Trans.Inst.Indian Geographers
ISSN 0970-9851

# Possibility of Urbanization in the Rural Areas of Kolkata Metropolitan Area

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**Abstract**

*Population growth and urban transformation of land have been essential drivers of land use/land cover (LULC) changes and the landscape pattern worldwide. Due to the growth of urban areas, rural land cover types, such as soil, wetland, water bodies and vegetation, have been replaced with urban materials through development or construction. India has entered a critical period of urbanization in which urban lands expand very fast and large scale of urban transformation takes place in the rural gram panchayat areas outside the city areas. In case of cities of India rapid expansion of urban land occurs not only in large cities but also in small cities and towns more specifically nearer the census town areas. During the last 50 years the population of India (nearly 1.3 billion in 2015) has grown two and a half times, but the urban population has grown nearly five times. Kolkata city is one of the major cities in India, which is located in the eastern part of India, where this study is conducted, is the fastest growing and the third largest in the country. Urban growth of this area however has posed serious threats to the livelihood of the small-scale farmers who earn their living by farming the productive agricultural tract located at the urban fringe. In this study the researcher have used the spatial analysis function of GIS to specify the possibility of urbanization in the rural areas of Kolkata Metropolitan Area (KMA) and to find out the major dominating factors behind the growth of this area.*

**Keywords:** *urban transformation, rapid expansion, possibility of urbanization, dominating factors.*

## Introduction

Cities are dynamic complex systems (Bettencourt & West, 2010) and our understanding of how they evolve is still woefully inadequate (Batty, 2008). One of the important characteristics of urban oriented research is the characterization of city morphology and growth. In the beginning of the 21st century marked a milestone because half of the world's population has resided in cities since then (Fragkias&Seto, 2009). According to United Nations projections, urban population will increase by 1.35 billion by 2030, at which time the urban population in the world will be approximately 5 billion (United Nations, 2012). It is forecasted that global urban land will increase by 1.2 million Square km by 2030, which will be almost triple the global urban land area. (Seto, Guneralp, &Hutyra, 2012). The most significant urbanization in the future is expected to occur in Asia, especially in China and India (Angel, Parent, Civco, Blei,

& Potere, 2011; Güneralp & Seto, 2008; Seto et al., 2012; Václavík, Lautenbach, Kuemmerle, &Seppelt, 2013). Urban settlements in the developing countries like India, are, at present, growing five times as fast as those in the developed countries. The concentration of urban population is becoming particularly characteristic for developing countries. As consequences most of the big cities in the developing countries are already faced by enormous backlogs in shelter, infrastructure and services and confronted with increasingly overcrowded transportation systems, insufficient water supply, deteriorating sanitation and environmental pollution. This is particularly important in fast, usually unplanned, changing areas, such as urban settlements in developing countries (Ramachandran, 1992). Urbanization has been the most powerful driver of world development in recent decades. Metropolitan areas act a vital role in the process of urbanization. So, particular emphasis was put on metropolitan cores, since these places experienced continuously dramatic growth. Nevertheless, spatial patterns of urbanization are changing. As a result, urban expansion concentrates in former metropolitan peripheries which progressively emerge into rural areas and small towns (Aguilar and Ward, 2003). The dispersed urban expansion gives birth to a wide urban rural interaction zone with increasingly diffuse limits between rural and urban characters (Aguilar, 2008).

The most recent studies of metropolitan regions have often focused on either the morphology of metropolitan area or rural hinterlands distant from the metropolis, with little work on the peri-urban areas in the context of metropolitan. In developing countries, a substantial and growing proportion lives in or around metropolitan areas and large cities, including the zone termed the 'peri-urban areas', which is neither solely urban nor rural (Ford,1999; Books and Davilla,2000).

Population growth and urban transformation of land have been essential drivers of land use/land cover (LULC) changes and the landscape pattern worldwide. Due to the growth of urban areas, rural land cover types, such as soil, wetland, water bodies and vegetation, have been replaced with urban materials through development or construction. So, it is important and urgent to quantitatively characterize and evaluate regional or global urban transformation of land and its effect to support urban growth predictions and related decision making, especially for the areas expected to experience rapid urbanization in the future.

