Int. Journal for Housing Science, Vol.37, No.2 pp.63-74, 2013
Published in the United States

AN INVESTIGATION ON LOCATION CHOICE FOR HOUSING IN MINING TOWNS: CASE STUDY OF KORBA, INDIA

Subrata Chattopadhyay, Debapratim Pandit, Bhunia Alolika and Salim Altaf
Department of Architecture and Regional Planning
IIT Kharagpur, West Bengal, India
e-mail:schat@arp.iitkgp.ernet.in

ABSTRACT

Researchers are in a constant struggle to identify the relationship between housing location and users' preferences for the last few decades. Various attempts made by William Michaelson (1977), Guido Francescato (1979), Fried (1970), and Lawrence (1986) have succeeded to propose logical links between residential choice, mobility, lifestyle and housing location. When focused only on mining towns, attributes and criteria vary as these towns have issues distinctly different from other metropolitan areas.

The present study is based in Korba, the power capital of Chhattisgarh, India, which has Asia's largest coalmine Gewra. Concentrating on the issues related to housing in Korba, the study identifies some generic issues related to location choice of housing in mining-towns.

The study identified that the whole town's economy in Korba, revolves around the mining activity. Both forward and backward linkages related to mining, are the supporting functions here and activity at the tertiary sector, is marginal. A fact file was generated through an extensive field survey of the 58 wards in the administrative boundary of Korba. A total of 590 household surveys were conducted along with 160 commercial surveys. All the mines, falling fully or partially within the municipal boundary, were surveyed. Finally, through a critical analysis of the findings from the survey, 8 different parameters related to housing conditions of different income

0146-6518/02/63-74, 2013

groups, were adopted. With the help of these parameters, a multi criteria decision analysis was done followed by the ranking of the parameters.

The study will help planners and policymakers to comprehend the demand of housing in mining towns across different income brackets and orient the housing production and location according to their typology. This will also add to the knowledge of the housing-market trends and typology of housing suitable for different income groups in mining towns.

Key words: Location choice, user preference, income groups, housing typology.

Introduction

Understanding the residential choice of users provides a key insight into the housing demand. The mining towns in particular, witness the influx of migrated population. As a direct result of the boom in the mining industry, the supply of housing has struggled to keep pace with the growing demand in mining towns. The end result has been high escalation in rents and a low level of satisfaction in these housing stocks. The combination of changes in the housing and labour market in mining towns requires new responses at all levels in the public sector, private sector, and also joint ventures, to increase the availability of affordable housing.

Our studies in Korba and also in Joda-Barbil, another mining town in the State of Orissa in India, revealed that the migrated labour population is predominantly male, leading to a below average sex ratio. We also observed that, the mining activity generates a secondary housing market, mostly rental in nature. Very few policies have addressed the issues of location choice of these mine workers, thus leading to mostly haphazard developments.

Researchers have pointed out that residents' satisfaction in housing contributes to the residential choice as people's response to the environment they live in. Here environment refers not only to the physical setting, such as dwelling units, housing developments, and neighbourhoods, but also to the social and economic dimensions of such settings (Francescato, 1998).

Past studies on residential location choice indicate emergence of several types of decision-making models i.e. geographic model, economic model and social model - with a wide array of variables used in them. Most of the models are essentially disaggregate in character where a household is taken as a unit for arriving at a choice of residential location. The relative influence of each variable at the household level, has been observed to change according to various factors i.e. city size and structure, disposable income, socio-economic characteristics, family structure, social and cultural values etc.

Literature Review

Housing is not merely a 'number game' which, only relates to housing demand and stock calculations, but involves also the matching of people to appropriate housing. A lot of research is being carried out on this aspect. Michaelson (1977), focused on mobility and choice and user needs coming from different class of society. Michaelson classified housing typology as high rise apartments, single family housing, downtown houses, and suburban houses, to comprehend dissimilarities in behaviour of different user groups. Guido Francescato (1970), tried to ascertain the connection between residents' satisfaction and site location. He exploited different methodologies such as behavioural observation recording system, occupants' satisfaction and perception survey and site information measures to reach the inferences. Sigrun Kabisch (2010) deployed thematic maps to describe each aspect of every type of housing in his research on 'Housing problems in reunified Germany', he again cross examined all the information and analysed what kind of connections exist between different features. Location theories have been in existence since the last century however, efforts have focused on residential location theories only since 1950's. The theoretical models on location choice can broadly be grouped into three categories: Geographic Model, Social Model and Economic Model.

