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DIVERSITY IN PERI-URBAN AREA IN A GLOBALISED LANDSCAPE: STUDY OF IT PARKS IN PUNE

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ABSTRACT: -

Urban development should be guided by a sustainable planning and vision that promotes interconnected green spaces, a multi-modal transportation system and mixed-use development. Public and private partnerships need to be used to create sustainable communities that protect cultural and environmental resources. Globalization triggered growth is often accompanied by urban sprawl occurring in spaces for diffusion around new urban economic cores. The Peri-urban interface is less understood and often characterized by marginalization and environmental degradation. Understanding of the emerging peri-urban situation well is necessary to address the current and emerging challenges. The space into which the town extends as the process of dispersion is only partly integrated into the growing urban complex. Not all residents living in the fringe are socially and economically assimilated. With liberalization of economy in India since 1991, Information Technology parks were set up in India to drive economic growth. The paper explores the correlation of the growth nucleus of such an IT park with the culturally diverse surrounding area. The analysis leads to inferences about the correlation of existence of the IT Park with the socio-economic development of fringes. The study highlights processes that underpin fringe development to the planned expansion of the fringe subsuming rural areas.

KEYWORDS: *Sustainable Planning, peri-urban, Information Technology Parks, Cultural Diversity.*

INTRODUCTION

A space-centered analysis must always be holistic. Space is as much a product of society as it is a source of social dynamics. In the process of urbanization, Urban Spaces are growing at an alarming rate. Rapid urban development, and increasing land use change due to increasing population and economic growth in selected landscapes is being witnessed of late in India and other developing countries (K Madhavi Lata et al, 2007) [1] Major aspects of globalization that relate to rural life or its development which includes the commercialization of agriculture and expansion of agro-industries, the liberalization of international trade and marketing for food and other agricultural products, the intensification and internal labour migraton, the increasing privatization of resources and services and the wider use of information and communication and technologies Instead of [2]

The emergence of the software and services outsourcing industry in India is one of the most visible outcomes of globalization, stimulated by the spread of modern Information Communication and Entertainment Technologies (ICETs) and the restructuring of global capitalism since the 1980s (Upadhya, 2006). Consequent to these reforms phenomenon, key cities in India are in the midst of restructuring space, in terms of both use and form. [3]

The continuing liberalization and economic reform programme in India since 1991 presents an

impact to the Indian economy particularly in the Information and Communication sector. Steps taken by the State to promote this sector includes the establishment of Information Technology Parks in different parts of the country. It is often argued that the process of economic liberalization and associated structural reform would accelerate rural–urban (RU) migration and boost the space and pace of urbanization. Linking of India with global economy would lead to massive inflow of foreign capital as also rise in indigenous investment resulting in an increase in employment opportunities within or around the existing urban centres (Kundu 2001) [4].

The establishment of the Rajiv Gandhi Info-Tech Park at Hinjewadi and IT Parks in Kharadi and Talwade have resulted in the transformation of the area in their vicinity. These IT Parks are located in the fringe area due to certain advantages like of lower rent, presence of educational hub etc. The term peri-urban area usually refers to the regions where sprawl has taken place. A peri-urban area refers to a transition or interaction zone where urban and rural activities are juxtaposed and landscape features are subject to rapid modifications which are induced by human activities (Douglas 2006) [5]

In comparison to developed countries the peri-urban interfaces lack fundamental urban infrastructure and basic urban amenities in lesser developed countries. While, the word 'suburb' describes a residential area developed around or next to the urban center, a peri-urban area is more distant to the core city and tends to have higher land-use diversity (e.g. individual houses, agricultural land and leisure residences). Due to this fact, peri-urbanisation is often called rurbanisation. Peri-urban areas, which are less dependent on and even begin to compete with the urban center regarding functionality, are often called post-suburbia. They are transition zones between fully urbanized land in the cities and areas in predominantly agricultural use (Bhaduri, 2001) [6]. The varied land uses which include traditional agriculture, horticulture, derelict farms, older villages, newer residential extensions, commerce, industry and services are intermingled in a random fashion which gives this distinctive quality of the peri-urban area. The peri-urban areas are located in the rural-urban fringe. The pattern of land use in this area is dynamic and changes from rural land use to urban land use over short period of time and distance (Manomani 2010) [7].

