes in satisfaction and take proactive measures to address emerging issues. It provides a holistic measure of satisfaction by considering multiple factors that contribute to the user experience on social media platforms. This comprehensive approach offers a more nuanced understanding of satisfaction levels compared to assessing individual factors in isolation.

Social Media Satisfaction Score – A Comparative Analysis

Social Media Satisfaction (SMSS) of users of different demographic profiles have been used to test the difference attributes by following null hypotheses-

H_0 01

There is no significant difference in mean score of social media satisfaction based on gender.

H_0 02

There is no significant difference in social media satisfaction scores based on age group of the users.

H_0 03

There is no significant difference in social media satisfaction scores based on the occupation of the users.

H_0 04

There is no significant difference in social media satisfaction score based on the annual income of the users.

H_0 05

There is no significant difference in social media satisfaction score based on the frequency of usage by the users.

Social Media Satisfaction Score – A Comparative Analysis

Hypotheses	Grouping Variable	t value	Significance 2 tailed	Results
H0 01	Gender	0.519	P > 0.05	Accepted
H0 02	Age Group	0.035	P < 0.05	Rejected
H0 03	Occupation	0.027	P < 0.05	Rejected
H0 04	Annual Income	0.347	P < 0.05	Rejected
H0 05	Frequency of Usage	0.740	P > 0.05	Accepted

- **Interpretation & Discussion**

From the table, as the test result of H0 01 - it is evident that t value is .519 , which is not significant at 0.05 level. It reflects that means value of social media satisfaction score of male and female users did not differ significantly. In this context the Null hypothesis "there no significant difference in social media satisfaction scores based on gender profile" is accepted, it implies that the statistical analysis did not find evidence to support the idea that there is a meaningful discrepancy in satisfaction levels between genders. In other words, the data suggests that both male and female users tend to have similar levels of satisfaction with their social media experiences. The null hypothesis H0 02 stating that there is no significant difference in social media satisfaction scores based on age group ($P < 0.05$) is rejected. This suggests that there is a statistically significant difference in satisfaction levels across different age groups. The H0 03 to test significant difference in social media satisfaction scores bases on occupation is rejected, it implies that occupation does have a statistically significant effect on social media satisfaction. The null hypothesis H0 04 stating that there is no significant difference in social media satisfaction scores based on annual income ($P < 0.05$) is rejected. This indicates that annual income does influence social media satisfaction levels significantly. The null hypothesis H0 05 stating that there is no significant relationship between frequency of usage and social media satisfaction scores ($P > 0.05$) is accepted. This suggests that the frequency of social media usage does not have a statistically significant impact on user satisfaction. This interpretation underscores the notion that frequency of usage does not appear to be a significant factor in determining satisfaction with social media platforms in the context of the study. In nullshell, the research findings indicate that while gender and frequency of usage do not significantly influence social media satisfaction, factors such as age group, occupation, and annual income do have a notable effect on users' satisfaction levels with social media platforms.

Understanding Association: Correlation Analysis of Social Media Metrics

- ***Quantification of the relationship between frequency of use of Social Media and Social Media Satisfaction Score***

H_0 06 There is no significant relationship between frequency of use of social media and social media satisfaction score.

Based on correlation analysis performed with the help of SPSS, the r-value is equivalent to -.106, it shows a weak negative relationship between the stated variables. This means that there is a slight tendency for the variables to move in opposite directions, but the relationship is not very strong. It shows that the frequency of use of social media is negatively correlated with the mean score of social media satisfaction. The significance value is 0.281 greater than the p value 0.01 (at the 1% level of significance) shows null hypothesis is accepted, it shows that changes in the frequency of social media use are not significantly correlated with the social media satisfaction and there is no meaningful relationship between these variables.

- ***Quantification of the relationship between Purchase Decision making and Social Media Satisfaction***

H_0 07 There is no significant relationship between purchase decision-making and social media satisfaction score.

Following correlation analysis conducted using SPSS, the obtained r-value equal to 0.917 shows a strong positive correlation between the customers' purchase decision-making and their social media satisfaction score. The obtained significance value is less than 0.01 shows that the null hypothesis is rejected that there is a significant relationship between

purchase decision-making and social media satisfaction score. It implies that customers have faith in various social media option for the purpose of decision-making and their satisfaction score is positively correlated with this.

- ***Quantification of the relationship between Trust and Social Media Satisfaction Score***

H_0 08 There is no significant relationship between trust and social media satisfaction score.

Based on correlation analysis performed with the help of SPSS, the r-value is equivalent to –

0.870. It shows a positive correlation between trust in social media and social media satisfaction scores. A positive correlation between trust in social media and social media satisfaction score suggests that as trust in social media platforms increases, users' satisfaction with their social media experiences also tends to increase. This implies that individuals who have higher levels of trust in the information, privacy, and overall functionality of social media platforms are more likely to report greater satisfaction with their usage. This positive relationship highlights the importance of trustworthiness in social media platforms for fostering user satisfaction. The significance value is less than 0.01 shows that the null hypothesis is rejected, it implies that there is a positive correlation between trust and social media satisfaction score.

CONCLUSION

The comprehensive analysis of social media satisfaction scores (SMSS) and their association with various demographic profiles and user behaviors provides valuable insights into the dynamics of user satisfaction on social media platforms in Ajmer. The findings offer important implications for businesses and marketers aiming to enhance their understanding of consumer preferences and optimize their social media marketing strategies.

Firstly, the study reveals that while gender and frequency of usage do not significantly influence social media satisfaction, factors such as age group, occupation, and annual income play a notable role in shaping user satisfaction levels. This underscores the importance of tailoring marketing efforts and content strategies to different demographic segments to better meet their preferences and needs.

Furthermore, the analysis highlights the weak negative relationship between the frequency of social media usage and social media satisfaction scores. While users may engage with social media platforms more frequently, this does not necessarily translate into higher satisfaction levels. This suggests that simply increasing user engagement metrics may not always lead to improved satisfaction and underscores the importance of focusing on quality interactions and content relevance.

Moreover, the strong positive correlation between purchase decision-making and social media satisfaction scores emphasizes the significant role that social media platforms play in influencing consumers' purchasing behavior. Businesses can leverage this insight to enhance their social media presence and capitalize on the platform's potential to drive sales and conversions.

Additionally, the positive correlation between trust in social media and social media satisfaction scores underscores the importance of building trustworthiness and credibility in social media platforms. Ensuring transparency, privacy protection, and reliable information can enhance user trust and ultimately contribute to higher satisfaction levels.

In conclusion, this study underscores the multifaceted nature of social media satisfaction and emphasizes the need for a nuanced understanding of user preferences and behaviors. By leveraging insights from this analysis, businesses can refine their social media strategies to better engage users, foster trust, and ultimately enhance overall satisfaction levels on social media platforms in Ajmer.

REFERENCES

1. Chaffey, D., & Ellis-Chadwick, F. (2019). Digital Marketing: Strategy, Implementation, and Practice (7th ed.). Pearson Education Limited.
2. Kotler, P., & Armstrong, G. (2018). Principles of Marketing (17th ed.). Pearson Education Limited.
3. Mangold, W. G., & Faulds, D. J. (2009). Social media: The new hybrid element of the promotion mix. Business Horizons, 52(4), 357-365.
4. Ryan, D., & Jones, C. (2009). Understanding digital marketing: Marketing strategies for engaging the digital generation. Kogan Page Publishers.
5. Smith, A. N., Fischer, E., & Yongjian, C. (2012). How does brand-related user-generated content differ across YouTube, Facebook, and Twitter? Journal of Interactive Marketing, 26(2), 102-113.
6. Strauss, J., & Frost, R. (2016). E-Marketing (7th ed.). Routledge.
7. Tuten, T. L., & Solomon, M. R. (2017). Social media marketing (2nd ed.). Sage Publications.
8. Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). Multivariate Data Analysis (8th ed.). Cengage Learning.
9. Hair, J. F., Celsi, M. W., & Ortinau, D. J. (2017). Marketing Research (4th ed.). McGraw-Hill Education.
10. Kothari, C. R. (2004). Research Methodology: Methods and Techniques (2nd ed.). New Age International.
11. Malhotra, N. K., & Birks, D. F. (2007). Marketing Research: An Applied Approach (3rd European ed.). Pearson Education.
12. Sekaran, U., & Bougie, R. (2016). Research Methods for Business: A Skill Building Approach (7th ed.). Wiley.

Khoj - *A Peer Reviewed International Journal of Geography*
Vol. 10, January-December, 2023, 86-107
DOI: 10.5958/2455-6963.2023.00007.3

Impact of Urbanisation on Urban Climate Change the Urban Heat Island Effect: A Case Study of Ajmer City

Shilpi Yadav[1]*, Sabir Khan[2] and Himanshi Parashar[1]*****

[1,3]*Assistant Professor, Department of Geography, Sophia Girls' College (Autonomous), Ajmer, Rajasthan, India*
[2]*GIS Expert, Department of Forest, Working Plan Office, Betul, Madhya Pradesh, India*
*(*Corresponding author) email id: *shilpi@sophiacollegeajmer.in, **sabirkhan89.gis@gmail.com, ***himanshi@sophiacollegeajmer.in*

Received: 16-02-2023; Accepted: 13-12-2023

ABSTRACT

Transformation has brought about negativity, and urbanization has adverse environmental effects, such as the rising surface temperatures of cities and urban areas compared to the surrounding rural areas. This phenomenon is popularly known as the Urban Heat Island (UHI) effect. UHI is a prominent feature of urban climates and is mainly caused by dark, non-reflective surfaces such as shopping complex parking lots, pavements, rooftops, and skyscraper buildings replacing open spaces and vegetation cover as a result of urban sprawling. This increased land surface temperature within urban areas affects material and energy costs, air pollution levels, and mortality. It also contributes to global warming, which further exacerbates climate change. This study analyzes the relationship between the urban heat island (UHI) intensity and land cover and land use characteristics of Ajmer city. There is significant diversity in the temporal and spatial pattern of temperature distribution in the Ajmer District. The region has experienced dramatic land use and land cover conversions caused by both human activities and natural disasters. The southwest part of the Ajmer District has a significantly lower temperature compared to other areas due to the presence of forestland. Forestland exhibits a lower temperature compared to other categories, except for water bodies. The city center of Ajmer has a lower temperature due to the presence of the Anasagar lake. In conclusion, the spatial layout of land use/land covers in the area has a significant impact on surface temperature.

Keywords: Climate change, Urban Heat Island (UHI), Land cover and land use, Urban sprawling

INTRODUCTION

The world has experienced major urbanization, and by 2050, about 66% of the world population is expected to be urbanized. Therefore, urban spaces have become crucial areas for environmental

changes that would disturb biodiversity, the water cycle, and climatic conditions (Grimm et al., 2008). Cities, where administrative offices and centers of economic activity are located, always attract people as they act as growth poles. The growth of urban areas, which is accompanied by a large population, will require a larger area. The past few decades have seen remarkable demographic, socioeconomic, and environmental transformations, mainly attributable to global urbanization (Malik, 2010). This dynamic phenomenon has sweeping implications, leading to significant LULC (land use and land cover) alterations, as revealed by (Bobrinskaya, 2012). The transition from natural and pastoral areas to built-up environments significantly contributes to biodiversity loss and ecosystem service depletion. Due to urban sprawl, the Urban Heat Island (UHI) phenomenon has expanded (Tiwari *et al.*, 1990). The Intergovernmental Panel on Climate Change (IPCC) publishes a global temperature trend formed from the local warming of UHI. The data compiled by the Climatic Research Unit (CRU) and the UK Met Office CRU, and cited by the IPCC, claim that the atmosphere has warmed by 0.6 to 0.8°C since the 19th century (Singh, 1989).

The rise in urbanization (including both natural increase and migration) and rapid industrialization is one of the major causes of climate change worldwide. Today, the most pressing problem in urban areas is the increasing surface temperature due to the dramatic alteration of the natural surface. Natural vegetation is being removed and replaced by non-evaporating, non-transpiring surfaces such as stone, metal, and concrete.

Understanding Urban Heat Island

The Urban Heat Island (UHI) is a phenomenon where hot surface air is concentrated in urban areas, causing surrounding temperatures in suburban and rural areas to progressively decrease (Figure 1). The UHI phenomenon, which is based on the analysis of incoming and outgoing energy flux from an urban surface system, has been explained (Ahmad, 2014). The energy absorbed

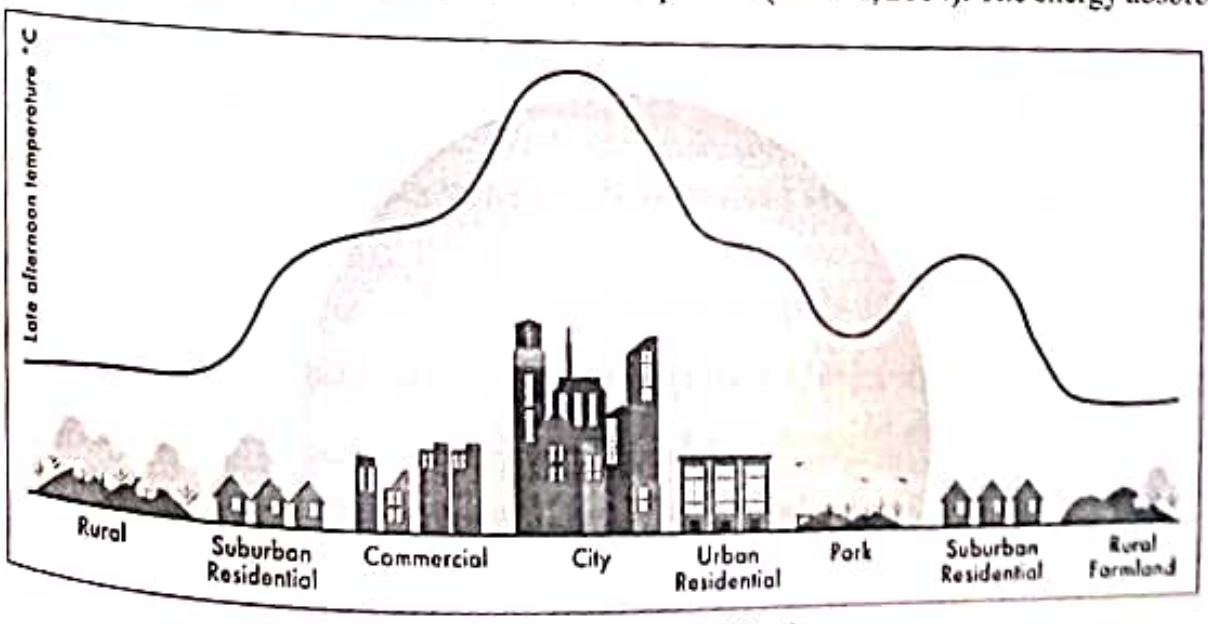


Figure 1: Urban Heat Island

by this urban surface system from solar radiation and anthropogenic activity is physically balanced by warming the air above the surface through convection and radiation, evaporation of moisture, and heat storage in surface materials. The partitioning of this energy balance determines the nature of the urban climate, which in turn affects how cities use energy and the comfort and well-being of citizens. The formation of a UHI depends on several climatic processes.

The phenomena occurring in either the Urban Boundary Layer (UBL) or the Urban Canopy Layer (UCL) can explain this formation. The UBL is governed by processes relevant to the mesoscale, with the higher altitude thermal inversion dominant during the daytime, while the UCL is governed by processes at the microscale, with the lower altitude inversion dominant during night-time (Figure 2).

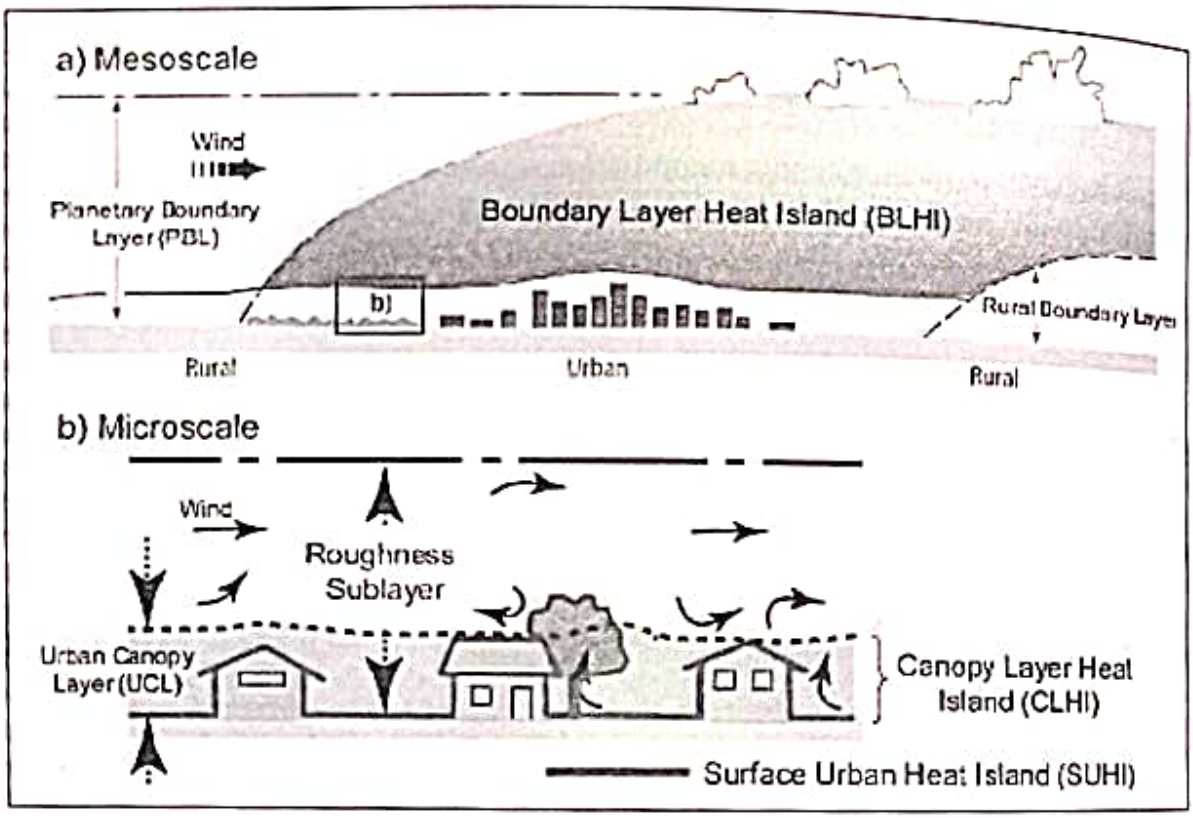


Figure 2: (a) Boundary Layer Heat Island and (b) Surface Urban Heat Island

Causes and Effects of the Urban Heat Island

The causes of the UHI are not limited to one factor. They may differ from city to city. However, some main factors considered to cause the UHI are:

1. Dark-colored pavement surfaces made up of bitumen, which absorb more radiation from the sun due to their color.
2. Decline in water resources like streams, lakes, or ponds, which reduces heat accumulation.

5. Drastic loss of green cover due to encroachment of forest areas, parks, illegal construction, and road widening, among other factors.