Geographic models stress mainly on the parameters of accessibility i.e. distance to work place, shopping destinations, social facilities and amenities along with cost implications based on their mode affordability and choice. Social models mainly focus on life cycle factors i.e. age and structure of households, neighborhood characteristics, quality of life, environmental pollution, community relations, ethnic and cultural ties and social recognition as the main explanatory variables. Economic models have extensively relied on economic parameters i.e. housing price and its quality, subsidies and taxes, availability of housing finance etc. Some hybrid models have also evolved which; have tried to explain residential choice by using a combination of social, economic and geographic variables.

Each group of parameters have a role in explaining residential location choice however, their significance level and relative level of influence vary considerably with the socio-economic, socio-cultural and demographic characteristics of the household.

Background information on Korba and structure of mining towns

Korba is a growing industrial hub in central India, which is an important district in Bilaspur division, in the newly formed state of Chhattisgarh. Korba is the home of 'Korwa', a hill-tribe and has been declared a Backward (Tribal) District. Even today, the original inhabitants living in the forest have retained their cultural traditions. The district is developing at a rapid pace with a number of Industrial units coming up in this area. Korba is also known as the electric power or often referred to as the Mining

Hub of Chhattisgarh. The district is enriched with all essential raw materials needed for power generation namely coal and water.

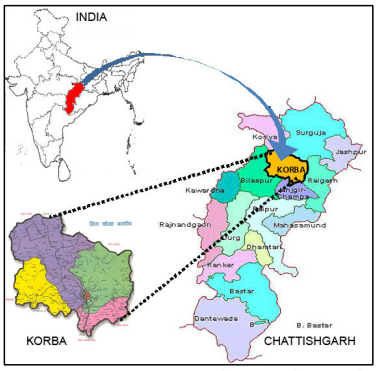

Figure 1: Location of Korba

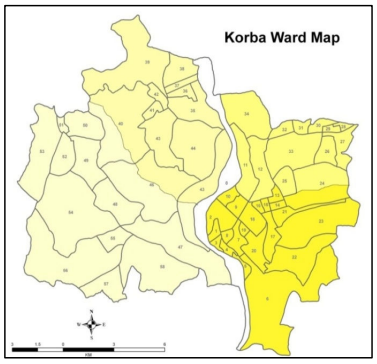

Figure 2: Ward map of Korba

Korba planning area is 322.6 sq.km. It is one of the largest reserves of coal in India. Apart from coal, Korba is rich with other minerals like Bauxite, Lime Stone, Fire Clay, Other Building Materials etc. Physiographically, the city is divided into two equal parts by the Hasdeo river and two bridges on the extreme north and south connects the two halves. The city is not well connected by any major railway routes or airport and is accessible through roads from Champa and Bilaspur. The figures 1 & 2 below show the location of Korba in India and the 58 wards within Korba municipality, respectively.

The major industries in Korba are located in various parts of the planning area and can be majorly identified as National Thermal Power Corporation (NTPC), in wards 39, 41, 42, on the north-western part, South-Eastern Coalfields Limited (SECL), in wards 51, 52, 55, 56, 57, 58, on the south-western part, Bharat Aluminum Company Limited (BALCO), in wards 27, 28, 29, 30, 32, 33, on the north-eastern part.

Housing for workers in mining or industrial towns has often been the subject of studies and discussions. Workers live in undesirable conditions, sometimes even without the bare minimum requirements. Mining towns have issues that are distinctly different from other urban areas. These include; the town structure, incomes of employees, town life expectancy, company influence within towns, and mining cultures. Mining town structures can be characterized in the following types:

Fly in, fly out: Mine workers are transported from their urban residence to the mine. Usually employees spend a period of time working and living in single quarters, then they are transported back home.

Closed towns: The town is run like a “company subsidiary.” All residents are attached to mine employment (employees or their family), all services are provided by the mine, and the company controls participation of private sector and the government (Fisher 1989).

Open mining towns: Gained popularity in the 1970's through a process of 'normalization' and is one which transfers management of township to shire councils, and where partnerships with private sector and government are sought for the provision and maintenance of infrastructure.