The IT sector which have led to growth impulses have also promoted unplanned growth as the areas are located outside the city limits which have been left beyond the purview of city planning These characteristics are found in case of the villages around Hinjewadi IT Park which are located in the peri-urban areas of the IT Park. The study of the amenities in the villages was done to understand the socio economic conditions of these villages which are located in the vicinity of the IT Parks.

OBJECTIVES:

1. The objective of this study is to explore the correlation of the high growth in the nucleus of the IT Parks with the development of the amenities in the surrounding area.
2. The study also aims to understand the changes in the income structure of the villages in the proximity to the Hinjewadi IT park .

STUDY AREA:

The study area is close to Pune so its climatic conditions and land use pattern are influenced by Pune city. The elevation of study area is about 580 metres above mean sea level. The selected villages are located in the north-west outskirts of Pune is within the commuting distance from the heart of the Pune City. Hinjewadi IT Park is close to Pune-Mumbai Express Highway IT Park is close to the Mumbai international airport is about 3 – 3.5 hours drive.

To enrich the study and have more data to substantiate the observations, data for the subsidiary IT parks of Talawade and Kharadi is also included in the study. The Talawade IT Park is located to the north of Pune between the NH4 and NH50. The Kharadi IT Park is located on the eastern boundary of Pune between the SH27 and NH9.

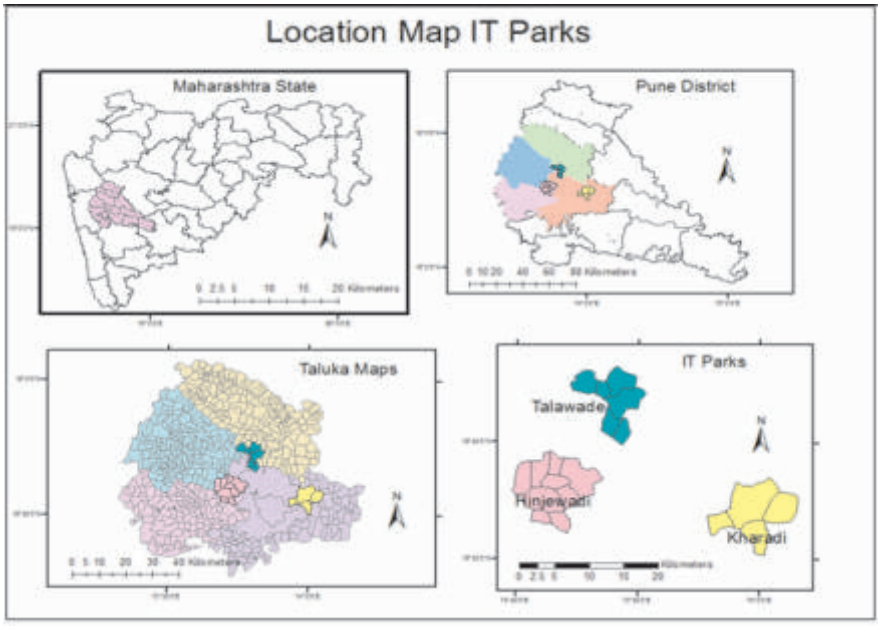
Pune is the cultural capital of Maharashtra is a rapidly growing urban city. Pune lies on the leeward side of the Sahyadri ranges also known as the Western Ghats at the confluence of Mula and the Mutha rivers, which are tributaries of the Bhima River. The highest point just outside the urban area is Sinhagarh fort (1300m above msl). The climate of Pune is on the whole dry and invigorating. The cold season from December to February is followed by the hot season lasting up to early June. The period from early June to about the beginning of October is

constituted to southwest monsoon. The succeeding period up to November is post-monsoon season. The climate of Pune is pleasant and is an asset to its citizen. Pune experiences four district seasons: summer, monsoon, post-monsoon and winter. Tropical summer months are from March to May; with maximum temperature ranging from 35ºC to 38ºC.).