Effects of the UHI

The UHI not only affects air quality in cities due to pollution generated by industrial and automobile exhaust, but also leads to a higher extent of particulate matter and greater amounts of dust compared to rural areas. The higher temperature in urban areas caused by the UHI promotes the colonization of species that prefer warm temperatures, such as lizards and geckos. Insects, such as ants, are more abundant in urban areas than in rural areas. These are referred to as ectotherms. Furthermore, cities tend to experience heatwaves, which have adverse effects on human and animal health, resulting in heat CRS, sleep deprivation, and increased mortality rates. The UHI also impacts nearby water bodies, as warmer water from the city's pavements, rooftops, etc., is transferred to drains and sewers, and eventually released into nearby lakes and creeks, thus impairing their water quality. Impact on temperature, urban heat islands (UHIs) can have secondary effects on local meteorology. These include altering local wind patterns, promoting cloud and fog formation, impacting humidity levels, and influencing precipitation rates. The additional heat generated by UHIs creates greater upward motion, which can trigger additional shower and thunderstorm activity.

Furthermore, UHIs create a local low-pressure area during the day, where relatively moist air from surrounding rural areas converges. This convergence can potentially lead to more favorable conditions for cloud formation. Rainfall rates downwind of cities have increased by 48% to 116%. This warming effect also contributes to a monthly rainfall increase of approximately 28% between 20 miles (32 km) and 40 miles (64 km) downwind of cities, compared to upwind areas. Some cities have experienced a total precipitation increase of 51%.

Here are several effects of UHIs

1. Increased city temperature.
2. Thermal discomfort.
3. Higher pollution levels.
4. Increased electricity demand.
5. Uneven rainfall distribution.
6. Increased flood risk.

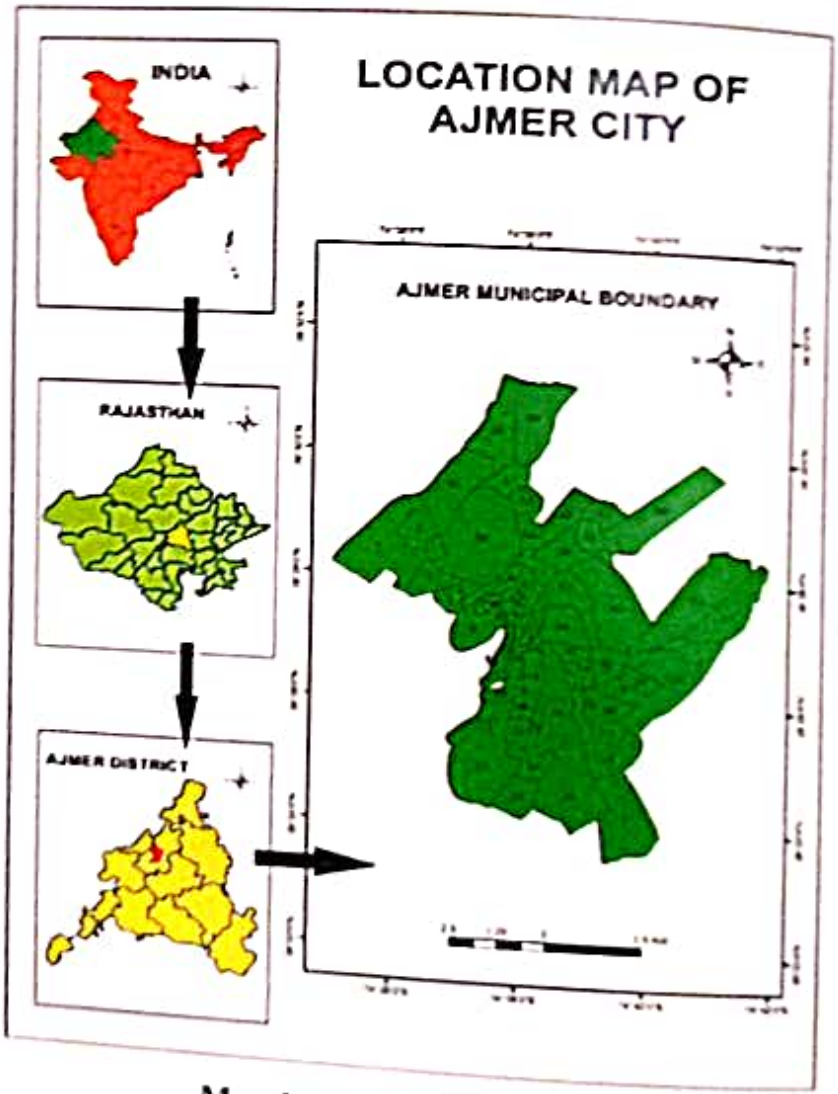
To mitigate urban heat islands, consider the following measures:

1. Increase shade around your home by planting trees and other vegetation, as they can reduce surface and air temperatures through shading and evapotranspiration. Additionally, installing green roofs can help.

2. Install cool rooftops, as they reflect sunlight and reduce rooftop temperatures. Using energy-efficient appliances and equipment is also recommended.
3. Implement urban relief strategies, such as planting trees in cities.
4. Raise awareness and implement heat reduction policies and regulations.
5. Consider installing green rooftops.
6. Utilize energy-efficient appliances and equipment.

Study Region

The historic city of Ajmer is situated in the geographic center of Rajasthan and lies about 131 km southwest of the state capital, Jaipur. It stretches from 26°26' north to 26°23' north and 74°36' east to 74°40' east. The strategic position of this city has been the key to its long and rather turbulent history (Map 1). It has a long history of about 1400 years. Ajmer has witnessed



Map 1: Study Region Map

many changes that have been significant in shaping the urban morphology of the city. The city is strategically located between the important tourist routes of the state, i.e., Jaipur-Jodhpur and Jaipur-Udaipur. Besides, Ajmer has been an important education center in the region. Mayo College (1875), Sophia School (1919), Government College (1836) are premier institutes in the city imparting knowledge since the last century. Ajmer city has an area of 81.70 sq. km and a population of 572,589 (2011 census).

OBJECTIVES OF THE STUDY

The main aim of the study is to analyze the population growth and growth direction of the urban area and its impact on urban climate. The study has the following objectives:

- To analyze the population growth direction (Urban Sprawling).
- To identify the Land Surface Temperature distribution pattern based on LU/LC of Ajmer City.
- To predict the effects of Environmental Change and Promote Future Sustainable Planning Agendas.

RESEARCH METHODOLOGY

The research explores the changes in the land use and land cover pattern, population growth, and impact on the land surface temperature, which includes 60 municipal wards, by using empirical inquiry, a Municipality report, and the use of Remote Sensing and GIS techniques. The Supervised classification method is applied in ArcGIS 10.2 software. Supervised classification, as the name signifies, involves the supervision of the user to carry out the process where a signature set will define which corresponds to a particular class, such as water bodies, urban land, vegetation, buildup, wasteland, and forest, etc. The LST can be derived from the thermal bands of the Landsat TM, ETM+, and Landsat 8 satellite imagery products. The methodology involves, firstly, the correction of different atmospheric noises that have been minimized using the ENVI Fast Line-of-sight Atmospheric Analysis of Hypercubes (FLAASH) atmospheric correction module. Secondly, the extraction of the land surface emissivity (LSE) of the study area to derive LST. Thirdly, biophysical indicators were derived from the different band combinations (Amiri *et al.*, 2009; Fu and Weng, 2016; Li, Zhou and Ouyang, 2013; Owen, Carlson and Gillies, 1998). The non-spatial data is acquired from the census report and master plan of the city. Maps are drawn by combining the spatial and non-spatial data.

Sources of Data

The satellite imagery of Ajmer from the years 2003, 2013, and 2023 has been collected through the USGS site.

The master plan of Ajmer City is taken into consideration.

Ward-wise maps and data have been collected from Ajmer Nagar Nigam and ADA.

RESULTS AND DISCUSSION

Land Use/Land Cover Classification Result and Accuracy Assessment

Image classification is not valid without an assessment of its accuracy. The source of errors does not only come from the classification itself, but also from image registration, badly selected training areas, etc. Accuracy assessment assumes that all differences between the classification results and reference data originate from the classification errors. One of the most common methods of classification accuracy assessment is the error matrix or confusion matrix. This matrix contains a category comparison of the relationship between known, ground-truth data and the classification results for the same category. Overall accuracy is measured in percent and represents the number of pixels correctly classified divided by the total number of pixels. The Kappa coefficient is a measure of overall statistical agreement (Table 1).

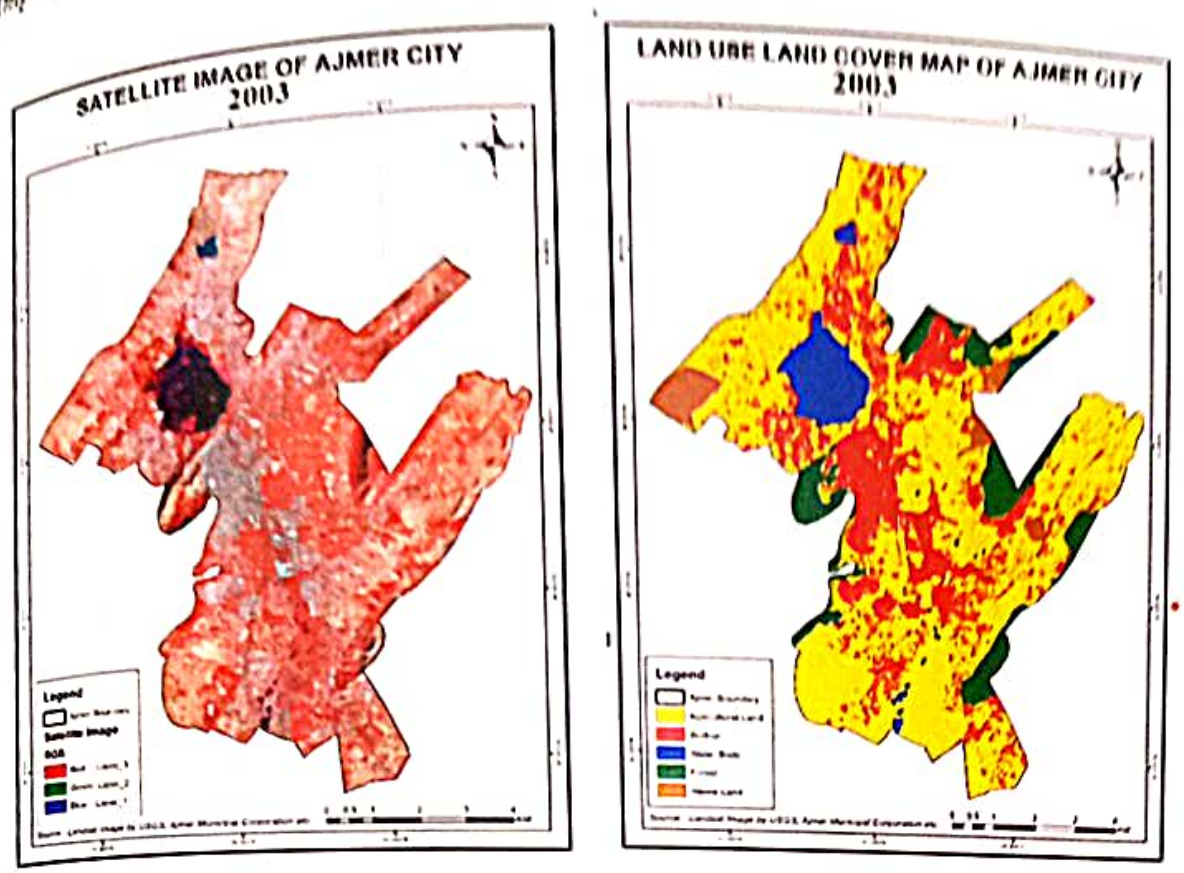
Table 1: Confusion Matrix of 2003 year LU/LC

Classified	Reference Data					
Class	Agriculture	Built - up	Water Body	Forest	Waste Land	Total
Agriculture	35	0	0	01	0	36
Built - up	0	32	0	0	0	32
Water Body	0	0	01	0	0	01
Forest	0	0	0	02	1	03
Waste Land	0	0	0	0	29	28
Total	35	32	01	02	30	100

Overall Classification Accuracy = 87.00%
Overall, Kappa Statistics = 0.7876

Land Use/ Land Cover Classification Result and Accuracy Assessment of Year 2003

In 2003, during our study on land use and land cover, we found that water body cover accounted for 3.49 sq. km., forestland cover accounted for 13.13 sq. km., agriculture cover accounted for 47.34 sq. km., wasteland cover accounted for 2.38 sq. km., and settlement cover accounted for 16.12 sq. km. These statistics show that agriculture and built-up land cover the highest areas, while forest land and wasteland cover the lowest areas of Ajmer City (Map 2).



(a) (b)

Map 2: (a) Satellite Image Map (2003) and (b) LULC Map of Ajmer city (2003)

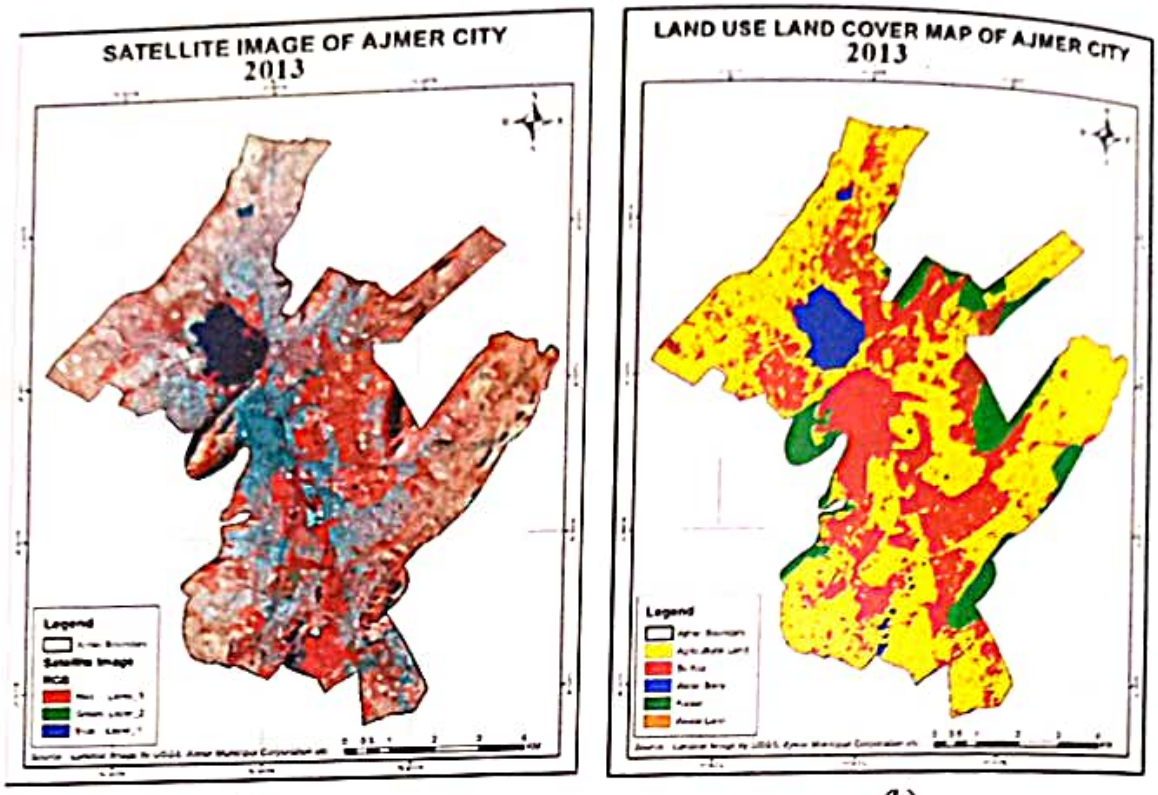
Land Use/ Land Cover Classification Result and Accuracy Assessment of Year 2013

In 2013, the land use and land cover analysis revealed the following areas: water body cover 2.44 Km Sq., forestland cover - 13.11 Km Sq., agriculture cover - 44.79 Km Sq., wasteland cover - 1.49 Km Sq., and settlement cover - 20.66 Km Sq. These statistics indicate that agriculture and built-up land cover the largest area, while forest land and wasteland cover the smallest area in Ajmer City (Map 3).

Table 2: Confusion Matrix of 2013 year LU/LC

Classified Class	Reference Data					
	Agriculture	Built - up	Water Body	Forest	Waste Land	Total
Agriculture	33	0	0	01	0	34
Built - up	0	36	0	0	01	37
Water Body	0	0	01	0	0	01
Forest	0	0	0	01	0	01
Waste Land	0	0	0	0	29	29
Total	33	36	01	02	30	100

Confusion Matrix for LU/LC in 2013
Overall Classification Accuracy: 83.00%; Overall Kappa Statistics: 0.7550



(a) (b)

Map 3: (a) Satellite Image Map (2013) and (b) LULC Map of Ajmer city (2013)

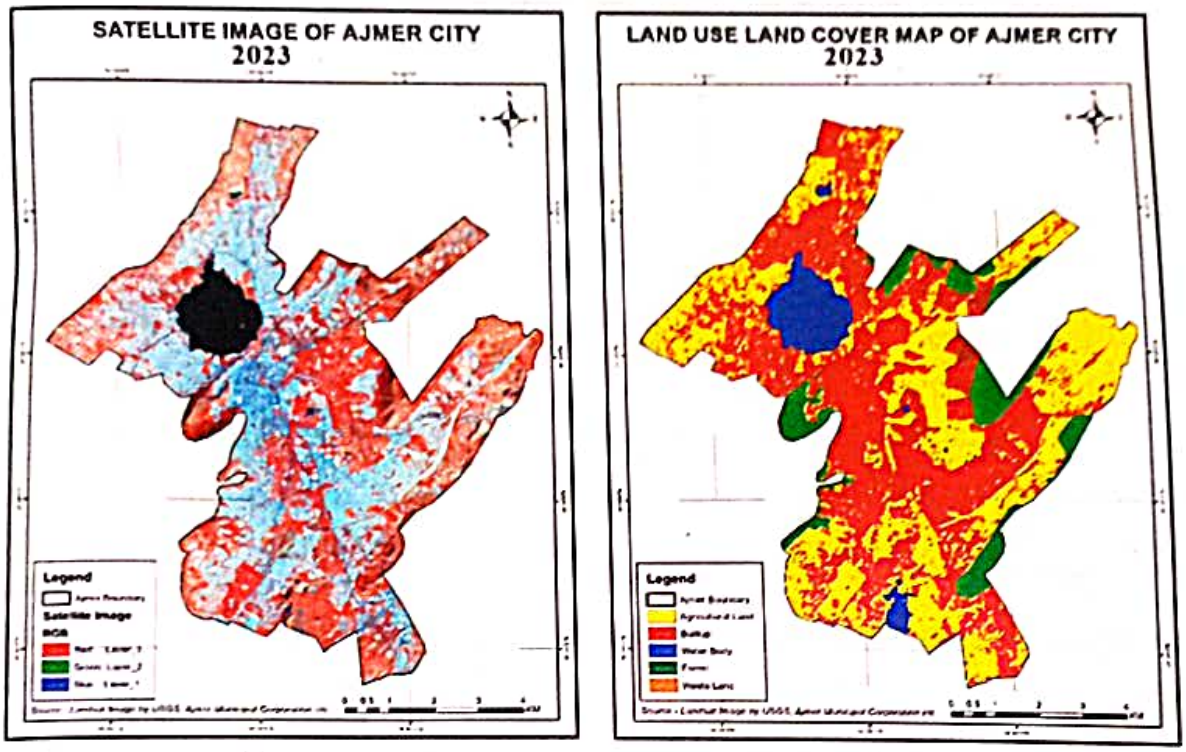
Table 3: Confusion Matrix of 2023 year LU/LC

Classified Class	Reference Data					
	Agriculture	Built - up	Water Body	Forest	Waste Land	Total
Agriculture	34	0	0	0	0	34
Built - up	0	38	0	0	0	38
Water Body	0	0	01	0	0	01
Forest	0	0	0	02	0	02
Waste Land	0	0	0	0	25	25
Total	34	38	01	02	25	100

Confusion Matrix of the 2023 year LU/LC
Overall Classification Accuracy = 89.00%; Overall, Kappa Statistics = 0.7976

Land Use/ Land Cover Classification Result and Accuracy Assessment of Year 2023

In 2023, Land use and Land cover, we found that Water body cover 4.71 Km Sq. area, Forestland cover 13.12 Km Sq. area, Agriculture cover 33.60 Km Sq. area, Wasteland cover 1.36 Km Sq. area, and Settlement cover 30.15 Km Sq. area. These statistics show that the agriculture and built-up land cover the highest area, while the forest land and wasteland cover the lowest area of the Ajmer City (Map 4).