Several studies that have analyzed urban growth processes in megacities have been limited to retrospective analysis (e.g., Bagan & Yamagata, 2012; Basawaraja, Chari, Mise, & Chetti, 2011; Bhatta, 2009; Pathan et al., 1993; Schneider & Woodcock, 2008; Taubenböck et al., 2009; Taubenböck et al., 2012). However, apart from mapping the status quo, predictive models are also empirically significant because they assess spatial change consequences (Jokar Arsanjani et al., 2013). Accordingly, several statistical and geospatial models have been advanced, including logistic regression models (Hu & Lo, 2007), Markov chains (MC; Kamusoko, Aniya, Adi, & Manjoro, 2009), cellular automata (CA; Han, Hayashi, Cao, &Imura, 2009), and MC-CA models (Vaz, Nijkamp, Painho, & Caetano, 2012), among others.

The mechanism of urbanization has been widely studied in developed countries but less studied in developing countries (Zanganeh Shahraki et al., 2011). India has entered a critical period of urbanization in which urban lands expand very fast and large scale of urban transformation takes place in the rural gram panchayat areas outside the city areas. In case of large cities in India rapid expansion of urban land occurs not only in large cities but also in small cities and towns more specifically nearer the census town areas. During the last 50 years the population of India (nearly 1.3 billion in 2015) has grown two and a half times, but the urban population has grown nearly five times. Kolkata city is one of the major cities in India, which is located in the eastern part of India, where this study is conducted, is the fastest growing and the third largest in the country. This city experienced with population growth of 10.30% according to census 2011. Kolkata city is now expanding towards southward as the researcher have seen from the classification of satellite images. The urban growth, however has posed serious threats to the livelihood of the small-scale farmers who earn their living by farming the productive agricultural tract located at the urban fringe. In this study the researcherhave used the spatial analysis function of GIS to specify the possibility of urbanization in the rural areas of Kolkata Metropolitan Area (KMA) and to find out the major dominating factors behind the growth of this area.

**Study Site**

KMA (Fig 1) is one of the oldest and second largest agglomerations in the country. The concept of Kolkata Metropolitan Area (formerly CMD i.e. Calcutta Metropolitan District) was introduced by the Calcutta Metropolitan Planning Organization (CMPO) by the Use and Development of Land Control Act of 1965. In the year 1966, a basic development plan was prepared by the CMD which was basically a perspective plan. According to this Schedule Act the area of the Calcutta Metropolitan District was the 1380 Sq. Km after its development. Now at present after the addition of few gram panchayats within the KMA, it extends over an area of 1841.47 sq.km. (Table 1) covering the whole of Kolkata district and parts of five other districts, namely, 24-Parganas (South), 24-Parganas (North), Howrah, Hooghly and Nadia. The boundary of this area was delineated by the Kolkata Metropolitan Development Authority (KMDA) and all types of planning and future development of this area is under the control of KMDA.

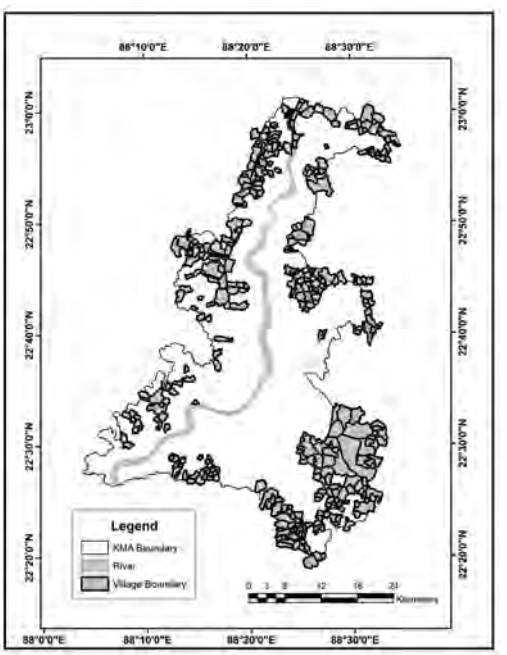


Fig 1. Rural areas of Kolkata Metropolitan Area

Table 1. Present Composition of KMA

| Name of Constituent Units | No of units | Area(sq.km) | Population |
|---|---|---|---|
| Municipal Corporations | 155 | 364.53 | 1814953 |
| Municipalities | 39 | 667.28 | 7313423 |
| Census Towns | 3 | 272.32 | 5799245 |
| Out Growth's | 6 | 4.68 | 17142 |
| Rural Areas | 371 | 532.66 | 948025 |
| Total KMA | 574 | 1841.47 | 15892788 |

Source: Census of India, 2011, KMDA 2011.