SELECTION OF THE STUDY AREA:

Considering the IT parks as the nucleas, villages in the buffer rings of 3, 5, 7 and 9 kms were selected. This area was identified as the area of mixed land-use through a pilot survey. The table lists the fringe villages selected for each IT park.

IT park	Names of Villages	Number of Villages	Number of Households surveyed	Number of persons covered
Rajiv Gandhi IT Park, Hinjewadi	Hinjewadi, Mann, Marunji, Nere, Chande, Nande, Sus, Tathawade	8	186	1176
Talawade IT Park	Talwade, Mhalunge, Khalumbare, Sudumbare, Nighoje Chikhali.	6	145	999
Kharadi IT Park	Awhalwadi, Manjri Khurd	2	209	1087



Amenities Score:

This analysis attempts to explore whether proximity to the IT Park has a significant correlation with the development of the fringe villages. This was done through a hierarchical analysis based on functional scores (Figure 1).

The distance of the village from the IT park centre is measured from the satellite image maps, and logged. In order to evaluate the level of amenities for a village, the technique of Hierarchical functional mapping is used. The following procedure is used to do a hierarchical functional mapping. The following amenities in villages are considered to work out the amenities score and development level of a village:

a. The presence of Banks in the village
b. Whether there is a weekly market in the village.
c. Whether there are village roads.
d. The presence of a Road connecting to the Highway.
e. Whether new roads were built in recent times.
f. Presence of malls.

g. Presence of Primary Schools
h. Presence of Secondary Schools
I. Availability of drinking water
j. Availability of primary health center
k. Availability of private medical practitioners
l. Availability of bus transport
m. Whether Government programs were implemented in the village

Each one of the above parameters has been assigned an attribute score of 0 or 1 based on the presence or absence of the facility in the village. A matrix is formed with villages in rows and amenities in columns. At each row-column intersection cell, a score of 0 or 1 is assigned. The relative weightage of each amenity is calculated as the ratio Total number of villages: number of villages that have the amenity the each intersection cell score as mentioned in Figure 1 is multiplied by the weightage of the amenity in the column. To get an amenity product. The sum of all amenity products for the row is calculated as the total score for the village. The Village scores are arranged in the descending order to compute the Village Rank. The villages are arranged in an ascending order of the distance from the IT Park to compute the Distance Rank.

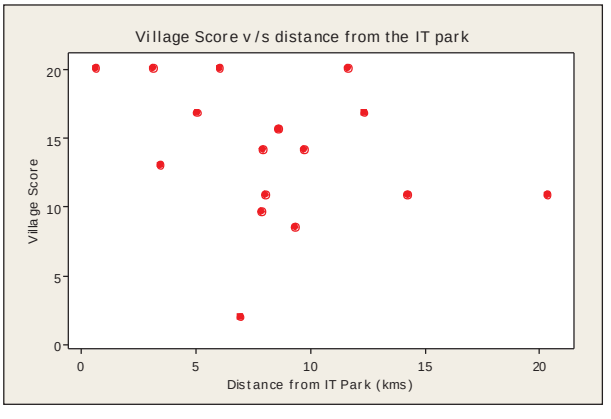
The Hierarchical Mapping matrix is shown below. The matrix also displays the distance of each village from the respective IT Park, and the Village Rank and Distance Rank for each village.