(a) (b)

Map 4: (a) Satellite Image Map (2023) and (b) LULC Map of Ajmer city (2023)

Population Growth

Ajmer's population was 4.85 Lakh. According to the 2001 census, the population of Ajmer is growing at a decadal growth rate of 20% in comparison to the 1991 population. The population of Ajmer is now calculated to be around 572,589. The population of the Ajmer city has grown more than threefold from 1.47 Lakh in 1941 to 5.72 Lakh in 2011 over the last six decades as given in the Table 4 and 5.

Table 4: Land use/cover area in kilometre square

	2003	%	2013	%	2023	%
Agricultural land	46.58	57.01	44.00	53.85	33.22	40.66
Built-up	16.12	19.73	20.66	25.28	30.15	36.9
Water body	3.49	4.27	2.44	2.98	3.85	4.71
Forest	13.13	16.07	13.11	16.04	13.12	16.06
Waste land	2.38	2.91	1.49	1.82	1.36	1.66
Total	81.70	100%	81.70	100%	81.70	100%

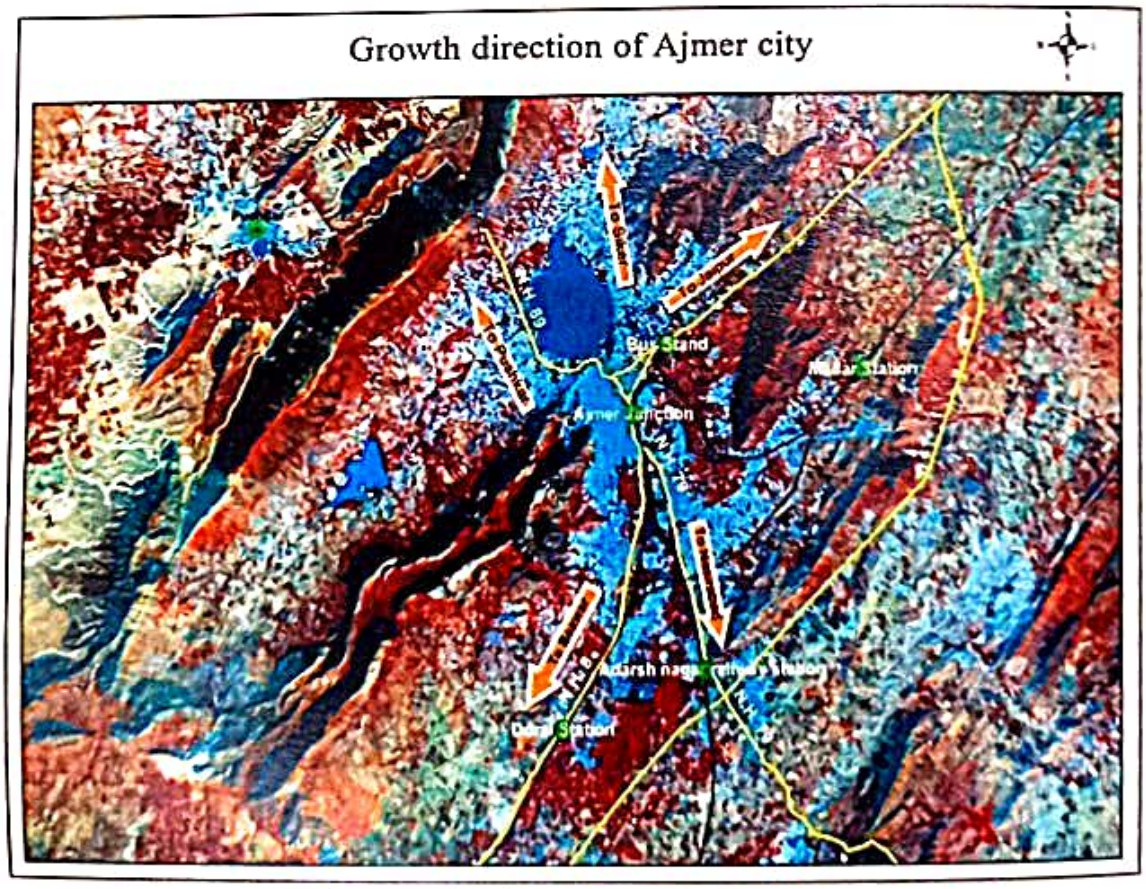
Table 5: Population Growth of Ajmer city

Year	Population	Average Decadal Growth	Growth rate (%)
1941	147,258	-	-
1951	196,633	49,375	33.5
1961	231,240	34,607	17.6
1971	264,291	33,051	14.3
1981	375,593	111,302	42.1
1991	402,700	27,107	7.2
2001	482,575	82,875	20.6
2011	572,589	90,014	18.66

Source: Census of India – 2011

Growth Direction of Ajmer City

Because of physical constraints, its development is in linear strip shape. The city was found to have a pattern for major expansion in three different directions: North, Northeast, and South. Presently, development is taking place along the major roads, namely Jaipur Road, Pushkar Road, Pushkar Bypass, and towards Nasirabad-Bhilwara Bypass (Map 5).



Map 5: Growth direction of Ajmer city

Table 6: Change Rate of LU/LC Since 2003 to 2023

Class	Area in Sq. Km Year 2003	%	Area in Sq. Km Year 2023	%	Changes	Change rate in Percent (%)
Water body	3.49	4.27	3.85	4.71	+0.36	+0.44
Forest	13.13	16.07	13.12	16.06	0.01	-0.01
Agriculture	47.34	57.94	33.60	41.12	13.74	-16.82
Wasteland	2.38	2.91	1.36	1.66	1.02	-1.25
Built - up	16.12	19.73	30.15	36.0	14.03	+16.27

Change rate of Land use/Land cover from 2003 to 2023

The above-mentioned Table 6 shows that Industry and Settlement have drastically increased by 19.73% and 36.0% respectively, from 2003 to 2023, while Agriculture land has drastically decreased by 57.94% and -41.12% respectively, from 2003 to 2023. These changes in Land use and Land cover categories affect the Land Surface Temperature pattern of the study area from 2003 to 2023.

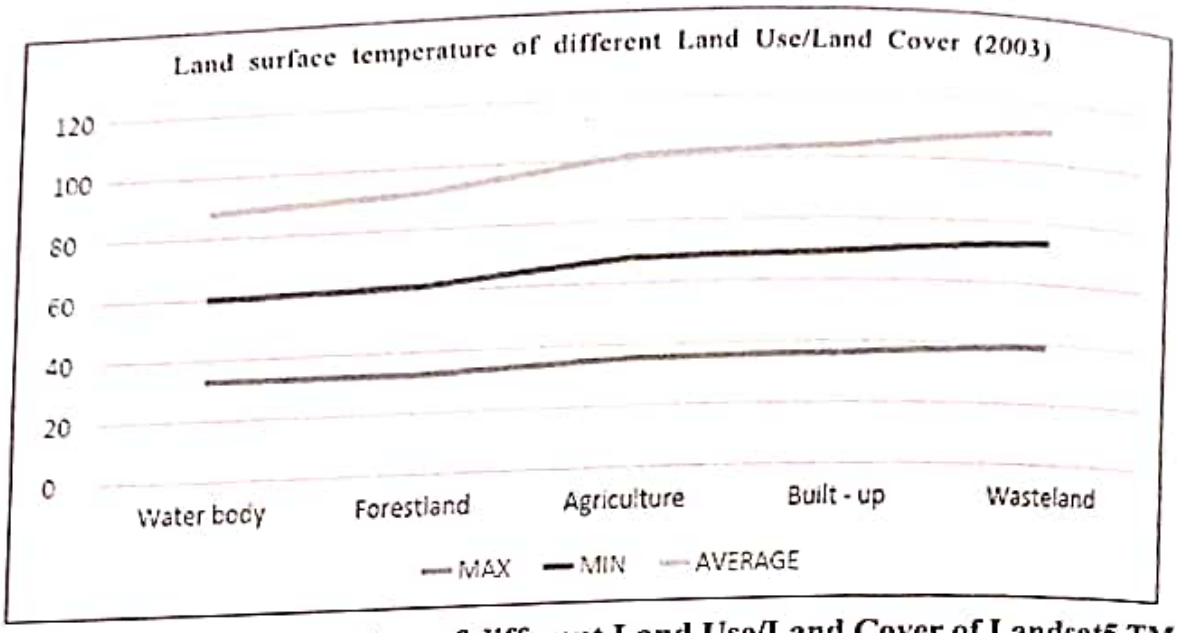
The Relationship is Based on Statistics and Graphical Analysis

50 sle points were randomly selected from different land use/cover types in the study area. Approximately 10 sles were selected from each land use/cover type, such as Forestland, Agriculture, Water body, built-up, and Wasteland. The maximum and minimum temperatures were recorded at each sle point within each category. The average temperature of each land use/cover category for each temporal LST was calculated using the formula for simple arithmetic mean. A linear graph was then plotted using the maximum, minimum, and average temperatures of each category. This process is very helpful for estimating the relationship between the LST map and the LU/LC map.

We found that when the land use/land cover category changes, the temperature also changes. The magnitude of temperature change from one place to another depends on the LU/LC category.

Table 7: Statistic of Land surface temperature of different Land Use/Land Cover of Landsat5 TM (2003)

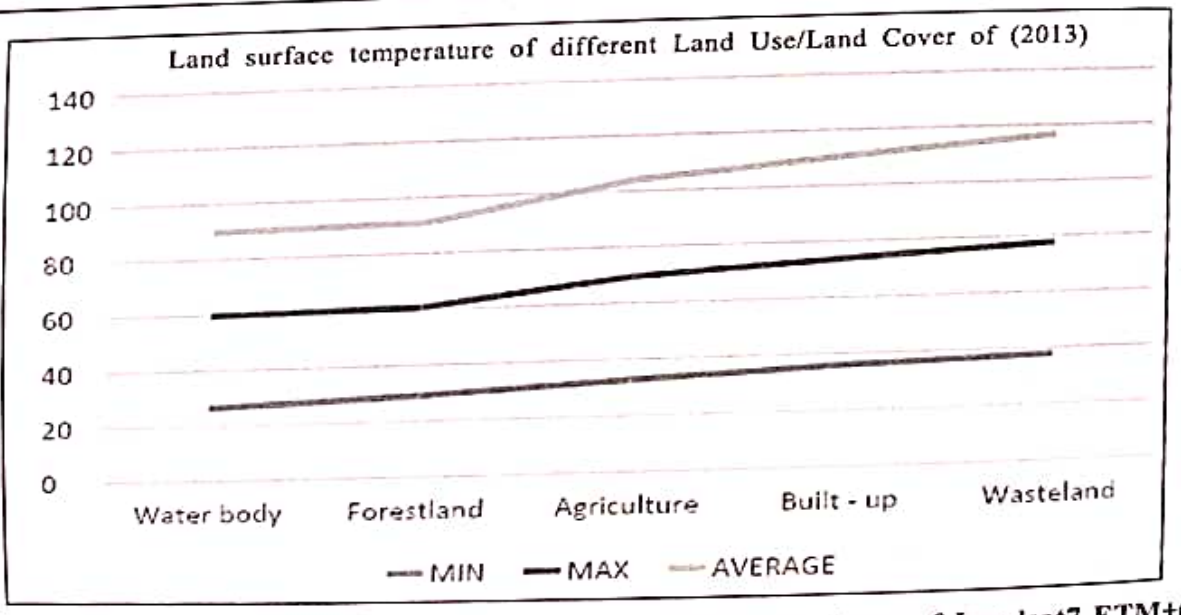
Classes	MAX	MIN	AVERAGE
Water body	32.923	26.816	28.3341
Forestland	32.378	28.85	30.3485
Agriculture	35.221	32.676	33.3726
Built - up	35.93	33.165	34.4283
Wasteland	38.96	34.63	37.0056



Graph 1: Land surface temperature of different Land Use/Land Cover of Landsat5 TM (2003)

Table 8: Statistic of Land surface temperature of different Land Use/Land Cover of Landsat5 TM (2013)

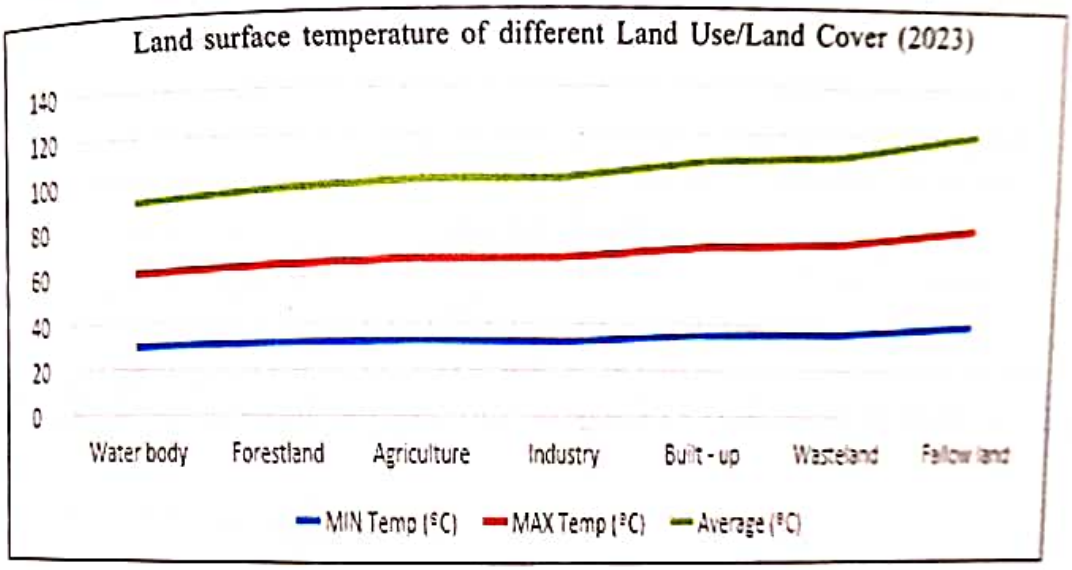
Classes	MAX	MIN	AVERAGE
Water body	26.475	33.269	29.872
Forestland	29.027	31.474	30.2505
Agriculture	32.58	36.716	34.648
Built - up	35.807	37.826	36.8165
Wasteland	37.799	39.843	38.821



Graph 2: Land surface temperature of different Land Use/Land Cover of Landsat7 ETM+(2013)

Table 9: Statistic of Surface temperature of different land use/Land cover of Landsat 8 OLI/TIRS (2023)

nd Use/Cover	MIN Temp (®C)	MAX Temp (®C)	Average (®C)
ater body	29.732	31.822	30.777
orestland	31.491	33.384	32.4375
griculture	32.439	35.124	33.7815
dustry	32.145	35.715	33.93
uilt - up	34.908	37.583	36.2455
asteland	35.345	38.624	36.9845
allow land	38.847	41.434	40.1405

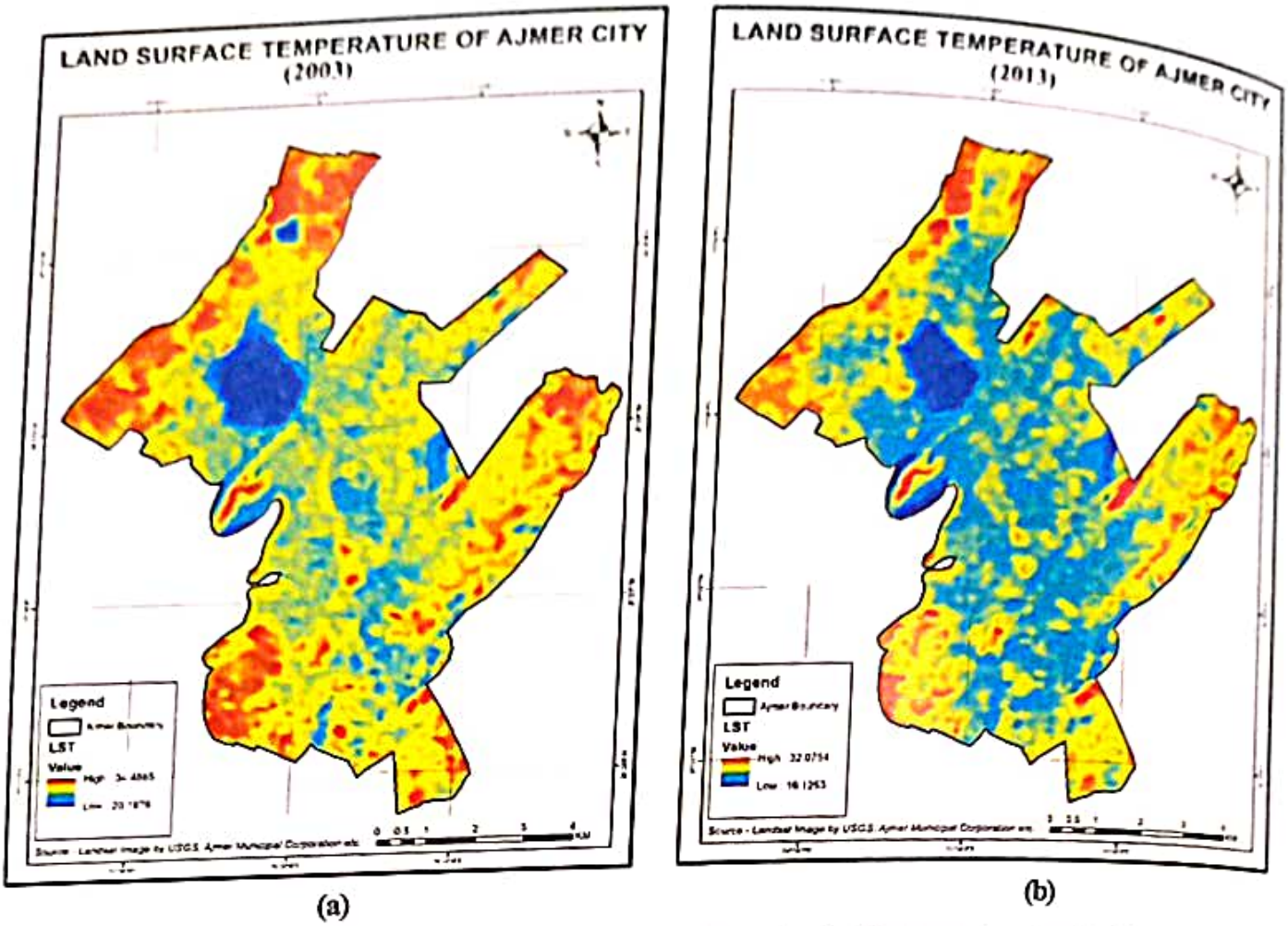


raph 3: Land surface temperature of different Land Use/Land Cover of Landsat7 ETM+(2023)

/e observed a sequence of LU/LC categories that are responsible for an increase in temperature a uniform manner, as shown below: Water body, Forestland, Agriculture, Industry, Settlement, Vasteland, and Fallow land. This sequence of LU/LC categories is responsible for a sustainable ncrease in temperature.