The number of household of the total rural areas in KMA is 220273. Average population density of the rural areas is 1780 persons per sq.km. According to the Census report (2011), it experiences 6% of the total population and 29% of the total area of KMA. Among the district, South 24 Parganas shares maximum percentage of rural population and area in KMA i.e. 2.38 and 12.85 percent respectively.

**Methods**

To delineate the possibility of urbanization in the rural areas of KMA different variableswere used. Those are socio-economic variables, land use variables and infrastructural variables (Table 2). Weightage has been given over the data on the presence and absence of the facility. To delineate the possibility of urbanization census data of 2011 has been used. To visualize the possibility of urbanization different cartographical techniques was used using Arc GIS software. To find out the main driving forces behind the urban growth of this area CAT PCA (Categorical Principal Component Analysis) has been used. Before applying the CAT PCA, the variables were categorized into three broad categories. Those are Socio-economic categories, land use categories and infrastructural categories.

Table 2.Criteria's for delineating possibility of urbanization

| Sl. No. | Name of Variables | Criteria | Character | | |
|---|---|---|---|---|---|
| | | | Urban | Peri Urban | Rural |
| Socio- Economic variables | | | | | |
| 1. | Population (Total) | >=2500<br><2500 | * | * | * |
| 2. | Population Density (Persons/Sqkm) | >=400<br><400 | * | * | * |
| 3. | Literacy (Percentage of Total Population) | >=70<br><70 | * | * | * |
| 4. | Workers Male (Percentage of total workers) | >=70<br><70 | * | * | * |

| | | | | | |
|---|---|---|---|---|---|
| 5. | Workers Female (Percentage of total workers) | >=15<br><15 | * | * | * |
| 6. | Percentage of Primary workers (Percentage) | >=15<br><15 | * | * | * |
| 7. | Percentage of Secondary workers (Percentage) | >=10<br><10 | * | * | * |
| 8. | Percentage of Tertiary workers (Percentage) | >=75<br><75 | * | * | * |
| Land use variables | | | | | |
| 1. | Non- Agricultural Land (Percentage) | >=30<br><30 | * | * | * |
| 2. | Vegetation (Percentage) | >=8<br><8 | * | * | * |
| 3. | Agricultural Land (Percentage) | >=60<br><60 | * | * | * |
| 4. | Waste Land (Percentage) | >=2<br><2 | * | * | * |
| Infrastructural Variables | | | | | |
| 1. | Distance from the City Centre (KM) | <10<br>>10 | * | * | * |
| 2. | Distance from Railway Track (KM) | <5<br>>5 | * | * | * |
| 3. | Availability of Rail and Bus Transport | Available<br>Not-Available | * | * | * |
| 4. | Distance to Higher Education (KM) | <5<br>>5 | * | * | * |
| 5. | Distance from Health Centre (KM) | <5<br>>5 | * | * | * |
| 6. | Shopping Facility (KM) | <5<br>>5 | * | * | * |
| 7. | Water Facility | Treated<br>Untreated | * | * | * |
| 8. | Drainage Facility | Available<br>Not-Available | * | * | * |
| 9. | Toilet facility | Available<br>Not-Available | * | * | * |

Source: Computed by the Authors

**Analysis and Discussion**

From the demographic data i.e. total population and population density it has been found by the authors that eastern side of the KMA is most populous than the western side of KMA. But from the literacy scenario it was also found that the percentage of literacy rate in the villages of the district of south 24 Parganas is relatively lower than the whole KMA. After analyzing the data from male workforce it has been found that all over the KMA, male workforce is almost same and high except two or three villages in Hooghly district. But female workforce is high in the neighboring areas of Kolkata city and it decreases outwards. It indicates that the female belongs to the areas nearer to Kolkata has been engaged in different kind of non-agricultural activities than the other areas. So women's participation is high towards the Kolkata. There after categorizing the workers, it has been found that the percentage of primary workers are high in the areas district of south 24 parganas and some villages of Howrah district than the other districts. But the percentage of secondary workers and tertiary workers is high in the villages nearer the Kolkata or the district head quarter or the municipal areas. Because of shrinking of cultivated land close to the urban units, the inhabitants of those areas have to depend on secondary or tertiary activities.