Data Collection

Data was collected through a primary household survey from all 58 wards of Korba. A total of 660 households had participated in the survey, implying a response rate of nearly 80 percent. Due to data gaps, we finally worked with the response of 590 households. Data was collected on socio-economic variables, ownership pattern, age and condition of buildings, migration pattern, and duration of stay. Key socio-economic attributes include household size, household structure, employment status and occupation of all household members and annual income.

In general, ownership pattern and income groups are key factors for one's choice of location; hence both ownership pattern and income groups are used to classify choice types. Other attributes, such as age, condition of buildings and duration of stay, are used as control variables. The table 1 below shows the variables with number of households for each case.

Table 1: This is a table of Data summary statistics.

Sl. No.	Variable	No. of household	Percentage
1(a)	Ownership status – Owned	337	57.119
1(b)	Ownership status – Rented	253	42.881
2(a)	From Within State	446	75.593
2(b)	From Outside State	144	24.407
3(a)	Age of building <5 years	124	21.017
3(b)	Age of building 5 to 10 years	117	19.831
3(c)	Age of building 10 to 20 years	123	20.847
3(d)	Age of building >20 years	226	38.305
4(a)	Condition of building – good	260	44.068
4(b)	Condition of building – average	284	48.136
4(c)	Condition of building – bad	46	7.797
5(a)	Nature of building – Pucca	502	85.085
5(b)	Nature of building – Kaccha	88	14.915
6(a)	LIG	184	31.186
6(b)	MIG	98	16.610
6(c)	HIG	308	52.203

To ensure adequate sample representation of choices in all categories, the survey was conducted in wards with respect to its population density, land use patterns and social structure. Households were classified according to monthly income such as; low

income group (LIG): with income less than Rs. 7300 per month, middle income group (MIG): with income between Rs 7301 and Rs. 14500 per month, and high income group (HIG): with income more than Rs. 14501 per month.

Data Analysis

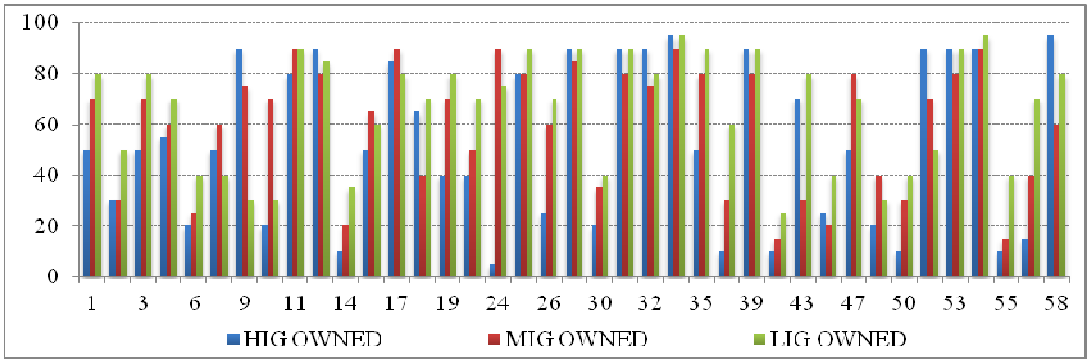

Figure 3: Ward wise comparison in percentage of owned houses with respect to income groups

From figure 3 above it is observed that for HIG, wards 9, 12, 27, 31, 32, 39, 51, 53 and 54 have around 90% of owned houses whereas wards 33 and 58 have more than 90% of owned houses. For HIG, wards 14, 36, 41, 50 and 55 have around 90% of rented houses. Similarly, for MIG, wards 11, 17, 24, 33 and 54 have around 90% of owned houses and wards 41 and 55 have around 85% of rented houses. For LIG, it is observed that wards 11, 25, 27, 31, 35, 39 and 53 have around 90% of owned houses but wards 33 and 54 have more than 90% of owned houses but ward 41 has around 70% rented houses.