Vater bodies have temperatures ranging from 27 to 32 degrees Celsius, Forestland has mperatures ranging from 29 to 32 degrees Celsius, Agriculture has temperatures ranging from 2 to 36 degrees Celsius, built-up areas have temperatures ranging from 34.5 to 38 degrees elsius, and Wasteland has temperatures ranging from 38 to 40 degrees Celsius.

his means that the distribution pattern of Land Surface Temperature depends on the LU/LC ategories. Areas with water bodies, Forestland, and Agriculture have lower temperatures ompared to other LU/LC categories.



(a) (b)

Map 6: (a) and (b) These maps are showing the changes in Land Surface Temperature from 2003 to 2013

Changes in Land Surface Temperature from 2003 to 2013

When we analyze the LST maps for the years 2003 and 2013, we observe that the maximum temperature in the 2003 map is 42.78 degrees Celsius, while the minimum temperature is 22.7448 degrees Celsius. In comparison, the 2013 map has a maximum temperature of 48.36 degrees Celsius and a minimum temperature of 14.06 degrees Celsius. The reason for this

Table 10: The changes in land surface temperature for different land use and land cover categories

LULC Class	2003 Average	2013 Average	Changes in Degree Celsius
Water body	25.795	28.396	2.601
Forestland	28.688	29.43	0.742
Agriculture	31.969	32.283	0.314
Built - up	34.72	36.086	1.366
Wasteland	38.23	39.819	1.589

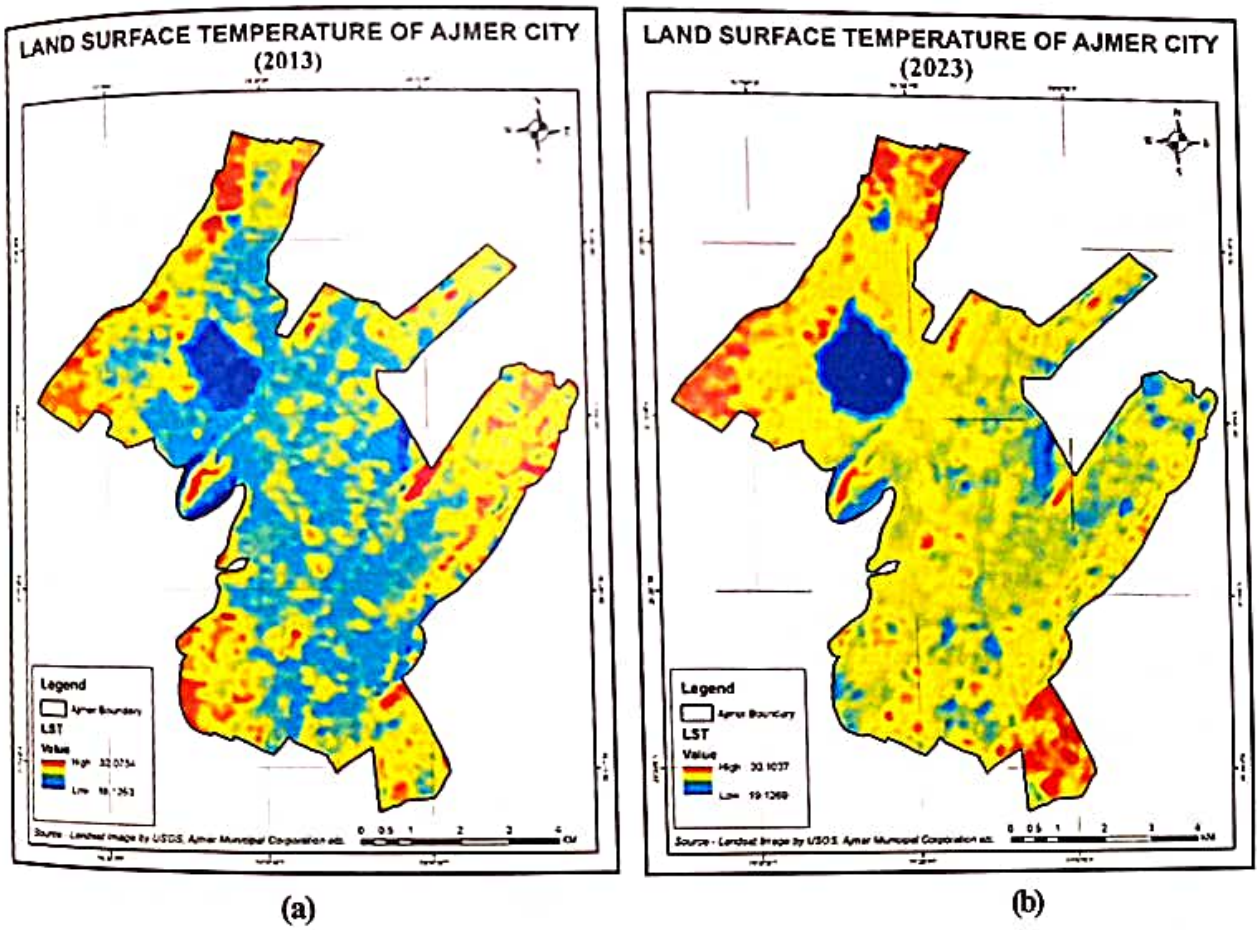
ifference is that the 2001 LST map recorded a minimum temperature of 14.06 degrees Celsius n this region. Additionally, the maximum temperature in the 2013 LST map is also higher due o the lower rainfall in September and October of that year compared to other time periods.

Ve also notice that the overall land surface temperature of the study area has increased by .5825 degrees Celsius from 2003 to 2013.

verage Temperature in 2003, 2013, and Changes in Temperature from 2003 to 2013

When calculating the statistics for each LU/LC category to determine changes in temperature, ve found that fallow land and water bodies experienced the highest increase in temperature rom 2003 to 2013, while agriculture and forestland experienced the highest decrease in emperature during that period. Settlements, industries, and wastelands showed a moderate ncrease in temperature. In conclusion, the temperature increased from 2003 to 2013.

Changes in Land Surface Temperature from 2013 to 2023



(a) (b)

Map 7: (a) and (b) These maps are showing the changes in Land Surface Temperature from 2013 to 2023

Display the LST maps for 2013 and 2023, and indicate the changes in temperature range

Upon analyzing the LST maps from 2013 to 2023, we observed that the LST map for 2013 had a maximum temperature of 48.36 degrees Celsius and a minimum temperature of 14.06 degrees Celsius. In comparison, the LST map for 2023 had a maximum temperature of 45.73 degrees Celsius and a minimum temperature of 28.31 degrees Celsius. The changes in temperature range between 2013 and 2023 can be attributed to certain areas of the 2013 data being covered by clouds, resulting in the minimum temperature of 14.06 degrees Celsius. Additionally, the maximum temperature of the 2013 LST map increased due to lower rainfall in September and October compared to other temporal datasets.

We observed that the overall land surface temperature of the study area decreased by -2.6299 degrees Celsius from 2013 to 2023.

Table 11: The changes in land surface temperature for different land use and land cover categories

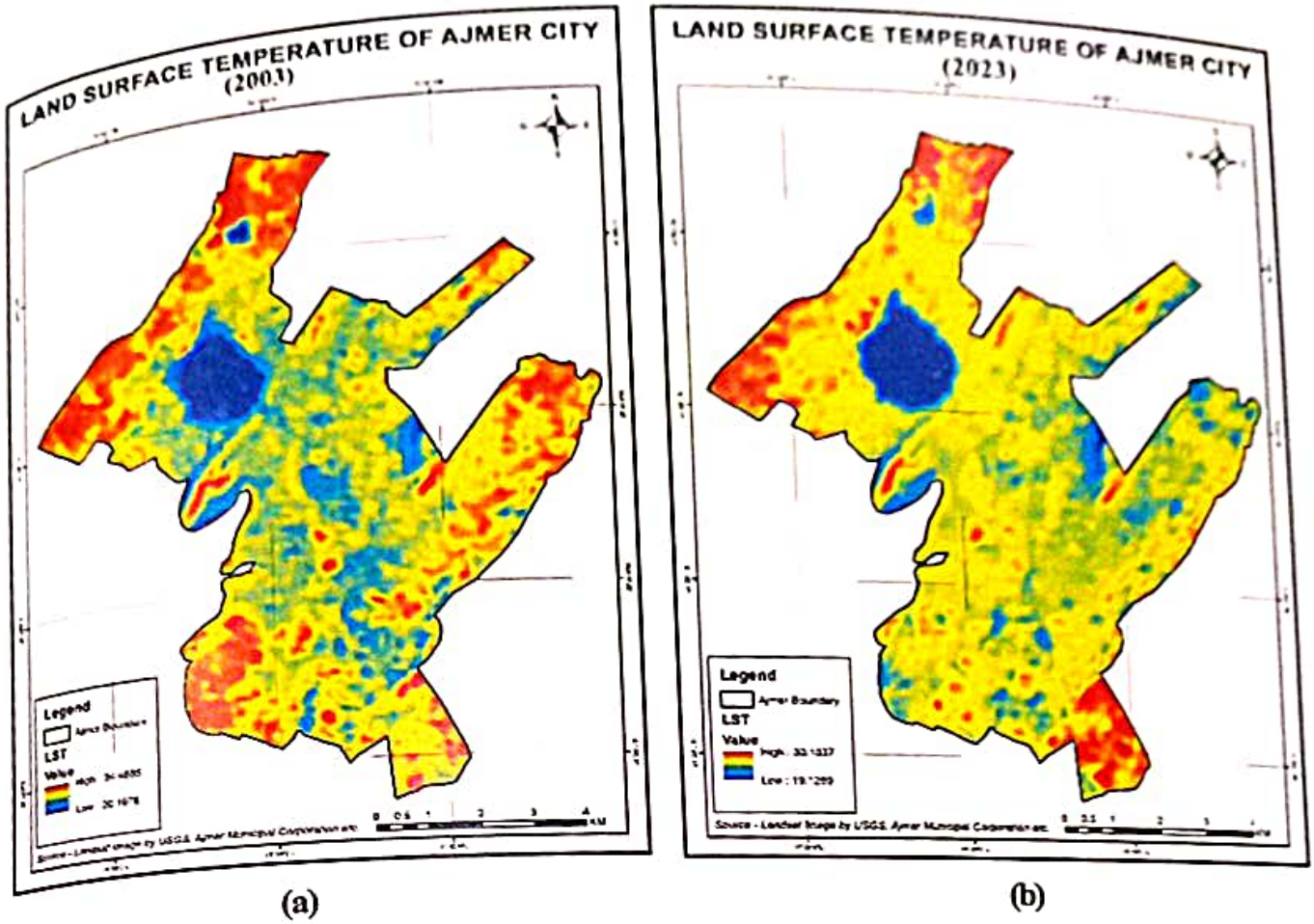
LULC Class	2003 Average	2013 Average	Changes in Degree Celsius
Water body	28.396	29.928	1.532
Forestland	29.43	32.956	3.526
Agriculture	32.283	34.566	2.283
Built - up	36.086	35.865	-0.221
Wasteland	39.819	39.412	-0.407

When we calculate the statistics of each LU/LC category to extract the changes in temperature, we found that the Forestland and Agriculture experienced the highest increment in temperature from 2013 to 2023 compared to Fallow land and industry, which experienced the highest decrement in temperature during the same period. Settlement and Wasteland experienced moderate decrement in temperature, while Water body experienced a moderate increment in temperature from 2013 to 2023.

Finally, we observed that the overall temperature of the study area decreased from 2013 to 2023. Some categories experienced an increase in temperature, while others experienced a decrease from 2013 to 2023.

Changes in Land Surface Temperature from 2003 to 2023

In the 2003 to 2023 LST maps, we observed that the 2003-year LST map had a maximum of 42.78 and a minimum of 22.74 degrees Celsius, while the 2023-year LST map had a maximum of 45.73 and a minimum of 28.31 degrees Celsius. The change in temperature range between 2003 and 2023 in the region is that the rainfall in the study area is very high from September to October in 2023. We observed that the Land Surface Temperature of the overall study area increased by 2.9526 degrees Celsius from 2003 to 2023 (Table 12).



(a) (b)

Map 8: (a) and (b) These maps are showing the changes in Land Surface Temperature from 2003 to 2023

Table 12: The changes in land surface temperature for different land use and land cover categories

LULC Class	2003 Average	2013 Average	Changes in Degree Celsius
Water body	25.795	29.928	4.133
Forestland	28.688	32.956	4.268
Agriculture	31.969	34.566	2.597
Built - up	34.72	35.865	1.145
Wasteland	38.23	39.412	1.182

Changes in Temperature from 2003 to 2023

When calculating the statistics of each LU/LC category to determine changes in temperature, it was found that Forestland and Water Bodies experienced the highest increase in temperature from 2003 to 2023, while the only industry showed a decrease in temperature during the same period. Agriculture, settlement, wasteland, and fallow lands experienced moderate increases in temperature from 2003 to 2023.

Overall, it was observed that the temperature in the study area has increased between 2003 and 2023. The temperature has increased in all LULC categories except for the industry.

To analyze the relationship between Land Surface Temperature (LST) and other corresponding LST maps, both the LST map and the corresponding LST maps were imported into ArcGIS. The LST map was then overlaid with the corresponding LST maps. ArcGIS was chosen for this analysis due to its superior data visualization capabilities. However, interpreting the results of this overlaying process can be challenging. Instead, a specific area with significant LULC (Land Use/Land Cover) transition was selected for each city. The LST and LULC maps of these areas provide insights into how the LST and corresponding LST slices have changed over time.

When examining the LST map of 2003 and its corresponding maps from different dates, it was observed that the LST values changed in the different temporal datasets. From 2003 to 2013, visual interpretation indicated an increase in temperature for both LST and their corresponding LST values. Similarly, from 2013 to 2023, visual interpretation revealed an increase in temperature for both LST and their corresponding LST values, with a decrease in some portions of the corresponding LST.

This is the only way to understand the changes in temperature between different temporal datasets. It means that through this method, we can obtain qualitative information about the different temporal datasets, but not quantitative information.

CONCLUSION

This research examines the significant role played by urban sprawl and land use changes in the development of urban societies. Specifically, it focuses on the urban growth of Ajmer city, one of India's most important historical, cultural, industrial, and commercial cities. The study utilizes remote sensing and GIS technologies, along with satellite data and census data, to monitor the dynamic process of urbanization.

The findings reveal that the expansion of Ajmer city's land area is driven by social factors such as migration, economic development, and population growth. In particular, there has been a recent trend of converting orchards and agricultural land into built-up areas. The study indicates that agricultural land has been the major source of land conversion in the study area. From 2003 to 2023, the agricultural land area has decreased by 25.59% (20.91 sq. km.).

Additionally, the study examines the growth of the built-up area. It is observed that the built-up area has increased by 28.97% (23.67 sq. km.) due to the conversion of agricultural land and wasteland. The population of Ajmer city has also witnessed significant growth, increasing from 1.47 lakh in 1941 to 5.72 lakh in 2011 over the span of six decades.

Furthermore, the study identifies that the major expansion of the city has occurred in three different directions: North, and South. This highlights the need for comprehensive planning and management of urban growth in these areas. The research demonstrates that GIS and remote sensing technologies play a crucial role in analyzing and quantifying spatial phenomena over time. These technologies offer more accurate and cost-effective change detection capabilities compared to conventional mapping techniques.

In conclusion, this study emphasizes the importance of using advanced technologies like GIS and remote sensing for monitoring and understanding urbanization processes. These tools enable researchers to analyze spatial data with better accuracy, lower costs, and faster turnaround times.

This research was conducted to assess the potential of satellite data in estimating surface temperature and to analyze the influence of land use/land cover and vegetation density on surface temperature. It also aimed to explore the relationships between different land use/land cover classes and land surface temperatures.

Temporal Changes and Spatial Patterns of Temperature Distribution

There is significant diversity in the temporal and spatial patterns of temperature distribution in Ajmer District. After studying the years from 2003 to 2023, we observed that the southwest part of Ajmer District has a much lower temperature compared to other areas of Ajmer District, mainly due to forestland. Forestland has a lower temperature compared to other categories, except for water bodies. The Ajmer city center also has a lower temperature due to the presence of the Anasagar lake.

In short, the conclusion is that the spatial layout of land use and land cover in the area greatly impacts surface temperature.

RECOMMENDATIONS

Coarser resolution satellite datasets do not provide sufficient information on surface temperature in heterogeneous and complex urban areas. Therefore, aerial thermal remote sensing with high spatial resolution is the preferred option for realistic assessment of surface temperature and its characteristics in such areas. Additionally, aerial thermal remote sensing offers temporal flexibility, allowing for a more normalized representation of the area and reducing apparent bias caused by solar and atmospheric distortion.

Based on the finding that surface temperature is negatively correlated with vegetation, it is advisable to afforest currently available regions, especially in highly built-up areas and barren land. This will help reduce the surface temperature of the region and to some extent influence the microclimate.

Further research could involve the utilization of more effective classification methods, such as neural networks, support vector machines, and decision tree control classification methods, to reduce classification errors and their impact on the results.

REFERENCES

Ahmad, A. (n.d.). Remote Sensing-GIS Evaluation of Urban Growth-Land Surface Temperature Relationships in Selangor, Malaysia. School for Social, Development and Environmental Studies

Ajmer-Wikipedia, the Free Encyclopedia. (n.d.). Ajmer Study Area Paper. Retrieved from http://en.wikipedia.org/wiki/Ajmer

Bobrinskaya, M. (2008). Remote Sensing for Analysis of Relationships between Land Cover and Land Surface Temperature in Ten Megacities. TRITA-GIT EX 12-008.

Ibrahim, A. A. (2008). Using Remote Sensing Technique (NDVI) for Monitoring Vegetation Degradation in Semi-Arid Lands and Its Relationship to Precipitation: Case Study from Libya. The 3rd International Conference on Water Resources and Arid Environments and the 1st Arab Water Forum.

Joshi, J. P., & Bhatt, B. (2011). Estimating Temporal Land Surface Temperature Using Remote Sensing: A Study of Vadodara Urban Area, Gujarat. *International Journal of Geology, Earth and Environmental Sciences, 5*(2), 1-11.

Kant, T., & Badarinath, K. V. S. (1998). Generation of Fraction Images from AVHHR Data Using Linear Mixing Model. *Journal of the Indian Society of Remote Sensing, 26*(1&2).