Hierarchical Mapping Matrix for Village Ranks and Distance Ranks

	Distance from IT park (km)	Banks	Weekly Market	Village roads	Highway touch Road	New road built	Malls	Primary school	Secondary school	Drinking water	Medical phc	Medical private	Transport Bus	Transport Private	Govt programs	Village Score	Village Rank	Distance Rank
Hinjewadi	3.1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20.09	1	2
Maan	3.4	0	0	1	1	1	1	1	1	1	1	1	0	1	1	13.08	10	3
Marunji	5	1	1	1	1	1	1	1	1	1	1	1	0	1	1	16.89	5	4
Nere	7.8	1	0	1	0	0	0	1	1	1	1	1	0	1	1	9.619	14	7
Chande	6.9	0	0	1	0	0	0	0	0	0	0	0	0	1	0	2	16	6
Nande	8	1	0	1	0	1	0	1	1	1	1	1	0	1	1	10.85	11	9
Sus	12.3	1	1	1	1	1	1	1	1	1	1	1	0	1	1	16.89	5	14
Tathawade	7.9	1	0	1	1	1	1	1	1	1	1	1	0	1	1	14.23	8	8
Awalwadi	9.7	1	0	1	1	1	1	1	1	1	1	1	0	1	1	14.23	8	12
Manjari Kh	8.6	1		1	0	1	1	1	1	1	1	1	1	1	1	15.65	7	10
Talwade	0.6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20.09	1	1
Mhalunge	11.6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20.09	1	13
Khalumbare	20.3	1	0	1	0	1	0	1	1	1	1	1	0	1	1	10.85	11	16
Sudumbare	9.3	1	0	1	0	0	0	1	1	1	0	1	0	1	1	8.476	15	11
Nighoje	14.2	1	0	1	0	1	0	1	1	1	1	1	0	1	1	10.85	11	15
Chikhali	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20.09	1	5
Amenity Weightage		1.143	2.667	1.000	1.778	1.231	1.600	1.067	1.067	1.067	1.143	1.067	1.200	1.000	1.067			

Figure 1

In order to evaluate whether there is an impact of the IT park proximity on the development levels of the villages, the Village score was plotted against the Distance from the IT Park.



Correlation Plot: Village Score v/s Distance from IT Park

The graph shows a scatter that shows no particular rising or falling trend. It does not visually show a correlation between the two.

To validate the correlation statistically, Pearson's correlation coefficient was computed for the Distance from IT Park to the village score.

• Pearsons Correlation coefficient (r) = -0.295. With a p value = 0.268.

• Thus with a 95% confidence we fail to reject hypothesis that there is no correlation between the distance of the village to the IT park and the amenities score.

We can therefore conclude with a 95% confidence that the proximity to the IT Park has no correlation with the amenities and economic development in the villages.

In order to account for possible outliers, a non-parametric correlation analysis was done to evaluate correlation between the village rank and the distance rank. This was done using the Spearman's correlation coefficient.

• Spearman's correlation coefficient =0.3110

The weak non-parametric correlation coefficient reiterates the conclusion that proximity to the IT Park has no correlation with the amenities and economic development in the villages.

Analysis based on descriptive household survey parameters

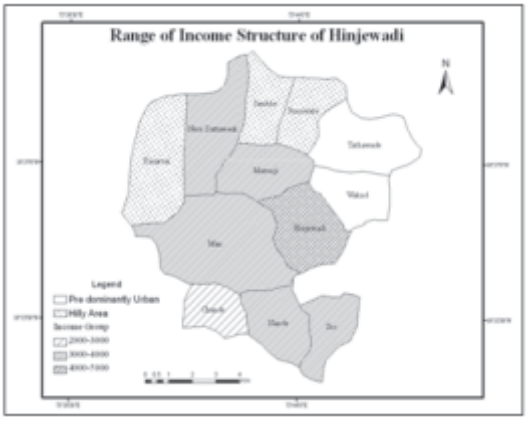
An analysis to establish whether IT parks had led to economic growth in the fringe villages, the survey collected the data about income levels of the households in the fringe villages. The parameter measured for the descriptive data analysis is the 'Monthly Household Income per adult'.

The analysis was done to compare the income per adult across the following three categories:

1. Income of persons employed in the IT sector
2. Income of persons employed in the Agricultural sector
3. Income of persons employed in other sectors

This analysis would give insights about whether the fast track growth of the IT sector in a close vicinity of the fringe villages had led to an improved economic situation for the people living in these fringe villages.