From the land use data of the rural areas it has been found that the percentage of built up area and percentage of waste land are higher close to Kolkata city or nearer the municipal areas. It decreases with distance from the city center and also from the municipal center. From the vegetation data it has also found that the percentage of vegetative cover is less than 8 percent almost all over the area except few villages in the Hooghly district. From the agricultural data it has been seen that the percentage of agricultural areas is high towards peripheral areas of the city. This is the major land cover features in the peripheral areas of Kolkata.

From the infrastructural overview it has been found that with increasing distance from the city center intensity of the railway line decreases. But from the data available of bus services it has been found that the entire region has experienced good bus services except some villages of South 24Parganas district. It indicates that because of lack of bus services most of the people uses suburban railway for their needs. So population pressure in the local train during peak hours is very high in the south section of eastern railway. This zone basically acts as a storehouse of the Kolkata city. Because using these railway fresh vegetables, milk, fish used to supply to Kolkata for the needs of city people.

By analyzing the distance from higher education it has been found that in the villages of Hooghly and South 24 Parganas district the distance from the educational institution is much higher than the other areas. It indicates that more colleges, technical schools are to be constructed specially in the Bhangar II block, which is situated in the south eastern side of the South 24 Parganas district. From the analysis of the health scenarios it has been found that distance from the rural areas to the primary health center is also high in the Bhangar II blocks of south 24 districts. Market facility is also high in the areas nearer to city center or district head quarter. Distance from the market is also high in the villages of south 24

Parganas district and Hooghly district. After scrutinizing the available drainage facilities of KMA it has been found that maximum availability of the drainage facility in the areas which are close to the city. Most of the villages within the KMA experiences lack of drainage facility and toilet facility. From the statistics of piped water supply facility it has been found that most of the villages in the Hooghly and South 24 Parganas district experiences lack of piped water facility.

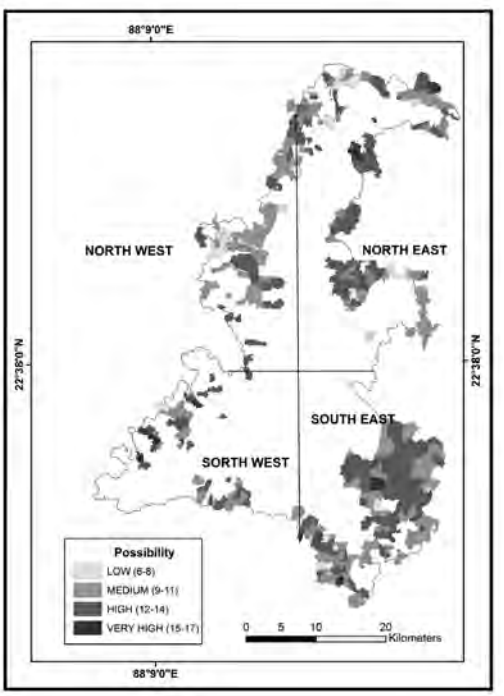


Fig. 2. Showing Possibility of Urbanization in KMA

Fig. 2 describes the possibility of urbanization in the rural areas of KMA. For the interpretation purposes the map of KMA has been categorized into four directional zones. Those are north east, south east, south west and northwest zones. In this figure the zone of very high, high, medium and low possibility of urbanization indicates the numbers of facilities having 15 to 17,12 to 14, 9 to 11 and 6 to 8 respectively. From the figure 2 it has been seen that there are inverse relationship between the distances from city center with the distance. So towards the semi urban areas intensity or the possibility of urbanization has been decreased with distance. It indicates the people want to stay nearer the city or urban areas because of good communication facility and infrastructural facilities.

To find out the major dominant factor behind this urbanization Categorical PCA (CAT PCA) has been used. All the variables related behind the urban development of the region have been categorized into three categories. Those are demographic variables, land use variables and infrastructural variables.