Krishna, T. M., Ravi Kumar, G., & Krishnaveni, M. (2009). Remote Sensing Based Agriculture Drought Assessment in Polar Basin of Tamil Nadu State, India. *Journal of Indian Society of Remote Sensing, 37*, 9-20.

Malik, J. (2004). Satellite Based Analysis of the Role of Land Use/Cover and Vegetation Density on Surface Temperature Regime of Delhi, India. International Science for Geo-Information Science and Earth Observation Enchedg.

Odindi, J. O., & Mhangara, P. (2012). Green Spaces Trends in the City of Port Elizabeth from 1990 to 2000 using Remote Sensing. *International Journal of Environmental Research, 6*(3), 653-662.

Rahman, A., Kumar, S., & Fazal, S. (2012). Assessment of Land Use/Land Cover Changes in The North-West District of Delhi Using Remote Sensing and GIS techniques. *Journal of Indian Society of Remote Sensing, 40*(4), 689-697.

Raja, D. R. (2012). Spatial Analysis of Land Surface Temperature in Dhaka Metropolitan Area. *Journal of Bangladesh Institute of Planners, 5*, 151-167.

Services International LTD. (n.d.). Ajmer Climate/Weather/Rainfall. Retrieved from http://www.delhitourism.com/climate-ajmer.html

Shetty, M. A., & Somashekar, R. K. (2014). Assessment of Vegetation Cover Through NDVI, Bangalore India. *Journal of Remote Sensing and GIS, 4*(3), 45-55

Singh, I. (1989). Monitoring of Forest Cover Type and Land Use Classes Through Remote Sensing Techniques (A Case Study in Ranikhet Tehsil, U.P.). *Journal of The Indian Society of Remote Sensing, 17*(2), 35-45.

Singh, R. B., Grover, A., & Zhan, J. (2014). Inter-Seasonal Variations of Surface Temperature in the Urbanized Environment of Delhi Using Landsat Thermal Data. *Energies, 7*, 1811-1828. doi: 10.3390/en7031811

Suribabu, C. R., Bhaskar, J., & Neelakantan, T.R . (2012). Land Use/Land Cover Change Detection of Tiruchirapalli City, India, Using Integrated Remote Sensing and GIS Tools. *Journal of Indian Society of Remote Sensing, 40*, 699-708.

The Yale Center for Earth Observation. (n.d.). Converting Landsat TM and ETM+ Thermal Bands to Temperature. Retrieved from http://www.yale.edu/eco

Tiwari, A. K., Kudrat, M., & Bhan, S. K. (1990). Vegetation Cover Classification in Sariska National Park and Surroundings. *Journal of Indian Society of Remote Sensing, 18*(3), 43-51.

Weng, Q., Lu, D., & Schubring, J. (2004). Estimation of Land Surface Temperature-Vegetation Abundance Relationship for Urban Heat Island Studies. *Remote Sensing of Environment, 89*, 467-483.

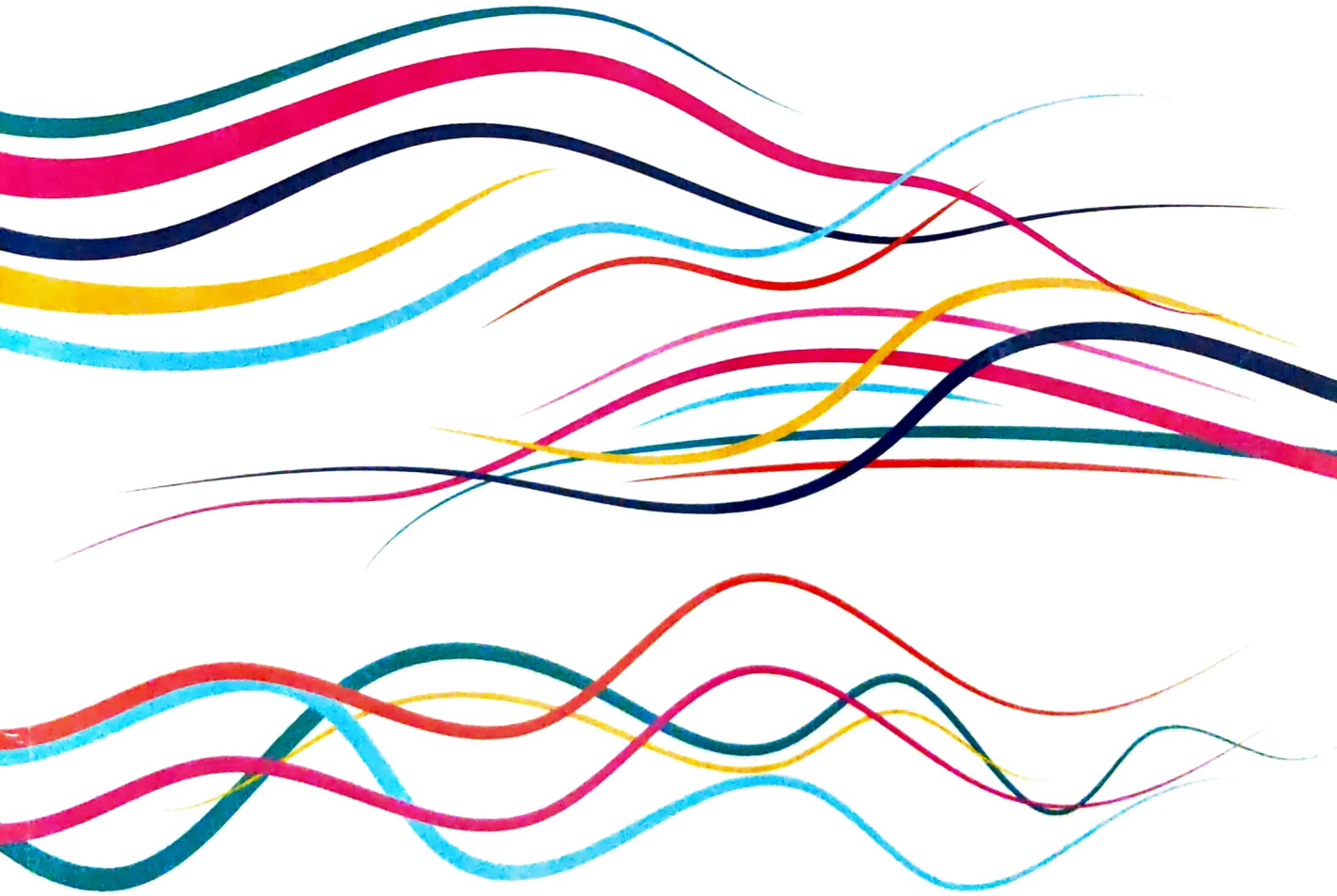
How to cite this article: Yadav, S., Khan, S., & Parashar, H. (2023). Impact of Urbanisation on Urban Climate Change the Urban Heat Island Effect: A Case Study of Ajmer City. *Khoj - A Peer Reviewed International Journal of Geography, 10*, 86-107.

Miscellany

Drishti : the Sight

ISSN 2319-8281
Volume XII, Issue I, (May, 2023 - October, 2023)

A refereed (Peer –Reviewed) bi-annual research journal of
English Literature/Assamese Literature/Folklore/Culture
(Enlisted in the UGC- CARE list of journals)



Chief Editor
Dr. Dipak Jyoti Baruah

Drishti: the Sight

Vol.- XII, Issue - I (May, 2023-October, 2023)

(UGC-CARE listed Journal)

A REFEREED (PEER-REVIEWED) BI-ANNUAL NATIONAL RESEARCH JOURNAL OF ENGLISH LITERATURE/ASSAMESE LITERATURE/FOLKLORE /CULTURE

Address for correspondence:

Dr. Dipak Jyoti Baruah

Professor, Dept. of English, Mahapurusha Srimanta Sankaradeva Viswavidyalaya,
Rupnagar, Guwahati-781032, Assam, India;
E-mail : info@drishtithesight.com
Our website : www.drishtithesight.com

Drishti: the Sight

Vol.- XII, Issue - I (May, 2023-October, 2023)

CONTENTS

- Editorial # 7
- A Lacanian Psychoanalysis of Gillian Flynn's Amy Elliott Dunne of *Gone Girl*# 9
  Sk Benazir, Dr. Safiul Islam
- A Scar in the Psyche: Nation and Gender in Amrita Pritam's *Pinjar* # 14
  Dr. Suja Mathew
- "Caught Straddling a Border": (Un) Familiar Terrains, Grand Confusions and Subjectivity in Indian English Travel Writings # 18
  Dr. Komal Yadav
- Culinary Subversion of Malayali Diaspora in Delhi: A Study on M Mukundan's Delhi: *A Soliloquy* # 22
  Rince Raju
- Depiction of Neo-colonialism and Its Impact on Ecology in the Select Writings of Tanure Ojaide # 27
  Mr. Biswajit Mondal, Dr. Sumit Kumar Dey
- Desire for the Dreadful: A Postcolonial Re-reading of Rudyard Kipling's 'To be Filed for reference' and 'Miss Youghal's Sais' # 32
  Abhijit Maity
- Displaced or Doubly Placed? Memory, Nostalgia and the Digital in Garth Davis's film *Lion* # 36
  Arun Singh
- Energy Governance, Dependency, and Future in *A Connecticut Yankee in King Arthur's Court* # 40
  Chander Shekhar
- Exploring the Delineation of Enlightenment and Willing Slavery in Jane Austen's *Pride and Prejudice* and R.K. Narayan's *A Willing Slave* # 44
  Dr. Sreeja Balakrishnan
- Fallen Trees as a Metaphor of Death: Re-Reading "When a Big Tree Falls" and "When Great Trees Fall" # 48
  Dr. Harleen Kaur
- Family at the Crossroad: Relocation of the Self in Akhil Sharma's *Family Life* # 52
  Anupam Roy
- Fight for Survival: A Study of Imitation in Hyeonseo Lee and David John's *The Girl with Seven Names* # 57
  V. Keerthana, Dr. Narasingaram Jayashree
- Haruki Murakami's Writing as Subversion of the Dominant Japanese Literary Tradition # 61
  Kaushik Bhuyan
- Narrating Oil: Witnessing Eco-crisis and Violence in Helon Habila's Petrofiction *Oil on Water (2010)* # 65
  Dr Aman Deep Singh
- Narrative of False and Repressed Memories: Studying Motivated Forgetting in Margaret Atwood's *Surfacing* # 69
  Yashasvini Rathore, Dr. Sucharita Sharma
- Of Rambuai and the Unsettling Lifeworlds: An appraisal of Malsawmi Jacob's *Zorami* #73
  Dr. Ritushmita Sharma
- Evaluating Gender Bias in the Assamese Language: A Quantitative Study #77
  Anuj Boruah, Sanjib Das

Narrative of False and Repressed Memories: Studying Motivated Forgetting in Margaret Atwood's *Surfacing*

Yashasvini Rathore
Research Scholar, Dept of English
IIS (deemed to be University), Jaipur

Dr. Sucharita Sharma
Sr. Assistant Professor, Dept of English
IIS (deemed to be University), Jaipur

Abstract

We are what we choose to forget and remember. Memory is an act that allows human beings to establish and survive the connection between the past and the present, creating a space for ourselves and the forms of experiences that we desire to live with. Thus, with this creative power, memory enables us to construe the past in the present. In such a world of memories, motivated forgetting becomes an active process on the part of the individual, where memory lapse is motivated by a desire to avoid a disagreeable recollection. Margaret Atwood, in her novels, uses remembering and forgetting as active forces which constantly communicate to construct the present selves of the protagonists.In *Surfacing*, the nameless protagonist tries to repress and actively reconstruct her memories in order to stay sane and survive. She,along with repressing painful memories recalls false memories, for the readers. This paper attempts to study motivated forgetting as a narrative technique used by Atwood to explore the unreliability and trauma of the narrators and to create incomprehensible characters. The research will also look at the freedom of construction and reconstruction of the self in a first-person narrative and the role of repressed memories in creating a split self in the narrator.

Keywords : Motivated Forgetting, Memories, Narrative, Repression, Self

> "The mind, he reflects, is like a house- thoughts which the owner no longer wishes to display, or those which arouse painful memories, are thrust out of sight, and consigned to attic or cellar; and in forgetting, as in storage of broken furniture, there is surely an element of will at work"(Atwood 421).

Motivated forgetting finds its roots in Sigmund Freud's key concept of repression and is hence, often used interchangeably with the term repressed memories (Morgan 207). Repression is a defense mechanism used by the ego to banish from consciousness any disturbing idea, memory, feeling, or motive. The process of repression is unconscious and automatic, and although the repressed material stays hidden in the unconscious,it still influences one's behaviour (Morgan 578).According to Anderson and Huddleston, the motive to forget exists in all people, and motivated forgetting is an adaptive technique wherein people control unwanted memories by engaging mechanisms to limit access to those uncomfortable experiences (53, 107). Hence, the concept allows for an active process of forgetting (unlike passive interference and decay theories), where emotions and motivation play a role in deciding what gets recalled and what stays out of awareness. A similar concept to motivated forgetting is defensive amnesia, in which one forgets important details of their past lives as a means of protecting themselves from intense and intolerable situations (Morgan 209). While the scope and definition of the concepts vary slightly in different sources for this research endeavour, the term motivated forgetting would include aspects of defensive amnesia as well.

A narrative is an act of memory, and memory is reconstructed every time it's recalled. The narrators/ protagonists of Margaret Atwood's novels display fallibility of memory all the time, and though the repressed memories often do come to the surface, the void created by them is often filled up by false

memories, emotional alienation, and numbness. *Surfacing* is the story of an unnamed woman protagonist, an illustrator of fairy tales, whose search for her missing father on a remote island (her childhood home) in Quebec leads her to make several important, but disturbing discoveries about herself. Her island home acts as a catalyst for the surfacing of long-repressed memories and dissolves her facade of false memories. The unnamed protagonist of *Surfacing* will be the focus of the research in this paper, as she offers an opportunity to understand motivated forgetting as a narrative technique employed by Atwood to create complex female characters.

The protagonist of *Surfacing* finds herself in a stressful situation at the start of the narrative, as her father has gone missing and she has to visit her childhood home to inquire about him. Her relationship with her past is one of careful observation. She narrates incidents from her past as the island evokes memories of her parents, brother, and her relatively "good childhood" (12). She reveals that she is divorced and has a child, and how leaving her child "was the unpardonable sin" that her parents never understood nor forgave her for (23). Interestingly, the protagonist feels emotionally numb, isolated, and alienated not just because of her "hermit crab" personality but as a constant way of being that she is now accustomed to (66). Her narrative, while she searches for her father with her friends (David and Anna) and her lover, Joe, is interlaced with the memories of her family. The protagonist's sanity is at stake as the island floods her with flashbacks of how things were. While looking back, she cautions herself and perhaps the reader as well:

> I have to be more careful about my memories, I have to be sure they're my own and not the memories of other people telling me what I felt, how I acted, what I said: if the events are wrong the feelings, I remember about them will be wrong too, I'll start inventing them and there will be no way of correcting it, the ones who could help are gone. I run quickly over my version of it, my life, checking it like an alibi; it fits, it's all there till the time I left. Then static, like a jumped track, for a moment I've lost it, wiped clean; my exact age even, I shut my eyes, what is it? To have the past but not the present, that means you're going senile(67).

While there is unresolved grief over her mother's death, fear about her father's mental state and disappearance,and resentment for her ex-husband, in the case of her child the feelings and the chain of thoughts keep changing. She first refers to her child as not "really mine" and how it was "imposed" on her by her husband (23, 28).Later, when Anna tells her that she's lucky she didn't have any kids with her ex-husband, the protagonist reveals:"I have to behave as though it doesn't exist, because for me it can't, it was taken away from me, exported, deported. A section of my own life, sliced off from me like a Siamese twin, my own flesh cancelled. Lapse, relapse, I have to forget." (42). She often uses the preposition "it" to refer to her child. In her narrative, the child is nameless, just like her and the rest of her family (parents, brother, and ex-husband). This unconscious omission of identity-defining names indicates the loss of the basic faculty of classification of others, as the self can't even come to terms with its own existence. Everyone related to her past is denied a name and given only a general label as she tries to navigate through her memories.

She starts realizing how deficient she is when it comes to language and emotions. All she cantruly feel is fear that "I wasn't alive" (105). The decline of her mental health is foreshadowed by her inability to feel and dream throughout the narrative. Freud, famously quoted that "the interpretation of dreams is the royal road to a knowledge of the unconscious activities of the mind", and the protagonist's inability to dream hints that her consciousness is hard at work to protect her from her repressed memories (604). She further starts to over-empathize with the animals and feels guilty about eating them. The island, her home, and her hunt for her fatheract as the catalyst for the surfacing of her repressed memories. The act of diving into the lake multiple times to search for her father is metaphorically an act of reaching down to her memories. She's able to recognize that beyond the "disguise" of the image of her drowned brother is her

child that she "killed" (137). The repressed memories reveal that the protagonist had an affair with her married art teacher and when she got pregnant, abortion is considered the natural solution for her state. She visits the abortion house alone and is "emptied, amputated"of her child (138). As she did have a choice in the matter of abortion, she refers to it as an act of "slaughter, murder" (139). She accepts:"It was all real enough, it was enough reality for ever, I couldn't accept it, that mutilation, ruin I'd made. I needed a different version. I pieced it together the best way I could...the memories fraudulent as passports" (137-38).

The fraudulent memory of her wedding is carefully pasted over the memory of the day she got her abortion (82). Her brother's drowning masks the memory of how probably her fetus after being scraped from her womb might have reached the sea through sewers (137).The narrator's other memory, in which the drowned brother is "saved only by accident", reveals wishful thinking as it shows what the narrator would like to have done with her child (68). There are several instances where she mentions how her brain covers "over the bad things" and fills the empty spaces "with an embroidery of calculations and numbers" (127). The repressed memories are plastered with events that are bearable to her,but even these new false memories induce feelings of sadness and anxiety. Her affair with her teacher and the termination of an unwanted pregnancy is given a slightly more acceptable image of an ex-husband and a child whom she has left. Perhaps this is one of the reasons for empathizing with animals in excess as her lover had referred to her aborted child as not "a person, only an animal," and therefore animals are symbolic of not only innocent lives being murdered by humans but her own child as well (138). The protagonist's motive for forgetting this particular memory is to avoid living with the guilt and horror of being a "killer" (139).

To bear the burden of what she had done, she created a false memory about having a husband which legitimized the existence of a child living away from her. She wears a wedding ring and tells her friends about having an ex-husband to establish the authenticity of her false memory. Whether she truly told her parents about this fake wedding remains unclear, as interaction with her parents is missing in the narrative. All she tells the audience is that they were unhappy with the divorce. This pseudo past is so deeply embedded in the narrator's mind that even in the climactic scene of revelation, the truth does not flash upon her in one instant. She recognizes it only gradually, working her way down through a series of memories in which the truth is half veiled and half visible until she finally arrives at a recollection of the abortion. Once she faces the repressed memory she tries to rectify her actions by getting pregnant again. Perhaps it's only by giving birth to a child that she can forgive herself, and as she's desperate for forgiveness, she plans on getting pregnant with her boyfriend, Joe, without discussing it with him. The emergence of repressed memories, and the grief of losing her parents drive her to a psychotic breakdown. The breakdown is the only way her consciousness can cope with the past and the present.