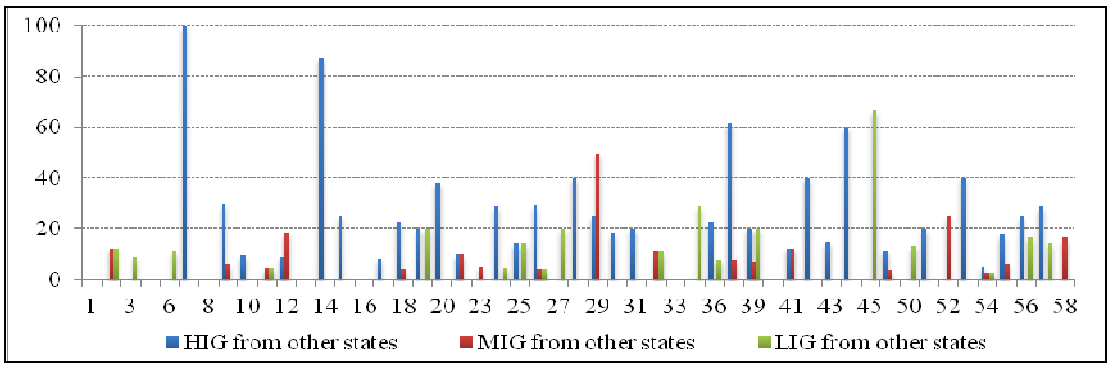

Figure 4: Ward wise comparison of migrated households from other states according to income groups

The figure 4 above shows that wards 7, 14, 37, and 44 have larger HIG migrating population owing to new developed areas. Ward 45 shows larger migrating LIG population owing to the nearby Gevra mine.

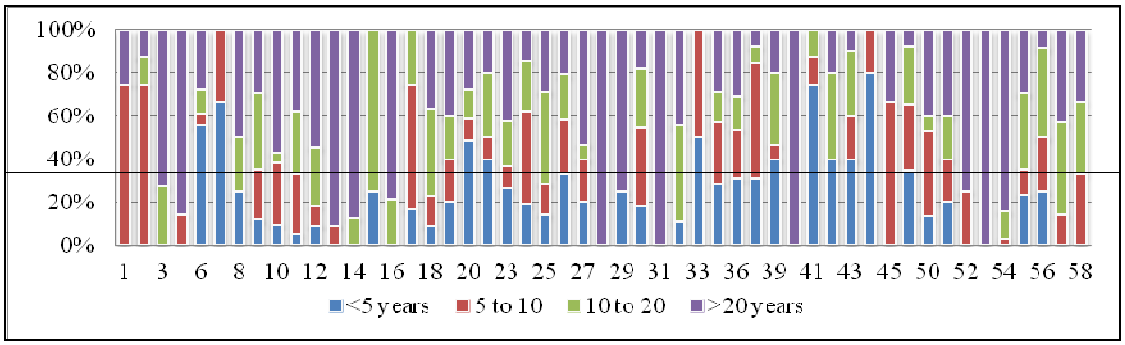

Figure 5: Ward wise comparison in percentage of age of houses

The figure 5 above shows that the major housing stock is more than 20 years old and from ward 15 to 44, houses less than 5 years are found. The core city and fringe area thus have houses which are relatively old.

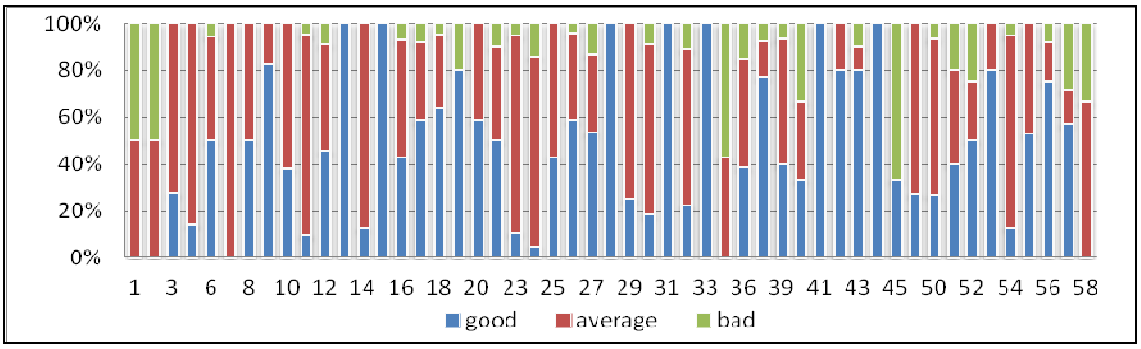

Figure 6: Ward wise comparison in percentage of condition of houses

The figure 6 above shows that major housing stock is in good condition. The core city and fringe areas have houses in bad conditions.