Table 3: Correlation Matrix among the demographic variables

| | VAR1 | VAR2 | VARI3 | VAR4 | VAR5 | VAR6 | VAR7 | VAR8 |
|---|---|---|---|---|---|---|---|---|
| VAR1 | 1.000 | | | | | | | |
| VAR2 | .291 | 1.000 | | | | | | |
| VAR3 | .069 | .037 | 1.000 | | | | | |
| VAR4 | -.069 | -.037 | -1.000 | 1.000 | | | | |
| VAR5 | -.081 | .125 | .121 | -.121 | 1.000 | | | |
| VAR6 | -.127 | -.439 | .043 | -.043 | -.184 | 1.000 | | |
| VAR7 | .044 | .163 | -.048 | .048 | -.045 | -.217 | 1.000 | |
| VAR8 | .084 | .332 | .180 | -.180 | .291 | -.579 | -.189 | 1.000 |

Variables: 1; Total Population, 2; Population Density, 3; Male workforce, 4; Female workforce, 5; Literacy rate in percentage, 6; Primary workers in percentage, 7; Secondary workers in percentage, 8; Tertiary workers in percentage.

From the correlation matrix (Table 3) among the demographic variables it was seen that there was a negative correlation among the total population, female workforce, literacy rate and primary workers. There was a perfect negative correlation among the male workforce and female workforce in these rural areas of the KMA. From the communalities (Table 4) it has been found that male workforce, female workforce and secondary workers in percentage shared almost 90% of the variance. Other than these factors total population and percentage of tertiary worker were explained 76% and 78% of the variance respectively. Average value of the communalities is 0.8.

Table 4: Communalities

| | Extraction |
|---|---|
| VARIABLE1 | 0.765 |
| VARIABLE2 | 0.622 |
| VARIABLE3 | 0.995 |
| VARIABLE4 | 0.995 |
| VARIABLE5 | 0.550 |
| VARIABLE6 | 0.749 |
| VARIABLE7 | 0.941 |
| VARIABLE8 | 0.786 |

Extraction Method: Principal Component Analysis.

From the Table 5 of the total variance explained it has seen that variable 1 i.e. total population explains 28% of the total

variances. It is clear that the first four factors explained relatively large number of variance. Those are 28%, 24%, 15% and 12% respectively. These four factors also have the eigen value more than 1. Whereas subsequent factors were explained only small amounts of variance. So among the socio economic variable total population, population density, male workforce and female workforce are the dominant variables which controls urbanization.

Table 5: Total Variance Explained

| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 2.264 | 28.300 | 28.300 | 2.264 | 28.300 | 28.300 |
| 2 | 1.897 | 23.709 | 52.009 | 1.897 | 23.709 | 52.009 |
| 3 | 1.237 | 15.464 | 67.473 | 1.237 | 15.464 | 67.473 |
| 4 | 1.006 | 12.569 | 80.042 | 1.006 | 12.569 | 80.042 |
| 5 | .755 | 9.443 | 89.486 | | | |
| 6 | .561 | 7.008 | 96.494 | | | |
| 7 | .280 | 3.506 | 100.000 | | | |
| 8 | .000 | .000 | 100.000 | | | |

Extraction Method: Principal Component Analysis.

Table 6: Component Matrix

| | Component | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| VARIABLE1 | .267 | | .561 | -.583 |
| VARIABLE2 | .507 | .531 | | |
| VARIABLE3 | .712 | -.679 | | |
| VARIABLE4 | -.712 | .679 | | |
| VARIABLE5 | .406 | | -.516 | |
| VARIABLE6 | -.529 | -.669 | | |
| VARIABLE7 | -.006 | | .617 | .702 |
| VARIABLE8 | .690 | | | |

Extraction Method: Principal Component Analysis.

Table 6 shows the component matrix of the eight variables. Out of eight variables only two variables are extracted. The researcher have extracted two variables wherein the eight variables are divided into two are extracted according to most important variables which similar responses in component 1 and simultaneously component 2, 3 and 4.