An analysis is also done to compare the incomes of households in different villages in the fringes of IT parks. This would show whether the development has happened in a balanced manner across all the villages. The disparity of incomes across sectors and across villages for each IT parks are also examined to validate whether the development has been uniform and balanced. Analysis was done to compare the Income per adult across sectors the persons were employed in. A map showing median income structure in the Rajiv Gandhi IT Park Hinjewadi fringe villages is shown below:



Map– Range of Income Structure- Hinjewadi

Income per Adult: Hinjewadi

Table – Analysis for Income per Adult for Hinjewadi

Sector	Mean	Minimum	Q1	Median	Q3	Maximum
Other	4008	1400	2500	3500	5000	10000
IT	4597	1667	3512	4583	6063	7000
Agriculture	3982	1500	2500	3833	5000	10000

The box plots of incomes compared across sectors is shown below:

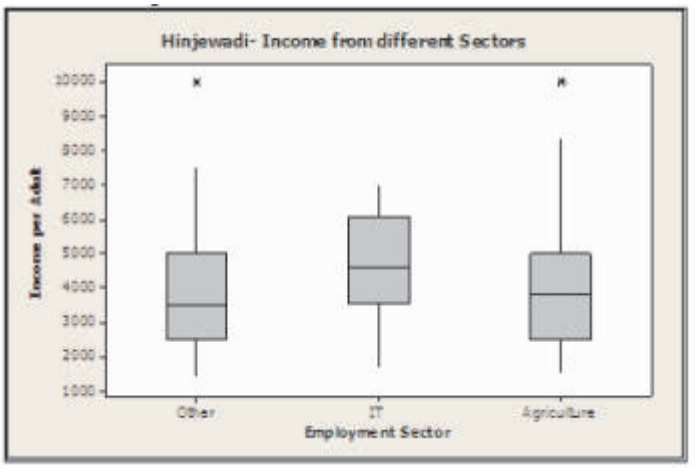


Figure – Hinjewadi- Income from Different Sectors

In order to evaluate whether employment in IT had led to significantly higher income levels, the mean income for IT was compared with the incomes of Agriculture and other sectors. A 2-sample t test done for the purpose showed the following results

Hypotheses:

H0: There is no significant difference between the mean incomes of the IT sector employees and the other sector employees.

Ha: There is a significant difference between the mean incomes of the IT sector employees and the other sector employees.

Test to be conducted with 95% confidence.

1. Mean IT income compared with mean Agricultural income:

Table – Two Sample t – test for Mean Income comparison IT Sector v/s Agriculture- Hinjewadi

Two-sample T for IT Sector vs Agriculture

	N	Mean	StDev	SE Mean
IT Sector	18	4597	1556	367
Agriculture	55	3982	2024	273

Difference = mu (IT Sector) - mu (Agriculture)
Estimate for difference: 615.612
95% CI for difference: (-310.532, 1541.756)
t-Test of difference = 0 (vs not =): t-statistic = 1.35 P-Value = 0.186 DF = 37

2. Mean IT income compared with mean Other sector income:

Table – Two Sample t – test for Mean Income comparison IT Sector v/s other sector - Hinjewadi

Two-sample T for IT Sector vs Other Sector

	N	Mean	StDev	SE Mean
IT Sector	18	4597	1556	367
Other Sector	49	4008	2141	306

Difference = mu (IT Sector) - mu (Other Sector)
Estimate for difference: 589.015
95% CI for difference: (-375.419, 1553.449)
t-Test of difference = 0 (vs not =): t-statistic = 1.23 p-Value = 0.224 DF = 41

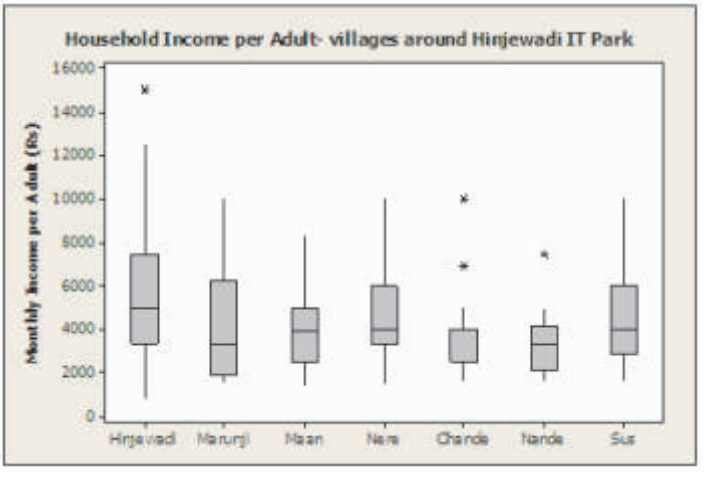
Both the comparisons show a high p value for the test of difference in means. The Null Hypothesis cannot be rejected with a 5% significance since the p value is higher than 0.05 It can be concluded with a 95% confidence that there is no significant difference between the mean incomes of the employees from the village in IT and other sectors. This further indicates that the people from the villages who have been employed in the IT sector are not in high salaried positions but in low paying routine jobs like security guards, gardeners, cleaners and transport operators.This may also indicate the high technology IT Park coming up in the vicinity has not led to an upliftment of the social status of the people in the fringe villages.The data was analyzed to compare the incomes across the villages. The results were as follows:

Descriptive Statistics: Income per Adult for villages around Rajiv Gandhi IT Park Hinjewadi (Rupees)

Table– Income per Adult for villages around Rajiv Gandhi IT Park Hinjewadi (Rupees)

Village	Mean	Minimum	Q1	Median	Q3	Maximum
Hinjewadi	5543	833	3333	5000	7500	15000
Marunji	4234	1600	1938	3333	6250	10000
Maan	3908	1400	2500	3875	5000	8333
Nere	4829	1500	3333	4000	6000	10000
Chande	3521	1667	2500	2500	4000	10000
Nande	3429	1667	2125	3333	4167	7500
Sus	4567	1667	2875	4000	6063	10000

Shown below are the comparative box plots for the Income per Adult for the villages.



Figure– Hinjewadi – Household Income per Adult

It can be seen from the data and the box plots that the median income in the nodal village of Hinjewadi is the highest. The income of Hinjewadi is compared with that of each of the other villages to determine whether it is significantly different. A two sample t test is conducted to compare the income /adult of each village with that of Hinjewadi. The results are examined with a 95% confidence.

The table on the next page summarizes the results:

Table - Results of the 2 sample t-test for comparison of Income per Adult- Hinjewadi

	Mean Difference	t statistic	p value	DF
Marunji	1309	1.61	0.115	47
Maan	1635	2.47	0.017	43
Nere	714	0.92	0.363	49
Chande	2022	2.79	0.008	49
Nande	2114	3.14	0.003	44
Sus	976	1.34	0.187	54

It can be observed that there is a significant difference between the mean income levels of Maan, Chande and Nande villages. It points towards disparity of income levels across villages, and higher incomes are seen dominantly in the main village in the fringe of the IT park. The data was tested to evaluate the disparity in income levels within the villages. The comparison baseline was taken as the Hinjewadi village. A Leven's test for equality of variances was conducted to compare the income variance of Hinjewadi with that of the other villages. A Leven's test was chosen over the more popular F test since the underlying assumption of normality of data that is required by the F test cannot necessarily be assured in this case. Leven's test works with all continuous distributions.

The table below summarizes the test results:

Table– Results of Leven's test for verifying equality of variances with Hinjewadi

	Test Statistic	p value
Marunji	0.17	0.678
Maan	4.66	0.035
Nere	0.76	0.387
Chande	3.01	0.089
Nande	4.24	0.045
Sus	0.94	0.335

It can be seen from the results that apart from Maan and Nande the variances are not different from those of Hinjewadi. The shift in income levels have thus happened in a consistent manner.

CONCLUSIONS

The study, data analysis and inferences drawn above show that the high growth is concentrated in the nodal villages of Hinjewadi IT park, whereas the erstwhile surrounding villages are starved of development that would have been expected to take place as a result of the IT Park space .Hence there is no correlation observed in the score of the amneties of the villages with respect to the distance from the IT park . This also indicates that the high technology IT park coming up in the vicinity cannot be pinpointed as the reason for upgradation of the social and economic status of the people in the fringe villages. Spatial planning can help to deliver economic, social and environmental benefits. If correctly administered, it is an important tool for promoting investment, development, environmental improvements and quality of life. A coherence of planning by various agencies bringing about this space of development would have avoided this haphazard development of the villages in the fringes close to the high growth nuclei.

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