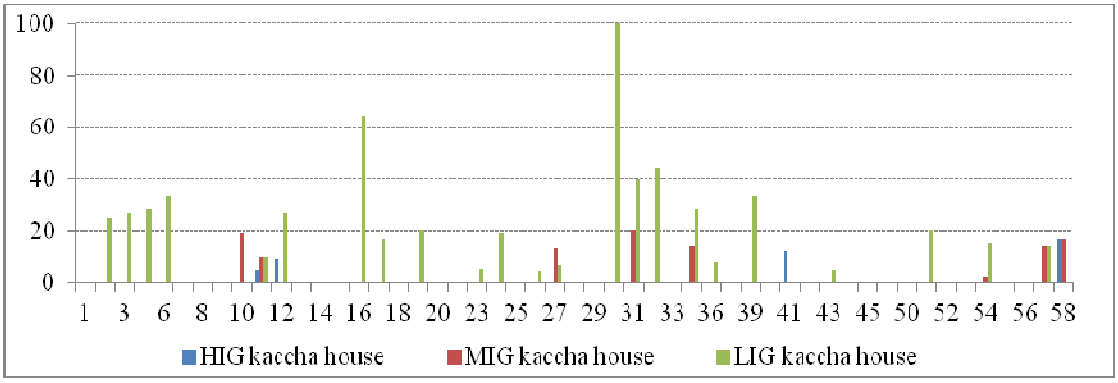

Figure 7: Ward wise comparison in percentage of type of houses with respect to income groups

The figure 7 above shows that LIG has more of Kachcha (temporary) houses. Wards 15 and 30 show a higher number of kachcha houses for LIG due to the shortage of housing stock of BALCO workers and irrigation department workers.

Multiple Correspondence Analysis

There are 6 nominal variables (I), each nominal variable has respective levels (J) and there are 590 observations. Performing Correspondence Analysis on the indicator matrix will provide two sets of factor scores: one for the rows and one for the columns. The row factor score is normalized to unity and column factor scores are, in general scaled such that their variance is equal to their corresponding Eigen value.

The JxJ table obtained is called the Burt matrix. The table 2 below is important in Multiple Correspondence Analysis because using Correspondence Analysis on the Burt matrix is often easier. But the Burt matrix also plays an important theoretical role because the eigen values obtained from its analysis, gives a better approximation of the inertia explained by the factors than the Eigen values.

Table 2: Burt Table in percentage value.

	Owned	Rented	Within State	Outside State	<5 years	5 to 10	10 to 20	>20 years	good	average	bad	Pucca	Kaccha	LIG	MIG	HIG
Owned	57.12	0.00	45.76	11.36	10.17	10.00	11.86	25.08	25.25	24.92	6.95	44.75	12.37	26.44	10.00	20.68
Rented	0.00	42.88	29.83	13.05	10.85	9.83	8.98	13.22	18.81	23.22	0.85	40.34	2.54	4.75	6.61	31.53
Within State	45.76	29.83	75.59	0.00	15.76	14.41	15.59	29.83	32.71	36.95	5.93	62.71	12.88	26.61	13.22	35.76
Outside State	11.36	13.05	0.00	24.41	5.25	5.42	5.25	8.47	11.36	11.19	1.86	22.37	2.03	4.58	3.39	16.44
<5 years	10.17	10.85	15.76	5.25	21.02	0.00	0.00	0.00	10.85	7.63	2.54	18.14	2.88	5.76	3.05	12.20
5 to 10	10.00	9.83	14.41	5.42	0.00	19.83	0.00	0.00	7.97	10.17	1.69	17.80	2.03	5.76	2.88	11.19
10 to 20	11.86	8.98	15.59	5.25	0.00	0.00	20.85	0.00	9.66	9.83	1.36	18.64	2.20	5.93	3.05	11.86
>20 years	25.08	13.22	29.83	8.47	0.00	0.00	0.00	38.31	15.59	20.51	2.20	30.51	7.80	13.73	7.63	16.95
good	25.25	18.81	32.71	11.36	10.85	7.97	9.66	15.59	44.07	0.00	0.00	41.19	2.88	7.97	6.61	29.49
average	24.92	23.22	36.95	11.19	7.63	10.17	9.83	20.51	0.00	48.14	0.00	40.34	7.80	17.80	8.64	21.69
bad	6.95	0.85	5.93	1.86	2.54	1.69	1.36	2.20	0.00	0.00	7.80	3.56	4.24	5.42	1.36	1.02
Pucca	44.75	40.34	62.71	22.37	18.14	17.80	18.64	30.51	41.19	40.34	3.56	85.08	0.00	21.19	14.41	49.49
Kaccha	12.37	2.54	12.88	2.03	2.88	2.03	2.20	7.80	2.88	7.80	4.24	0.00	14.92	10.00	2.20	2.71
LIG	26.44	4.75	26.61	4.58	5.76	5.76	5.93	13.73	7.97	17.80	5.42	21.19	10.00	31.19	0.00	0.00
MIG	10.00	6.61	13.22	3.39	3.05	2.88	3.05	7.63	6.61	8.64	1.36	14.41	2.20	0.00	16.61	0.00
HIG	20.68	31.53	35.76	16.44	12.20	11.19	11.86	16.95	29.49	21.69	1.02	49.49	2.71	0.00	0.00	52.20