Table 7: Correlation matrix among the land use variable

| | VARIABLE 1 | VARIABLE 2 | VARIABLE3 | VARIABLE4 |
|---|---|---|---|---|
| VARIABLE 1 | 1.000 | | | |
| VARIABLE 2 | 1.000 | 1.000 | | |
| VARIABLE 3 | -.838 | -.841 | 1.000 | |
| VARIABLE 4 | -.324 | -.325 | -.200 | 1.000 |

Variable 1; Agriculture in percentage, Variable 2; Forest in percentage, Variable 3; Built up area in percentage, Variable 4; Waste land in percentage.

From the correlation matrix (Table 7) among the land use variables it has been seen that there was a perfect correlation among the agriculture and forest in this area. But it has negatively correlated with the built up area and waste land area. After calculating the descriptive statistics of the variables it has been seen that the mean in case of the agricultural areas is higher than the other variables. So looking at the mean it indicates that agriculture is the major dominant variable in this area.One major noticeable fact is that though those areas experiences maximum percentage of agricultural land but it those areas fulfill maximum number of the criteria's to become an urban center. So in those areas the possibility of urbanization is very high because of availabilityvacant land withgentle slope and good communication facility.

Table 8: Total Variance Explained

| | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|
| Component | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 2.831 | 70.772 | 70.772 | 2.831 | 70.772 | 70.772 |
| 2 | 1.144 | 28.597 | 99.370 | 1.144 | 28.597 | 99.370 |
| 3 | .025 | .629 | 99.998 | | | |
| 4 | .000 | .002 | 100.000 | | | |

Extraction Method: Principal Component Analysis.

From the table 8 it has seen that first component explains almost 71% of the variance i.e. agricultural area and second component explains only 29% of the variance. It also indicates that in the semi urban areas of Kolkata the amount of

agricultural area is higher than the other land cover types. So only these two factors have the eigen value greater than one.

Table 9 describes the component matrix among the land use variables. From the component matrix it has been seen that only first two factor plays a dominant role behind the urban development.

Table 9: Component matrix

| | Component | |
|---|---|---|
| | 1 | 2 |
| VAR00001 | .995 | -.076 |
| VAR00002 | .995 | -.076 |
| VAR00003 | -.886 | -.448 |
| VAR00004 | -.254 | .965 |
| Extraction Method: Principal Component Analysis. | | |

Table 10 : Correlation Matrix among the Infrastructural variables

| | **VAR1** | **VAR2** | **VAR3** | **VAR4** | **VAR5** | **VAR6** | **VAR7** | **VAR8** | **VAR9** |
|---|---|---|---|---|---|---|---|---|---|
| VAR1 | 1.000 | | | | | | | | |
| VAR2 | .133 | 1.000 | | | | | | | |
| VAR3 | -.032 | .134 | 1.000 | | | | | | |
| VAR4 | .093 | .106 | -.005 | 1.000 | | | | | |
| VAR5 | .201 | .077 | .041 | .101 | 1.000 | | | | |
| VAR6 | -.144 | .015 | .092 | .057 | -.113 | 1.000 | | | |
| VAR7 | .050 | .112 | .037 | .060 | .025 | .059 | 1.000 | | |
| VAR8 | .197 | .201 | .158 | .067 | .110 | .011 | .195 | 1.000 | |
| VAR9 | -.036 | .111 | .062 | -.003 | .022 | .041 | .110 | .112 | 1.000 |

Variable 1; Distance from City Center, Variable 2; Distance from Railway , Variable 3; Availability of Bus services , Variable 4; Distance to higher education, Variable 5; Distance to Primary Health Center, Variable 6; Market Facility, Variable7; water Supply, Variable 8; Drainage Facility, Variable 9; Toilet Facility.

From the correlation matrix (Table 10) among the infrastructural variables it has seen that with the increase in distance from the city center availability of bus services, market facility and toilet facility decreases.

After calculating the descriptive statistics of the variables it has seen that the mean in case of the distance from city center is high than other variables.

Table : 11 Communalities

| | Extraction |
|---|---|
| VARIABLE1 | .531 |
| VARIABLE2 | .351 |
| VARIABLE3 | .307 |
| VARIABLE4 | .746 |
| VARIABLE5 | .376 |
| VARIABLE6 | .609 |
| VARIABLE7 | .263 |
| VARIABLE8 | .476 |
| VARIABLE9 | .345 |

Extraction Method: Principal Component Analysis.