Her breakdown entails retreating from the world of humans, in which she has always had trouble,to a moresecure natural environment ruled by the gods. Nature appears safe to her, as it's a familiar childhood space where she pretended to be an animal while playing with her brother. Her father preferred animals to humans as they "were more consistent, their behaviouratleast more predictable" and so she too feels safe in regressing to a more primitive living condition(53). There are different rules and rituals of the environment, which she follows in order to heal and forgive herself.Whether the healing is healthy is debatable, as the protagonist looks forward to the child growing inside her, as a sign of redemption. She finally dreams again and there is a good chance she rejoins civilization, as she feels she's no longer a "victim" (185). The use of false memories for almost half the narrative makes her an unreliable narrator,but once she recovers her repressed memories,the resultant psychotic breakdown (gradually building since her return) again renders her unreliable. As the ending of her narrativeis ambiguous and the protagonist has consistently been unreliable, it doesn't help in formulating an opinion about her mental health after the breakdown. Would she forget this breakdown along

with the memory of her abortion, just like she had done earlier? This question remains unanswered.

The first-person narration of her own life story allows her greater control to not only tell her story the way she wants to but also construct and reconstruct herself. Many of Atwood's novels use memory as a narrative tool, as her protagonists often develop their sense of self through a specific kind of storytelling that is based on retrospection and recollection of their past experiences.A character with repressed, traumatic, and false memories is like an abstract puzzle piece to themselves as well as the readers. Repression of memories/motivated forgetting/defensive amnesia is a common technique that Atwood often uses in her novels, which adds to the incomprehensibility of the female protagonist characters.

The unnamed protagonist refers to madness as "only an amplification of what you already are" (95). Interestingly, her understanding of what kind of behaviour is abnormal is reflected in how her repression of memories leads to the creation of a split self. The unnamed protagonist gradually becomes more alienated, detached, and finally incapable of language and living with civilization because of the fabrication of false memories. She describes herself as a "hermit crab" personality since childhood, and this is only amplified because of the active repression of her memories of abortion (66). She divides her memories into what is bearable and what needs plastering over, and this causes a split/division in her sense of self that renders her detached and numb. She says:"I'd allowed myself to be cut in two...with me there has been an accident and I came apart. The other half, the one locked away, was the only one that could live; I was the wrong half, detached, terminal." (102).

It's her muddled and false memories that make her an incomprehensible, unreliable, and ambiguous protagonist. The false memories aren't perceptive differences but active attempts at creating memories of things that never happened to deal with the trauma of the repressed events. The motivation to forget her decision to abort the child is not just a result of a maternal defensive mechanism but a moral dilemma of being a "killer" (139). Her act of drowning out her memories is an attempt to stay sane and deal with the overwhelming guilt. While the narrative allows her the freedom to reconstruct her sense of self, it also eventually forces her to face the repressed memories before she can heal and forgive herself. Just like memory and narrative are reconstructed every time they're recalled and retold, the self of Atwoodian protagonists situated in this space of their memories and first-person narration is actively constructed, deconstructed, and reconstructed.

Works Cited

Anderson, Michael C, and Ean Huddleston."Towards a cognitive and neurobiological model of motivated forgetting."*True and False Recovered Memories: Toward a Reconciliation of the Debate*, edited by Robert F. Belli, Springer, 2012, pp. 53-120. Nebraska Symposium on Motivation, vol. 58.

Atwood, Margaret. *Surfacing*. Virago, 1979.

—. *Alias Grace*. Virago, 1997, pp. 421.

Freud, Sigmund. *The Interpretation of Dreams*. Translated and edited by James Strachey,Basic Books, 2010, pp. 604.

Morgan, Clifford T., Richard A. King, John R. Weisz and John Schopler.*Introduction to Psychology*. 7th ed., Tata McGraw Hill, 2011, pp. 207-10, 578-88.

□□

Impact Factor:6.817(SJIF) **SP Publications** Vol-6, Issue-2, 2024
International Journal Of English and Studies (IJOES)
An International Peer-Reviewed and Refereed Journal

Fake Smile Cells: Repression and Silence in *Nosedive*

Ms. Yashasvini Rathore
Assistant Professor, Department of English, Sophia Girls' College (Autonomous), Ajmer.

Article Received: 12/01/2024
Article Accepted: 09/02/2024
Published Online: 11/02/2024
DOI:10.47311/IJOES.2024.6.2.34

Abstract:
Imagine a world where people rate one's social interactions online and offline. The ratings are not just another popularity contest but control one's socio-economic status. The pressure to conform and be likable would lead to self-repression, and a lot would remain unsaid in a world dependent on the currency of people's position in society. Though hierarchical discrimination has been a reality for humans for centuries, the narrative of *Nosedive* (an episode of the science fiction anthology *Black Mirror*) adds another system of hierarchy based on one's social ratings. The paper studies the act of silence and repression of emotions as an everyday phenomenon in the story. Further, the dystopian world of *Nosedive* is contrasted with our reality, and the nosediving effects of social comparison are also elaborated.

Keywords: repression, emotions, silence, social comparison

"Unexpressed emotions will never die. They are buried alive and will come forth later in uglier ways." **— Sigmund Freud.**

Black Mirror is a British science-fiction TV series anthology that explores the impact of technology on humans. It has become a global phenomenon since its release, and its dystopian tone in each standalone episode warns about where we are heading as a civilization. Each series episode can be read through the Postmodern and Posthumanist lens as the writers depict our current obsessions and dependence on technology. *Nosedive* (episode 1 of season 3), written by Rashida Jones and Mike Schur, presents a world where an established social rating system forces people to put on a persona of niceness and repress all their negative emotions and behavior. Acting politelylyrespectfully, and positivelytively is essential for maintaining social-socio-economic. The story follows Lacie Pound, a young woman whose world dictates being rated/judged by people on a minute-to-minute basis. Every interaction, whether online (through social media) or offline, is ranked on a 5-point star rating scale.

Everyone rates and is rated, and their rating affects their daily life. The ones with high scores enjoy a privileged social position and access to commodities and services (housing, cars, jobs, etc.), whereas those with low scores are treated as outcasts. The plot eerily marries our current obsession with our virtual self-image and the desire to be accepted and liked with existing structures of classism and materialism to create this grim reality where a simple score decides one's survival in the world.

Lacie, the protagonist of the story, is a 4.2 who wishes to improve her position in the world. The pressure of constantly comparing oneself and assuming the virtual images of people's lives to be their reality motivates Lacie to buy herself an apartment that is out of her budget. The house is symbolic of the idealistic lifestyle that she wishes to acquire. She is told to increase her rating to rent her expensive lifestyle apartment. Her meeting with a data analyst reveals that more 5-star ratings by "quality people" (the ones with high ratings themselves) can help her to reach a 4.5 rating in a short time ("Nosedive" 00:13:09). Soon, she finds an opportunity to achieve this when her school friend Naomi invites her as maid of honor for her wedding.

Stjepan Mestrovic defines a post-emotional society as one where emotions have been "transformed into a quasi-intellectual-phenomenon" and "insincere sincerity, synthetic candor, feigned frankness, and affected openness" are valued (Tüzün 150). *Nosedive* is a perfect example of a postemotional society, as everything seems to imitate authentic expression. Everyone pretends to be friendly and polite to the extent of toxicity. Openness is reserved only for people with good ratings. Lacie's world is post-emotional; therefore, emotions like frustration, anger, and disgust are hidden and often expressed through the passive-aggressive act of rating someone down. Lacie is rated down in the story when she misses her Uber ride for the airport and when she expresses her frustration at missing her flight. Everyday life actions elicit a specific response (emotion) from the audience through ratings. However, these responses are based on a transactional model where one rates favorably so that they also receive good ratings. People in Lacie's world are consumed by their persona, and hiding their "real" self has become a way of being in the world (Tüzün 161). Every character tries to conform to the system and be likable to people on their faces. This feigned sweetness often contrasts with their sharp facial expressions of disgust, annoyance, shame, irritation, etc. The real estate agent of Lacie and the airport assistance officer are good examples of this discrepancy between words and facial expressions.

"Between what is said and not meant, And what is meant and not said, Most love is lost." this quote by Kahil Gibran would gain an ironic position for the people in the story of *Nosedive.* In the post-emotional world of the episode, there is an unsaid understanding between everyone that they are using each other for a better rating.

Naomi, while informing Lacie that she is not the Maid of Honour anymore as her rating has decreased to 2.6, tells her that when she invited Lacie to speak, she was a 4.2. The simulations predicted that a vintage bond of a low four speaking at her gathering would give Naomi a bounce of a minimum of .2 points. When Lacie retorts by asking if it was just about numbers for her, she hits back by dropping all pretenses "Oh, cut the shit! It was numbers for both of us. You wanted those primo votes, do not deny it. It is not like you could get them on your own. Let us not kid ourselves" ("Nosedive" 00:47:02). Many time people remain silent on witnessing the struggles of those with lower ratings. Lacie witnesses a colleague struggling to enter their office as he no longer has a suitable rating. Despite her wanting to help him, she chooses her self-preservation as helping the colleague means she invites the displeasure of others. The simple act of rating someone is just the sound of the smartphone pinging/beeping. The erasure of words from this action makes it impersonal and simplistic. While the rating says a lot without any verbal stimulus, it creates an almost robotic-like trance where everyone remains hooked to their screens, absorbing the lives of others through their pictures and captions.

Silence is a constant background in the episode as everyone constantly silences their authentic selves. The expressions are muted, the speech carefully crafted, and people look the other way when someone with a low rating asks for help. Moreover, there is collective silence about the rating system and the discrimination it leads to. The majority of the people are so comfortable with it that they choose to ignore the mental repercussions of this pervasive silence.

The constant social evaluation of one's overt behavior and exposure to idealized living standards leads the protagonist to repress her emotions. Repressing one's emotions is deliberate, and the silence. In contrast, others suffer because of the social rating system, which is out of convenience as she enjoys an excellent social ranking at the beginning of the story. Lacie's ambition of achieving a higher rating by attending Naomi's wedding as her maid of honor does not go according to plan. When Naomi drops her as the maid of honor, Lacie's mental state receives a final blow, and her behavior spirals out of hand. She gatecrashes Naomi's wedding with her clothes dripping in dirt and snatches the microphone to give a hysterical speech. In her speech, she finally expresses her feelings about how Naomi always looked down on her, tried to control her behavior, and even revealed that she slept with Lacie's boyfriend. Her breakdown, which was building up, erupts with far-reaching consequences. Repression in psychoanalytic theory is the exclusion of distressing thoughts, memories, and emotions from consciousness, which can lead to anxiety and neurotic symptoms (Repression | Definition & Facts | Britannica). Lacie ends up experiencing a nervous breakdown as her psyche can no longer repress her desire to

express her authentic self. Her consciousness struggles for control while giving the speech as she hopes to improve her rating, but simultaneously, she wishes to confront Naomi about betraying her. Her hysterical speech mixes her original speech and sentences, expressing her rage. She is arrested for causing a ruckus at the wedding.

The prison ironically becomes a place where she finally lets it all out. Even though she is caged in, it is in that cell where she gets an opportunity to express herself without fearing ratings. The prison cell beside her is occupied by a man perhaps free of the social rating world. They start listing the things they "do not like" about each other. The last dialogue of the story, "Fuck you!" is said in unison by these two characters ("Nosedive" 00:59:53 - 01:01:28). The freedom to utter obscenities and express her disliking is cathartic as finally, Lacie gets to speak things she would be punished for outside the prison cell. Hence, this prison cell is far more liberating than the world outside, where everyone is trapped inside their fake smile cells. The fake smile cells everyone has built-in *Nosedive* lead to a silent and repressed society that has tranquilized all their authentic impulses.

Nosedive also raises an important question about authentic self-expression and its importance for healthy mental well-being. The citizens of *Nosedive* are physically healthy and live in sanitized spaces, but their mental health suffers as they are pressured to be positive constantly. They are continuously hooked to their devices and virtual self-image; they look happy and satisfied, but what they feel is only explored through the point of view of a couple of characters in the episode and according to a recent study that analyzed the data of 10,560 Facebook users, individuals who are more authentic with their self-expression on the platform also reported greater life satisfaction (Bailey et al.). The study was only for one platform; the data from more social media platforms can help one imagine more clearly what a post-emotional society like *Nosedive* would look and feel like.

At the beginning of the episode, one observes how carefully Lacie practices her giggles in front of the mirror. This simple act of honing one's smile to be accepted reveals how people in her world have mastered their fake smiles. Almost everyone is cooped up in this post-emotional world with smartphones, obsessing over their ratings. Only through two significant characters, one realizes the pathetic state of those obsessed with their ratings. Lacie's brother Ryan and Susan (the woman who offers her a lift to Naomi's wedding) are the ones who understand that the ratings can change someone drastically. Ryan is a 3.7 and gets favorable points from his gaming community online; he keeps on making fun of Lacie for wanting to improve her living standards by getting a better rating. He cares for Lacie and does not want her to attend Naomi's wedding as she is always mean to her. He believes that probably all high fours are "suicidal on the inside" as this obsession of comparing oneself with others

and pretending to be happy all the time can surely lead one to be depressed ("Nosedive" 00:24:08). Susan, on the other hand, is a friendly 1.4 who has given up on people-pleasing. As in the past, her high rating could not save the life of her husband, who had to let go of his medical trial position to a person with a better rating. So once she lost her husband, she gave up on the rating system and started speaking her mind, leading to her low scores. Ryan and Susan are examples of how one can survive in the cutthroat world of social rating while still expressing themselves. Ryan is still a part of the system. He dislikes the excessively feigned niceness and materialism, but Susan has decided not to play by the rules.

Lacie's conversation with Susan is pivotal as it voices why she continues to conform. She tells Susan that it is easy for her as she has lost everything she has, but Lacie, on the other hand, never has anything worth losing. She reveals that she is still fighting first to be content to "look around and think, well, I guess I am okay. To breathe out, not feeling - Like just And that is way off, like, way off. Moreover, until I get there, I have to play the numbers game. We all do, that is what we are in" ("Nosedive" 00:42:16 – 00:43:07). Lacie puts into words why everyone is running behind the numbers as they have not reached contentment yet. The kind of contentment Lacie is chasing comes with the cost of constantly repressing one's emotions and silencing one's authentic self.

The world presented in the episode seems farfetched, but our world already has a couple of systems in place, as shown in the episode. According to the website Datareportal, as of July 2023, 60.6% of all people use social media ("Digital"). The applications Facebook and Instagram, which are the source of inspiration for the online sharing portal in *Nosedive,* boast of being on the list of top five social media platforms that people use regularly as of July 2023 ("Global"). We already use an online rating system for rating services like delivery, customer support, and even places and organizations. While it is not as pervasive, it does influence our behavior. The social rating system in the story shares an ideological background with China's social credit system, which was announced in 2014. The social credit system is a regulatory framework intended to report on the 'trustworthiness' of individuals, corporations, and governmental entities across China. It is being posited as similar to having a credit score where good behavior is rewarded, and bad behavior is punished. The framework has yet to be rolled out entirely. However, the dire consequences of having a bad score could result in slower internet speed, removal of traveling rights either domestically or abroad, publicized as an evil citizen/organization, and being put on the blocklist by the government or other credit assessors (Ma).

Nosedive also does not seem like an exaggeration, as it takes up something as basic as a social comparison, vital for understanding and defining oneself. It turns

it into a giant that forces people to conform. Most dystopian narratives end with either the collapse of the dystopian world due to the actions of the protagonist or the protagonist ending up dead or imprisoned. Lacie's action of breaking her silence (even though it is a psychological breakdown) and expressing her authentic pent-up emotions is an act of defiance. Even though life will be difficult for her as she no longer enjoys the security of a high rating, she can at least exist without constantly repressing her emotions. She becomes the other in a society that values insincerity and feigned positivity. Her future appears to be bleak as the post-emotional society is comfortably ignorant of the ill effects of its social rating system.

While Lacie is successful in escaping her "matrix" of the social rating system, much like "Truman" escaping his reality of an artificial TV set, the question of whether we as humans will be able to escape or instead prevent our reality, which is increasingly becoming dependent on technology remains to be seen. As more and more people get addicted to their smartphones and virtual selves, the more the grim reality of constant comparison gets closer to turning into a nosedive. This social comparison could only result in disappointment, depression, and anxiety, as there will always be a section of people who will do better and who will have it all. Moreover, the pressure of only sharing what is good, positive, and happy with others also creates a constant need to feel and experience these positive events and emotions. The need for social acceptance and belongingness also included the need to be liked and accepted for one's virtual self—a self that lives in a space between reality and hyperreality, much like the one Lacie inhabits.

End Notes:

1. The word matrix is also used as a pun to refer to the 1999 science fiction movie *The Matrix,* in which humanity is unknowingly trapped inside a simulated reality, which intelligent machines have created to distract humans while using their bodies as an energy source.
2. *The Truman Show* is a 1998 Am.erican movie where an insurance salesman discovers his whole life has been a reality TV show.

References:

"A Quote by Sigmund Freud." *Goodreads.com*, 2023, www.goodreads.com/quotes/422467-unexpressed-emotions-will never-die-they-are-buried-alive-and. It was accessed on September 8, 2023.

Bailey, Erica R., et al. "Authentic Self-Expression on Social Media Is Associated with Greater Subjective Well-Being." *Nature*

Communications, vol. 11, no. 1, Nature Portfolio, Oct. 2020, https://doi.org/10.1038/s41467-020-18539-w. It was accessed on October 2, 2023.

"Between What Is Said and Not Meant - Kahlil Gibran Quotes." *The Minds Journal*, November 19, 2016, themindsjournal.com/quotes/between what-is-said-and-not-meant/. It was accessed on September 8, 2023.

"Digital Around the World." *DATAREPORTAL*, https://datareportal.com/global-digital-overview. Accessed September 8, 2023.

"Global Social Media Stats." *DATAREPORTAL,* https://datareportal.com/social-media-users. Accessed September 8, 2023.

Ma, Alexandra. "China has started ranking citizens with a creepy 'social credit' system – here is what you can do wrong, and the embarrassing, demeaning ways they can punish you." *Business Insider*, April 8, 2018, https://www.businessinsider.in/politics/china-has-started ranking-citizens-with-a-creepy-social-credit-system-heres-what-you can-do-wrong-and-the-embarrassing-demeaning-ways-they-can punish-you/articleshow/63666457.cms

"Nosedive." *Black Mirror*, season 3, episode 1, Zeppotron, October 21,2016. *Netflix,*https://www.netflix.com/watch/80104627?trackId=1427728 &tctx=-97%2C-97%2C%2C%2C%2C%2C%2C.

"Repression | Definition & Facts | Britannica." *Encyclopædia Britannica*, 2023, www.britannica.com/science/repression-psychology. It was accessed on October 2, 2023.

Tüzün, Hatice Övgü. "Mediated Subjectivities in Postemotional Society Black Mirror's "Nosedive"." *Reading "Black Mirror": Insights into Technology and the Post-Media Condition*, edited by German A. Duarte, Justin Michael Battin, Transcript Verlag, 2021, pp. 149-164.