From the above an insight on various variables affecting different income brackets can be observed. For instance LIG owned houses (26.44%) are more than the others with major being in the fringe areas within the planning area. HIG rented houses (31.53%) are more than the others due to the presence of large industries which rents

out quarters and houses. HIG migrates (16.44%) more than other groups. Other observations are common trends for any urban area.

Interpretation of Multiple Correspondence Analysis

The interpretation in Multiple Correspondence Analysis is often based upon proximities between points in a low-dimensional map (i.e., two or three dimensions). For the proximity between variables it is required to distinguish two cases. First, the proximity between levels of different nominal variables means that these levels tend to appear together in the observations. Second, because the levels of the same nominal variable cannot occur together, we need a different type of interpretation for this case. Here the proximity between levels implies that the groups of observations associated with these two levels are themselves similar.

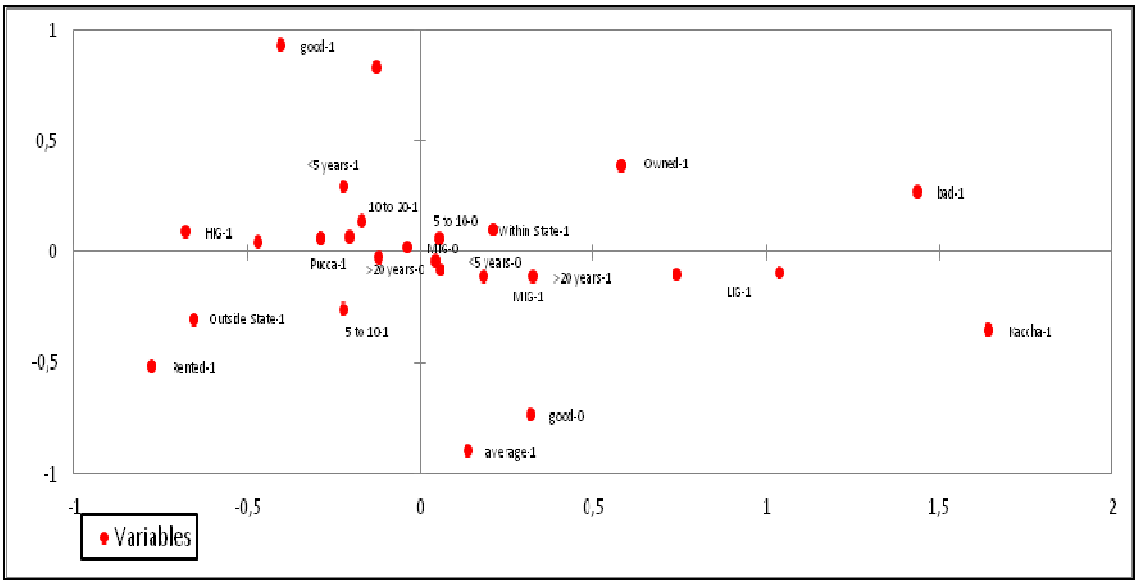

Figure 8: Symmetric plot of variables.

The uni-dimensional analysis shows factors like ownership status as rented, duration of stay at present place for 10 to 20 years, people from outside the state, Pucca (permanent) houses, condition of house as good and HIG, being clustered together (say A) and ownership status as owned, duration of stay at present place for more than 20 years, people from within the state, condition of house as average and MIG being clustered together (say B).