From the communalities (Table 11) it has been seen that distance to higher education and market facility shared almost 74% and 61% of the variance respectively. Other than these factors distance from city center and toilet facility were explained 53% and 47% of the variance respectively. Average value of the communalities is 0.4.

Table 12: Total Variance Explained

| | **Initial Eigenvalues** | | | **Extraction Sums of Squared Loadings** | | |
|---|---|---|---|---|---|---|
| Component | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 1.671 | 18.570 | 18.570 | 1.671 | 18.570 | 18.570 |
| 2 | 1.307 | 14.525 | 33.095 | 1.307 | 14.525 | 33.095 |
| 3 | 1.026 | 11.397 | 44.493 | 1.026 | 11.397 | 44.493 |
| 4 | .987 | 10.968 | 55.461 | | | |
| 5 | .915 | 10.166 | 65.627 | | | |
| 6 | .859 | 9.549 | 75.175 | | | |
| 7 | .791 | 8.788 | 83.963 | | | |
| 8 | .761 | 8.459 | 92.423 | | | |
| 9 | .682 | 7.577 | 100.000 | | | |

From the table 12 it has seen that component 1, 2 and 3 have the eigen value greater than one and these three factors explains almost 45% of the variance i.e. distance from city center, distance from railway, and availability of bus services and other five components explain only 55% of the variances. But among these variables distance from the city center and distance from the railway is playing a vital role behind the growth of this area. So these are the major dominant factor behind the urban development.

Table 13: Component Matrix

| | Component | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| VARIABLE1 | .487 | -.541 | |
| VARIABLE2 | .579 | | |
| VARIABLE3 | .320 | | |
| VARIABLE4 | .322 | | .797 |
| VARIABLE5 | .419 | | |
| VARIABLE6 | -.024 | .635 | |
| VARIABLE7 | .433 | | |
| VARIABLE8 | .666 | | |
| VARIABLE9 | .291 | | |

Extraction Method: Principal Component Analysis.

Table 13 describes the component matrix among the infrastructural variables. From the component matrix it has been seen that only three factor plays a dominant role behind the urban development. Those are distance from city center, distance from higher education and market or shopping facility.

**Discussion and Conclusion**

Kolkata is one of the metropolitan cities with 15.89 million populations and a scarcity of open land. This determines the value of cultivated land to the people. The rapid growing economy has resulted in an urban expansion and the influx of migrants from rural to urban areas and especially from the East Pakistan. The growing population and its needs, particularly in Kolkata cities demands more land that is fixed in supply. In order to meet the increasing demand for land, city development expands to areas where fertile agricultural lands and wetlands are available. This development leads to the intensive land transformation in the urban areas. This type of land transformation is considered as a logical result of population growth and economic development and it has been neglected as an avoidable consequence in the process of development. Rapid transformation is therefore argued as a threat to agricultural tract. With rapid economic growth of the area, the economic structure of the area also shifts from agricultural to non-agricultural based economy. It leads to the additional burden on the present farming conditions, which may further worsen the situation. It means that as the urbanization rises more and more agricultural land is converted to non-agricultural uses which lead to the reduction of agricultural production. To discourage this conversion the policy makers should focus on this major issue.

Any future urban land transformation should be supported by a coherent urban planning policy recognizing zoning regulations and importance of open space, greenbelt, water bodies and agriculture land. Decisions made now will have a major impact on the enabling infrastructure and civic amenities. Unless more aggressive measures are taken, cities future will be locked for decades to come. Negative externalities in terms of traffic congestion, parking, pollution, water supply and sanitation problems, solid waste disposal and lack of open space will be emerged. Further research is required to delineate a suitable zoning development management plan to sustain a baseline for urban growth keeping in mind the carrying capacity of the city and also its semi-urban areas. Furthermore, the possibility and probability of urbanization approach associated with the

urban growth is suggested to play a key role in a transition to continued urbanization. The research outcome would assist planners and land developers to evaluate whether development goals are in agreement with the intended land use objectives and if yes, how the resources should best be used to optimize city's enabling infrastructure and carrying capacity.

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