ISSN 2319-5339 (P), 2583-7591 (O) IIS Univ.J.A. Vol.12 (1&2), 91-103 (2023)

Mothball Wishing to be a Butterfly: Studying Joan's Eating Disorder in Margaret Atwood's *Lady Oracle*

Yashasvini Rathore & Sucharita Sharma

Abstract

The understanding of psychological disorders evolves over time and with this evolves their depiction in fictional works. As each individual's case with a particular ailment is unique, so is its portrayal in fiction. One such portrayal of Binge-Eating Disorder is in Margaret Atwood's novel *Lady Oracle*. The paper attempts to study the various causes of disordered eating of Joan along with her journey of reversing her eating patterns. It is argued that the interplay of social and familial causes lead to Joan's predicament. As the narrative is set in the mid and late twentieth century, it also allows one to compare the changes since then in various media avenues and their influence in circulating different ideals of the female body. The paper contributes to both medical and health humanities as it analyses in deep the portrayal of Binge-Eating Disorder in the novel.

Keywords: Binge-Eating disorder; Familial; Female; Health humanities; Medical humanities; Social.

> I knew this even when I was ten. If Desdemona was fat who would care whether or not Othello strangled her? Why is it that the girls Nazis torture on the covers of the sleazier men's magazines are always good looking? The effect would be quite different if they were overweight. The men would find it hilarious instead of immoral or sexually titillating.
>
> Margaret Atwood, *Lady Oracle*

According to Shapiro et. al, Medical Humanities aims to improve healthcare facilities by teaching its practitioners using methods, concepts, and content from the humanities disciplines to create more self-aware and

humane professionals (192-93). While memoirs, autobiographies, non-fiction, and self-help books in Literature contribute directly to the field of medicine, fiction can help in illustrating the conflicts in the medical encounter (between health practitioners and patients, science and superstition, social and cultural context), develop empathy and generate an ethical, historical and epistemological reflection of the practice (Mejía-Rivera 25).Leo Tolstoy's *The Death of Ivan Ilyich* (1886), Albert Camus' *The Plague* (1947), Ken Kesey's *One Flew Over the Cuckoo's Nest* (1962), and Alberto Barrera Tyszka's *The Sickness* (2006) are some novels that explore themes around medical practice.

Food and sleep are two essentials of the human body that are affected in case of any mental or physical disturbance. While eating is important for providing nutrients and energy to the body, sleep is necessary for rest and healing. Eating and sleeping disorders often accompany other abnormal disorders and physical ailments. Feeding and Eating Disorders are often dubbed as modern female disorders though pathological patterns of eating have been observed throughout the centuries (Butcher et al. 300). The myth that it affects more women than men is also called into question, as these disorders are underdiagnosed and misdiagnosed in men (Butcher et al. 300). DSM- 5 by the American Psychiatric Association lists nine Feeding and Eating Disorders namely, Pica, Rumination Disorder, Avoidant/ Restrictive Food Intake Disorder, Anorexia Nervosa, Bulimia Nervosa, Binge- Eating Disorder, Other Specified Feeding and Eating Disorder and Unspecified Feeding and Eating Disorder (329-58).

Literature has often depicted the causes and symptoms of psychological disorders accurately and sensitively, whether it is Lady Macbeth's obsessive-compulsive disorder (a result of her guilt) in William Shakespeare's *Macbeth* or Henry Jekyll's disassociative identity disorder (a result of restraining his wilder impulses) in Robert Louis Stevenson's *The Strange Case of Dr. Jekyll and Mr. Hyde*. Global attention to mental health has created a more humane depiction of psychological disorders in movies and literature. *Thirteen Reasons Why,* a popular contemporary novel by Jay Asher, explores conditions like depression, bipolar disorder, anxiety, PTSD, and suicide in teenagers. Today, there isn't a dearth of fiction, non-fiction and self-help books for people dealing with various eating disorders; the list is, of course, longer for women than for men. These narratives of Feeding and Eating Disorders can help a large range of health practitioners in General Health, Psychiatry, Psychology, Nutrition, and Physical Training.

Margaret Atwood is a Canadian writer known for depicting the psycho-

logical world of her female characters that often have to live with one or multiple psychological conditions like anxiety, depression, and other psychotic problems. Her novels provide ample narratives that can easily be used to understand various emotional states, a variety of psychological disorders, and even physical ailments. *Surfacing* depicts the psychotic breakdown of a woman because of the resurgence of her traumatic memories; *Life Before Man* portrays depression; and *The Blind Assassin* discusses the effects of abuse. In *The Robber Bride,* Atwood traces the psychological development of three women and how it shapes/influences their decision-making power as adults; *Bodily Harm* draws the life of a woman with breast cancer; *Cat's Eye* explores the crippling anxiety and depression of an artist; and *Alias Grace* depicts a murderess and her experience of psychiatric institutionalization.

Atwood, in the Introduction to a Cookbook, writes, "Eating is our earliest metaphor, preceding our consciousness of gender difference, race, nationality, and language. We eat before we talk." She has often used eating as a metaphor for the power struggle between men and women (Parker 349). Her first novel, *The Edible Woman* explores the condition of Marian who gradually stops eating as she loses autonomy and her sense of self in her romantic relationship. The condition has been read as Anorexia Nervosa, an eating disorder where intense fear of gaining weight or becoming fat combines with behaviour that result in significantly low body weight (Butcher et al. 295). While the condition of starving oneself is certainly not new, the term Anorexia Nervosa was coined by Sir William Gull in 1873; what Atwood depicts is closer to the literal translation of the term which is "lack of appetite induced by nervousness" (Muhlheim). Marian begins to empathize with the animal products lying in front of her because she feels that just like those objects, she is also being consumed by her fiancé, metaphorically. Her loss of appetite is both a physical expression of her powerlessness and a protest against that powerlessness (Parker 350). She is incapable of articulating herself like Joan, the protagonist of Atwood's third novel *Lady Oracle.*

Lady Oracle is the story of Joan Foster, a successful writer with a history of Binge-Eating Disorder that starts in her childhood and continues well into her adulthood. The novel is narrated in the first person by Joan and this allows the reader a close look into her psychological world. She develops an eating disorder as a result of her failure to fit within society's norms for young girls. This failure makes her a victim of the traumatic experience of her mother's rejection. Joan does lose her excess weight but the memories of her obese self are so humiliating that she hides her former

self from people in general and men in particular. This duplicitous self appears in her two kinds of writing where she writes Costume Gothics under a pseudonym (Louise K. Delacourt) and poetry under her birth name. The act of hiding parts of herself that has the slightest chance of being laughed upon or rejected creates anxiety and paranoia in her adulthood. The reader gets a more detailed look at Joan's life as compared to Marian's. Joan's childhood is responsible for her miserable state as an adult, but with Marian one can't apply this longitudinal approach of analysis (studying/researching something/someone over a period of time) as the text only focuses on her adult life.

Psychological disorders in women have been a subject of research in the Feminist tradition for a long time now. The "madwoman in the attic" has been given a voice where she can finally explain the reasons for her madness, while also questioning the representation of her madness in a patriarchal society. Eating disorders too have been the subject of a plethora of research through the feminist lens, where social and cultural power structures are studied to understand their repercussions on women's eating patterns. For this paper, Joan's condition would be understood in the light of psychoanalysis and her social interactions. Atwood's depiction of Binge-Eating Disorder will be studied and used as a prototype to study contemporary conditions.

Psychoanalysts, developmental and child psychologists have emphasized the effect of childhood experiences on adult life and personality. Hence, the relationship dynamics of the family is the first chapter in a person's life that is deeply studied to understand his/her needs and motivations as an adult. Sigmund Freud, in his theory of psychosexual stages of development (a human development approach in which each stage an erogenous zone is the source of pleasure for the individual), describes the Phallic Stage as a period when the male child is attracted to the mother and sees his father as a competitor and the female child is attracted to the father and sees the mother as a rival (Hall et al. 54). The female child sees her mother as lacking the protruding male sex organ and blames the mother for her castrated condition. This rivalry is complicated as the nature of feelings is of "ambivalence" and not just pure hostility towards the opposite sex parent (Hall et al. 55–56). Joan's feelings towards her mother are also ambivalent. She wishes to hurt her by binge eating, but at the same time she desires her acceptance as well. Overeating is symbolic of filling up on the love and affection that she desires and is also a mechanism to deal with the ambivalent relationship. Her mother's active rejection of her because of her weight in childhood and binge eating and obesity in ado-

lescence complicates the relationship even further. Her father is an absent parent till she is five and his name is used by her mother to either scare her into submission or depict him as a pleasant man whose arrival would signal positive changes in their lives. Joan later describes him as an "absence" as most of the time he usually remained in the background never taking an active part in Joan's upbringing (69). There is enough evidence in the text itself to suggest that her father struggles with post-traumatic stress disorder. Despite his absence, Joan is much kinder while depicting her father than she is while talking about her mother: "…, the secret that I alone knew: my mother was a monster" (67).

The surrogate mother figure in Joan's life is Aunt Lou who loves and appreciates her as she is. She takes her to fairs and cinema halls and lets her eat all that she wishes. She is kind to her and emphasizes that it doesn't matter how one looks. Aunt Lou is described as a heavy, independent, and happy woman—a stark contrast to the protagonist's mother. Her relationship with Joan is based not only on affection but also on the fact that she is someone Joan can relate to as another fat female who isn't a rival for her father's love. This complex dynamics of Aunt Lou as being present-compared to her absent father and being opposite (physically and behaviour-wise) of what her mother is in every way- allows their relationship to flourish. Joan says that in one of her daydreams, "I used to pretend Aunt Lou was my real mother, who for some dark but forgivable reason had handed me over to my parents to be brought up….In this case my father was not my real father, and my mother…but here it broke down, for what could have persuaded my mother to take me in if she hadn't be obliged to?" (89).

Joan is named by her mother after Joan Crawford, a popular American actress. This act of naming is symbolic of hoping that the girl can mould herself into a beautiful, hardworking, and successful woman. While the expectation of being desirable is set upon Joan when she is born, she learns quickly that her mother isn't satisfied with the daughter she has. It begins with Joan being a plump toddler and as she grows, she keeps on gaining weight; the mother finally starts expressing her displeasure openly as she turns six. The most traumatic event for Joan is when she is asked to step down as a butterfly by her dance teacher (who is carefully shown how grotesque she looks by her mother), and instead be a mothball. She feels humiliated, angry, helpless, and betrayed since as a six-year-old, she doesn't understand why she can't wear a beautiful butterfly dress with wings. Her mother's active rejection of her leads her to start binge eating; she describes this as a "war" with her mother where the disputed territo-

ry was her body (69). This revolt on Joan's part leads her to start eating stubbornly and forgetting that it's her own body that will bear the consequences, no matter who wins in the end. Her mother tries to nag, plead and even bribe her to lose weight but Joan makes it a mission to fail her in her project of making her lose weight. She even buys clothes that would flaunt her body's size to hurt her mother more. Joan, by the age of fifteen, weighs two hundred and forty-five pounds because of binge eating and she describes that "It was only in relation to my mother that I derived a morose pleasure from my weight; in relation to everyone else, including my father, it made me miserable. But I couldn't stop" (74). Hence, her binge eating activity is filled with ambivalence, mirroring her relationship with her mother. Finally, when one day she is able to reduce her mother to tears, she sees this as a sign of her power. She believes she has been successful in defeating her mother as she would never allow her to turn her into "her image, thin and beautiful" (88). Eating in Atwood's world is associated with power but the power that Joan derives from it does her more harm than good, leaving her to feel wretched most of the time.

However, reading this mother-daughter relationship and using it as the sole reason for Joan's Binge-Eating Disorder would be unfair. As pointed out by Rabinor, most of the time, disorders, including eating, are blamed on poor mothering, as it is the primary caregiving activity (273). Joan later learns that her mother was brought up in a strict environment, leading her to run away from home at sixteen. She gets pregnant accidentally with a man she isn't in love with and has to manage everything alone until he comes back from the war. Her daughter constantly challenges her authority and is far removed from the beautiful figure that society expects her to raise as a mother. Later, she even starts abusing alcohol to escape her reality. Joan's power struggle with her mother hurts them both. Justifying her unkindness and dissatisfaction towards her daughter because of her own trauma is one way to understand their relationship, but it would be unfair to completely blame her for Joan's condition.

Rabinor points out that disorder occur because of the interplay between intrapsychic, familial, and cultural factors (273). In Joan's case, several other factors at play result in and help her sustain her binge eating, even though she actively blames her mother while narrating her story. Her teacher is responsible for taking away her desired butterfly wings for the dance recital, but she holds a grudge against her mother alone. Over time, she realizes that her hurt was unjustified, "It's hard to feel undiluted sympathy for an overweight seven-year-old stuffed into a mothball suit and forced to dance; the image is simply too ludicrous. But if I described

myself as charming and skinny, they would find the whole thing pathetic and grossly unfair" (52).

At the age of seven, when she joins a Girl Guide group called Brownies, she is bullied by three girls because of her sensitive nature. The reason the tormentors give for bullying her is that she's "fat" (59). She describes herself as a sensitive child who is easily reduced to tears. While this could be a call for attention and understanding, it's not just her mother who ignores it but her absent father is also of no help. When she cries at the Brownies meeting, the teacher tells her, "You must learn to control yourself" (58). This constant feedback to be different from what she is, from all her social interactions, renders her helpless.

Aunt Lou takes her to movies that reinforce body norms and gender roles for women. As a teenager, her peers see her as a friendly fat girl who can be counted on to give advice and store secrets. None of her female friends see her as capable of having fleshly desires; she is believed to be above them. She is constantly reminded that no man would ever marry someone like her. Moreover, she admits she feels miserable about her weight and the only pleasure she gets out of it is the pain she causes her mother, so she continues her pathological overeating. As a writer of Costume Gothic, she describes her audience as people wanting an escape from life. She says, "I knew all about escape, I was bought up on it" hinting towards her mindless eating as a young girl (34). What starts as a war for control with her mother is also a means to escape reality for Joan. Hence, it is the interplay of social and familial causes that adds to Joan's trauma, leaving her with no outlet to express her feelings or find the necessary help to heal.

Today, Binge- Eating Disorder is the most common of all eating disorders, and if one were to formally diagnose Joan using the Diagnostic criteria for Binge-Eating Disorder given by DSM- 5, her symptoms would comply with the criteria (Butcher et al. 301). She has recurrent episodes of binge eating where she lacks a sense of control. She says about her eating that".., it made me miserable. But I couldn't stop." (74). The binge-eating episode includes eating until feeling uncomfortably full, eating large amounts of food when not feeling hungry, and feeling disgusted with oneself. The binge eating causes her marked distress and she doesn't use any compensatory behaviour afterward like vomiting, over-exercising, starving, etc. (Butcher et al. 299).

Joan's mother tries every possible trick to make her lose weight. Over a period of some ten years, she enrolls Joan in dancing school, hands her

diet booklets, bribes her with buying pretty dresses, rebukes her about her body size, pleads with her about the effects of obesity on health, sends her to a psychiatrist for help, tries to get her on different diet plans and medicines and when she refuses to stick to them, she mixes laxatives in food which makes Joan sick. Each of these attempts can be read through the medical and health structure but the one that directly affects the realm of Medical Humanities is that of the unsuccessful sessions with the Psychiatrist.

On her first visit to the Psychiatrist, Joan tells him, "I like being fat" (83). This simple declaration opens a floodgate of emotions and she starts crying inconsolably. While the psychiatrist smiles kindly and waits for her to express herself through tears, Joan can notice the trace of disgust on his face. His question to her statement is "Don't you want to get married?" which reduces her to tears again (83). This statement, which Joan hears in different ways from everyone around her, is least expected in a clinical setting where the Psychiatrist is responsible for helping to heal her maladaptive behaviour. The Psychiatrist gives up after three sessions, as neither Joan nor her mother are ready to understand their variety of issues. Joan resents him and she feels he dislikes her for this exact resentment. The mother, on the other hand, is offended by the suggestion that it's a family problem that requires sessions with family members. While this encounter has the potential to heal both the mother and the daughter, it fails as they, along with their psychiatrist, are unable to build a healthy therapeutic bond.

The Psychiatrist lacks tact and empathy when he questions Joan's obvious false statement of liking her body with a question that triggers her trauma. She has already been told in multiple ways by her mother, peers, and various movies that obese women neither need nor get a romantic partner. Moreover, he again shows his lack of tact by approaching the mother and telling her that there is perhaps something wrong with her family, triggering the mother's fragile sense of worth. He could have been a source of help, as he understands Joan's eating problem is deeply rooted and affects her more than she realizes, but he isn't able to completely keep a check on his own behaviour and displays an expression of disgust and resentment towards Joan. Every mental health practitioner receives training in counselling skills and is taught to keep his/her feelings, prejudices, and biases away when he/she is in a session with a client. Being non-judgmental is one of the basic skills that is needed in any empathetic practitioner, which Joan's psychiatrist lacks. Joan notices his disgust and resentment towards her, and that stops her from trusting him. Her mother, on the other hand,

doesn't like being held responsible for Joan's obesity and so she reacts defensively by calling him and other mental health professionals quacks. An encounter of this nature could have been beneficial if the mother and daughter had been able to seek help from a professional who could help them navigate their needs and feelings in Group therapy or Family Therapy.

Her journey from obese to thin begins when Aunt Lou dies and leaves her two thousand dollars on the condition of losing hundred pounds of body weight. Like the reader, Joan too questions this condition of her aunt as either a way of making her life easier or a sign that she too like others felt Joan was grotesque. This ambiguity adds to her feelings of worthlessness but as she wishes to leave her home and move far away from her mother, she accepts the challenge. Her weight loss is unhealthy as she starts starving herself and goes to extremes to lose hundred pounds. This extreme behaviour allows her to finally fit into the mould of femininity endorsed by the actress that she grew up watching.

The other unsuccessful and equally unhealthy attempts are again quite characteristic of people with Feeding and Eating Disorders and of people who wish to lose excess weight. When Joan decides to lose a hundred pounds, she takes extreme measures by starving, eating laxatives, using fat burners, and appetite-suppressing pills. She decides to try every possible solution that her mother had suggested over the years. This extreme behaviour does allow her to achieve her goal but with numerous side effects along the way. She is able to shrink herself as abnormally as she had expanded. Getting on extreme fad diets, taking laxatives, popping fat burners and appetite suppressants, eating low-calorie foods, drinking fat-reducing concoctions, over-exercising, using purging methods, and starving oneself are common methods adopted by millions of people around the world. A simple Google search today on the topic "How to lose weight" would result in two billion, nine hundred forty million (2,940,000,00) search results.

Most of the results advertise extreme means and even guarantee losing weight in a short span of time. Today, along with social, cultural, and gender norms, the media plays a monstrous role in pushing out various body, weight, and health ideals. There is a plethora of research that talks about the negative effects of media on body image and eating disorders. Advances in digital media have seen the emergence of activism for body acceptance and positivity; however, the thin ideal still remains popular and promotes perfectionism and disordered eating (Derenne and Eugene

133). The polarity of thin and fat looks simple but isn't, as it is based on some direct parameters like weight, fat deposition, and different body shapes, and some indirect ones like overall BMI and other health indicators. Let's take the case of body shape; a popular website called health line enumerates ten common body shapes of women with categories like banana, pear, diamond, athletic, hourglass. Simone M. Scully (author) includes a section in the article on how such objectification perpetuates the idea of "ideal" or "most desirable" and pushes the message of categorizing all kinds of female bodies into just ten types. If Joan had been a young girl in the last decade as compared to the 1950s, she would have been raised with many more celebrities making her feel terrible about her body, more sources that would trigger her binge eating (with the advent of ready-to-eat meals and home delivery of food) and far more unhealthy alternatives to shrink herself.