The analysis shows that the cluster A of the variables is characterized as being more predominant in wards 20, 55 and 56. Similarly the cluster B of the variables is characterized as being more predominant in wards 3, 4 and 32. Two factor scores of 80.7% and 45.5%, similar scatter plots can be created for other factor scores to identify relations among variables and other observations.

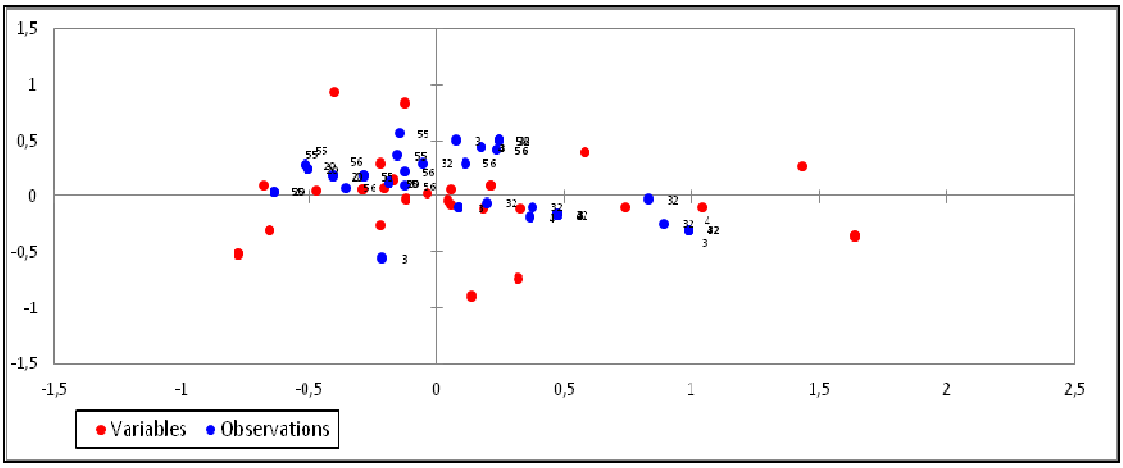

Figure 9: This figure is of symmetric plot of variables and observations

Conclusion

The observations could be summarized as, in any typical mining town, the company housing caters mainly to the needs of HIG and higher MIG and thus a secondary housing market is generated for LIG and lower MIG. Company provided housing for HIG is generally rental in nature; hence the percentage of owned houses for HIG is comparatively lower than others. The presence of small pockets and settlements composed of LIG within the planning area has higher percentage of owned houses.

Due to the absence of vocational training and professional training institutes for industry workers in Korba, a major HIG population of skilled workers and professionals migrate from other states, whereas, LIG population of unskilled, marginal and semi-skilled workers migrate from within the state of Chhattisgarh.

It can be easily observed that people who are staying in the city for a longer period (above 20 years), are following a common trend, where the core city mainly comprises of HIG because of the higher living cost. New developed areas comprise the MIG because of availability of small plots.

The condition of housing follows a very predictable trend which concludes that most of the HIG houses are in good and average condition. As companies are maintaining the existing housing stock, HIG has better conditions than other income categories of individual households. In most cases company housing for LIG is in very poor condition. Even the infrastructure required for the same, is not provided.

In most of the cases it is observed that poor utilization of the housing schemes like "Deen Dayal Awas Yojna'', is also a reason for increasing stock of substandard housing. It failed to reach the target group due to the isolated and leap-frog

development, it acted as a piece meal solution without basic infrastructure of water supply, drainage and road.

Through this study, the location choice for housing in Korba was understood in particular, that led to some generic understanding on location choice for housing in mining towns.

References

[1] Academic unpublished document – Korba Development Plan, 2031, IIT Kharagpur (MCP 2010-2012).

[2] Michelson, W. (1977) *Environmental Choice*, *Human Behavior*, *and Residential Satisfaction*. New York: Oxford University Press.

[3] Greenacre, Michael J. (1984), *Theory and applications of correspondence analysis*. London: Academic Press, Inc.

[4] Hervé Abdi & Dominique Valentin, *Multiple Correspondence Analysis.*

[5] Academic unpublished document – Joda-Barbil Development Plan- 2021, IIT Kharagpur (MCP 2005-2006).

[6] Despres, C., and Piche, D., edited, *Housing Surveys- Advances in theory and methods*, University of Laval, Canada.

[7] Vliet, W., *The Encyclopedia of Housing,* Sage 1998.