Binge-Eating Disorder is not only linked with obesity, diabetes, and other metabolic dysfunction but can also lead to a higher risk of psychopathology, including mood, anxiety, and sleep problems, in people of similar weight status without disordered eating (McCuen-Wurst et al. 96). It's easy to only focus on the repercussions of binge eating on one's physical health and ignore the psychological complications. In Joan's case, her mother too warns her of the effects on her physical health and gives her pills to deal with the effects of overeating. She uses laxatives, fat-burning pills, and appetite suppressants, which have direct side effects like headaches, stomach cramps, fits of weakness, and accelerated heartbeats. Such physical side effects do affect one's mental health. Looking at Feeding and Eating Disorders through only one lens leaves the other part wanting. For the health, exercise, and fitness industry, it would be working on the nutritional and physical training aspects. The mental health practitioners would work on the underlying emotions and thoughts behind the behaviour. There would also be professionals like Psychiatrists who would be in a position to prescribe medicine and provide psychological counseling. It's only when both physical and psychological conditions are given due attention and care that healing can occur holistically.

Unfortunately, Joan's physical transformation isn't able to give her the power she felt over her mother while overeating. Even after leaving her home and starting fresh, the feelings of worthlessness continue. Moreover, she feels she needs to hide her history as a fat girl from every romantic partner as well as the people she meets after her weight loss. This then leads to anxiety and paranoia regarding her past life. She's able to feel like a fairy godmother for the readers of her novels and help them escape their

lives. This does provide her with some sense of control and power but this identity of hers as a writer of Costume Gothics is under a pseudonym that she hides from everyone in her life. Joan continues to mindlessly eat whenever she experiences stress and is far from a healthy self-functioning adult.

Joan, as a child, often fantasized about a Fat Lady from a Freak show at a local fair that she attended with her aunt every year. These daydreams of this Fat Lady reveal Joan's ambivalence towards her own body. In her imaginary tales, she sometimes craves understanding and acceptance for the Fat Lady, and at other times she puts this symbolic twin of hers through life-threatening stunts. As an adult, she acknowledges that it is easy for intellectuals to sympathize with the obese little girl that she is and to blame the society for trying to mould her into the mould of normative femininity. But the adult Joan confesses that while these intellectual thoughts are pious, she, as a young girl, wants things that are symbolic of ideal femininity, like skirts and tiaras. Here she reveals some important steps that are part of one's healing journey: acceptance and denial. Denial of one's true thoughts, feelings and needs, and accepting oneself only superficially create dissonance within oneself. It is easy to say, "Love yourself as you are", but Joan as a child is exposed to and conditioned to like stereotypically pretty and feminine things. For her, to reject them completely wouldn't help. Hence, when intellectuals and health practitioners sell the idea of self-love, they need to assimilate it with the person's needs and beliefs.

Joan's narrative of Binge-Eating Disorder allows one to use it as a case study that encompasses a variety of causes and treatment plans. While the narrative appears to be an obvious struggle for power and desperation for love, it conceals a far more layered ambivalence. The interplay of familial, social, intrapsychic, and cultural causes leads to Joan's eating disorder. While it isn't in Joan's hands to change the social and cultural structures she lives in, she ends up changing herself (at least physically).

End Notes:

1. Typically psychological disorders require a treatment approach that involves traditional medicine and therapeutic counselling. The treatment approach varies from individual to individual. Physical ailments can easily lead to psychological disorders and vice versa.

2. *Madwoman in the Attic* a book by Sandra Gilbert and Susan Gubar discusses the history of female writers and their portrayal of mad women.

Works Cited:

Asher, Jay. *Thirteen Reasons Why*. Penguin Books Ltd, 2009.

Atwood, Margaret. Introduction. *The Canlit Foodbook*. Totem, 1987, pp. 1-4.

---. *The Edible Woman*. Virago, 1979.

---. *Surfacing.* Virago, 1979.

---. *Lady Oracle.* Virago, 1982.

---. *Cat's Eye.* Virago, 1990.

---. *The Robber Bride*. Bloomsbury, 1993.

---. *Life Before Man*. Vintage, 1996.

---. *Bodily Harm*. Vintage, 1996.

---. *Alias Grace.* Virago, 1997.

---. *The Blind Assassin*. Virago, 2001.

Butcher, James N, Susan Mineka, and Jill M. Hooley. *Abnormal Psychology*.16th ed., Pearson, 2013.

Derenne, Jennifer, and Eugene Beresin."Body image, media, and eating disorders-a 10-year update."*Academic Psychiatry*, vol. 42, no.1, 2018, pp. 129–34.

Diagnostic and Statistical Manual of Mental Disorders: Dsm-5. American Psychiatric Association, 2013.

Hall, Calvin S, Gardner Lindzey, and John B. Campbell. *Theories of Personality*.4th ed., J. Wiley & Sons, 2016.

McCuen-Wurst, Courtney, Madelyn Ruggieri, and Kelly C. Allison. "Disordered eating and obesity: associations between binge-eating disorder, night-eating syndrome, and weight-related comorbidities." *Annals of the New York Academy of Sciences*, vol. 1411, no. 1,

2018, pp. 96-105. *NCBI*.

Mejía-Rivera, Orlando."Literature and cinema in the training of doctors and medical humanities."*Acta médica colombiana*, vol. 44, no. 3, 2019, pp. 25-29.

Muhlheim, Lauren. **"**History of Eating Disorders Are Eating Disorders a Modern Illness?**"***verywellmind*. Dotdash, 23 March 2020, https://www.verywellmind.com/history-of-eating-disorders-4768486.

Parker, Emma. "You Are What You Eat: The Politics of Eating in the Novels of Margaret Atwood." *Twentieth Century Literature*, vol. 41, no.3, 1995, pp. 349–68. *JSTOR*, https://doi.org/10.2307/441857.

Rabinor, Judith Ruskay. "Mothers, Daughters and Eating Disorders: Honoring the Mother-Daughter Relationship." Reprint from *Feminist Perspectives on Eating Disorders,* Guilford Publications, Inc., 1993. *Judith Ruskay Rabinor, PhD*.

Scully, Simone M. "What Are the Most Common Body Shapes?" *healthline.* 17 May 2019, https://www.healthline.com/health/women-body-shapes#overview.

Shakespeare, William. *Macbeth*. Arden Shakespeare, 2013.

Shapiro, Johanna, Jack Coulehan, Delese Wear and Martha Montello. "Medical humanities and their discontents: definitions, critiques, and implications." *Academic medicine: journal of the Association of American Medical Colleges*, vol. 84, no.2, 2009, pp.192-98. *UC Irving Previously Published Works*.

Stevenson, Robert Louis. *The Strange Case of Dr. Jekyll and Mr. Hyde and Other Tales of Terror*. Penguin Classics, 2003.

Research Paper | Marketing Management | E-ISSN No : 2454-9916 | Volume : 10 | Issue : 5 | May 2024

AN IMPACT STUDY OF SOCIAL MEDIA MARKETING ON CONSUMER BEHAVIOR IN AJMER

Marcel Chaudhary[1], Dr. Varsha Maheshwari[2], Ms. Yuvnika Sogani[3]

[1,3] Research Scholar, Engineering College, Ajmer,
[2]Assistant Professor, Sophia Girls' College, Ajmer

ABSTRACT

In recent years, the proliferation of social media platforms has revolutionized marketing strategies, offering businesses unprecedented opportunities to engage with consumers. This study aims to investigate the impact of social media marketing on consumer behavior in Ajmer, a culturally rich city in India. Through a mixed-methods approach, combining qualitative interviews and quantitative surveys, this research explores how social media marketing practices employed by businesses in Ajmer influence consumer perceptions, attitudes, and purchasing decisions. A structured survey was conducted among a diverse sample of consumers in Ajmer to quantify the extent to which social media marketing influences their purchasing behavior across various product categories. Key variables such as demographic factors such as age, gender, and socioeconomic status will be examined to understand how they moderate the relationship between social media marketing and consumer behavior.

The findings of this study are expected to provide valuable insights for businesses in Ajmer and beyond, enabling them to optimize their social media marketing strategies to effectively target and engage consumers. Furthermore, the research contributes to the existing body of knowledge on the evolving dynamics between social media marketing and consumer behavior in the context of a culturally distinct city like Ajmer.

KEYWORDS: Social Media Platforms, Consumer Behavior, Purchasing Behavior

INTRODUCTION

The development of technology in the modern era has given rise to the ever-evolving trends and consumer dynamics with the help of social media. This modernization has shifted the dynamic of consumer behaviour to be more awareness and consciousness oriented. The focus of this study is to unravel the intricate relation between social media and its corresponding impact on the buying behaviour of consumers. While consumer behaviour has certainly been a well-explored area of study in first-tier urban settings, existing literature tends to miss the mark when it comes to understanding today's consumer needs and how technology plays a crucial role with respect to the population of Ajmer. Ajmer, the two-tier city of Rajasthan, is covered with a blend of tradition and modernity. Such factors make the city an ideal setting to study the relationship between social media and consumer behaviour.

With cutthroat competition, it is absolutely essential for companies to assess how consumers behave on social media and what they're looking for. This understanding would not only help companies get more sales but also would be made aware of intricacies of their product. By delving into the different ways people buy things and what drives their decisions, a clearer picture can be painted of just how much social media influences what they choose to purchase.

The way information gets shared, online interaction, sharing of thoughts, ideas and content in today's era has seen a drastic change due to the important contribution of social media to the field of communication. Society in general has unseemly included social media platforms like Instagram, Facebook, Pinterest, etc. into its everyday life. Hence, for business, it is crucial to capitalize on the fact that this force needs to be understood to the deepest level as it may unlock various factors about human behaviour and how it reacts to spending a portion of their wealth towards certain products that have not been uncovered earlier. Better understanding would ultimately lead to companies realizing the needs of consumers and working on their product to be more consumer friendly.

Ultimately, the importance of social media's relevance is crucial to be assessed not only for the benefit of businesses but also for consumers at the same level. Through social media, consumers can realise that they are voiced and heard, that their concerns are taken into consideration. The collective potential of consumers to bring about a change in the competitive environment of the market stays relevant in today's modern era and this study aims to bring about a clarity especially in tier 2 cities with special reference to Ajmer.

MATERIALS AND METHODS

Social Media Satisfaction Scores (SMSS) of users of different demographic profiles have been used to test the different attributes by following null hypotheses. The calculation of Social Media Satisfaction Scores (SMSS) is essential for obtaining a comprehensive understanding of social media users'

satisfaction to prioritize factors for improvement, facilitate comparative analysis and give a base to predict future trends. Composite scores can be used in predictive modeling to forecast future satisfaction levels or identify potential areas of concern. By analyzing historical data and trends, organizations can anticipate changes in satisfaction and take proactive measures to address emerging issues. It provides a holistic measure of satisfaction by considering multiple factors that contribute to the user experience on social media platforms. This comprehensive approach offers a more nuanced understanding of satisfaction levels compared to assessing individual factors in isolation.

Social Media Satisfaction Score – A Comparative Analysis

Social Media Satisfaction (SMSS) of users of different demographic profiles have been used to test the difference attributes by following null hypotheses-

H_0 01

There is no significant difference in mean score of social media satisfaction based on gender.

H_0 02

There is no significant difference in social media satisfaction scores based on age group of the users.

H_0 03

There is no significant difference in social media satisfaction scores based on the occupation of the users.

H_0 04

There is no significant difference in social media satisfaction score based on the annual income of the users.

H_0 05

There is no significant difference in social media satisfaction score based on the frequency of usage by the users.

Social Media Satisfaction Score – A Comparative Analysis

Hypotheses	Grouping Variable	t value	Significance 2 tailed	Results
H0 01	Gender	0.519	P > 0.05	Accepted
H0 02	Age Group	0.035	P < 0.05	Rejected
H0 03	Occupation	0.027	P < 0.05	Rejected
H0 04	Annual Income	0.347	P < 0.05	Rejected
H0 05	Frequency of Usage	0.740	P > 0.05	Accepted

- **Interpretation & Discussion**

From the table, as the test result of H0 01 - it is evident that t value is .519 , which is not significant at 0.05 level. It reflects that means value of social media satisfaction score of male and female users did not differ significantly. In this context the Null hypothesis "there no significant difference in social media satisfaction scores based on gender profile" is accepted, it implies that the statistical analysis did not find evidence to support the idea that there is a meaningful discrepancy in satisfaction levels between genders. In other words, the data suggests that both male and female users tend to have similar levels of satisfaction with their social media experiences. The null hypothesis H0 02 stating that there is no significant difference in social media satisfaction scores based on age group ($P < 0.05$) is rejected. This suggests that there is a statistically significant difference in satisfaction levels across different age groups. The H0 03 to test significant difference in social media satisfaction scores bases on occupation is rejected, it implies that occupation does have a statistically significant effect on social media satisfaction. The null hypothesis H0 04 stating that there is no significant difference in social media satisfaction scores based on annual income ($P < 0.05$) is rejected. This indicates that annual income does influence social media satisfaction levels significantly. The null hypothesis H0 05 stating that there is no significant relationship between frequency of usage and social media satisfaction scores ($P > 0.05$) is accepted. This suggests that the frequency of social media usage does not have a statistically significant impact on user satisfaction. This interpretation underscores the notion that frequency of usage does not appear to be a significant factor in determining satisfaction with social media platforms in the context of the study. In nullshell, the research findings indicate that while gender and frequency of usage do not significantly influence social media satisfaction, factors such as age group, occupation, and annual income do have a notable effect on users' satisfaction levels with social media platforms.

Understanding Association: Correlation Analysis of Social Media Metrics

- ***Quantification of the relationship between frequency of use of Social Media and Social Media Satisfaction Score***

H_0 06 There is no significant relationship between frequency of use of social media and social media satisfaction score.

Based on correlation analysis performed with the help of SPSS, the r-value is equivalent to -.106, it shows a weak negative relationship between the stated variables. This means that there is a slight tendency for the variables to move in opposite directions, but the relationship is not very strong. It shows that the frequency of use of social media is negatively correlated with the mean score of social media satisfaction. The significance value is 0.281 greater than the p value 0.01 (at the 1% level of significance) shows null hypothesis is accepted, it shows that changes in the frequency of social media use are not significantly correlated with the social media satisfaction and there is no meaningful relationship between these variables.

- ***Quantification of the relationship between Purchase Decision making and Social Media Satisfaction***

H_0 07 There is no significant relationship between purchase decision-making and social media satisfaction score.

Following correlation analysis conducted using SPSS, the obtained r-value equal to 0.917 shows a strong positive correlation between the customers' purchase decision-making and their social media satisfaction score. The obtained significance value is less than 0.01 shows that the null hypothesis is rejected that there is a significant relationship between

purchase decision-making and social media satisfaction score. It implies that customers have faith in various social media option for the purpose of decision-making and their satisfaction score is positively correlated with this.

• ***Quantification of the relationship between Trust and Social Media Satisfaction Score***

H_0 08 There is no significant relationship between trust and social media satisfaction score.

Based on correlation analysis performed with the help of SPSS, the r-value is equivalent to –

0.870. It shows a positive correlation between trust in social media and social media satisfaction scores. A positive correlation between trust in social media and social media satisfaction score suggests that as trust in social media platforms increases, users' satisfaction with their social media experiences also tends to increase. This implies that individuals who have higher levels of trust in the information, privacy, and overall functionality of social media platforms are more likely to report greater satisfaction with their usage. This positive relationship highlights the importance of trustworthiness in social media platforms for fostering user satisfaction. The significance value is less than 0.01 shows that the null hypothesis is rejected, it implies that there is a positive correlation between trust and social media satisfaction score.

CONCLUSION

The comprehensive analysis of social media satisfaction scores (SMSS) and their association with various demographic profiles and user behaviors provides valuable insights into the dynamics of user satisfaction on social media platforms in Ajmer. The findings offer important implications for businesses and marketers aiming to enhance their understanding of consumer preferences and optimize their social media marketing strategies.

Firstly, the study reveals that while gender and frequency of usage do not significantly influence social media satisfaction, factors such as age group, occupation, and annual income play a notable role in shaping user satisfaction levels. This underscores the importance of tailoring marketing efforts and content strategies to different demographic segments to better meet their preferences and needs.

Furthermore, the analysis highlights the weak negative relationship between the frequency of social media usage and social media satisfaction scores. While users may engage with social media platforms more frequently, this does not necessarily translate into higher satisfaction levels. This suggests that simply increasing user engagement metrics may not always lead to improved satisfaction and underscores the importance of focusing on quality interactions and content relevance.

Moreover, the strong positive correlation between purchase decision-making and social media satisfaction scores emphasizes the significant role that social media platforms play in influencing consumers' purchasing behavior. Businesses can leverage this insight to enhance their social media presence and capitalize on the platform's potential to drive sales and conversions.

Additionally, the positive correlation between trust in social media and social media satisfaction scores underscores the importance of building trustworthiness and credibility in social media platforms. Ensuring transparency, privacy protection, and reliable information can enhance user trust and ultimately contribute to higher satisfaction levels.

In conclusion, this study underscores the multifaceted nature of social media satisfaction and emphasizes the need for a nuanced understanding of user preferences and behaviors. By leveraging insights from this analysis, businesses can refine their social media strategies to better engage users, foster trust, and ultimately enhance overall satisfaction levels on social media platforms in Ajmer.

REFERENCES

1. Chaffey, D., & Ellis-Chadwick, F. (2019). Digital Marketing: Strategy, Implementation, and Practice (7th ed.). Pearson Education Limited.
2. Kotler, P., & Armstrong, G. (2018). Principles of Marketing (17th ed.). Pearson Education Limited.
3. Mangold, W. G., & Faulds, D. J. (2009). Social media: The new hybrid element of the promotion mix. Business Horizons, 52(4), 357-365.
4. Ryan, D., & Jones, C. (2009). Understanding digital marketing: Marketing strategies for engaging the digital generation. Kogan Page Publishers.
5. Smith, A. N., Fischer, E., & Yongjian, C. (2012). How does brand-related user-generated content differ across YouTube, Facebook, and Twitter? Journal of Interactive Marketing, 26(2), 102-113.
6. Strauss, J., & Frost, R. (2016). E-Marketing (7th ed.). Routledge.
7. Tuten, T. L., & Solomon, M. R. (2017). Social media marketing (2nd ed.). Sage Publications.
8. Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). Multivariate Data Analysis (8th ed.). Cengage Learning.
9. Hair, J. F., Celsi, M. W., & Ortinau, D. J. (2017). Marketing Research (4th ed.). McGraw-Hill Education.
10. Kothari, C. R. (2004). Research Methodology: Methods and Techniques (2nd ed.). New Age International.
11. Malhotra, N. K., & Birks, D. F. (2007). Marketing Research: An Applied Approach (3rd European ed.). Pearson Education.
12. Sekaran, U., & Bougie, R. (2016). Research Methods for Business: A Skill Building Approach (7th ed.). Wiley.

Sr Pearl
Dr. Sr. Pearl
PRINCIPAL
SOPHIA GIRLS' COLLEGE
(AUTONOMOUS)
AJMER