

## **Evolution of Smart City Concept and its Economic Performance: A Study of Cities in Telangana State of India**

**Dr. Ashok Kumar Lonavath<sup>1</sup>, Dr. Karunakar Virugu<sup>2,\*</sup>, V. Sathish Kumar<sup>3</sup>, D. Krishna Naik<sup>4</sup>**

<sup>1</sup>Associate Professor, Department of Geography, Osmania University, Hyderabad, Telangana State, India 500007

<sup>2</sup>Assistant professor, Department of Geography, Osmania University, Hyderabad, Telangana State, India 500007

<sup>3</sup>Project fellow UPE-CART-ES, Department of Geography, Osmania University, Hyderabad, Telangana State, India 500007

<sup>4</sup>Research Scholar, Department of Geography, Osmania University, Hyderabad, Telangana State, India

---

**Abstract:** *Everyone is aware that modern cities are performing more and more of services necessary to the functioning of society. There is awareness that the vital services are not performed in the same proportions by all cities. Almost every geographer would identify Detroit as a manufacturing city, Glasgow as a port city, Manchester as Industrial city and Beijing as a Trading center there by indicating that one city does more than its share of manufacturing another provides trade and few facilitates the market for the finished goods.*

*Perhaps this classification is done more by faith or intuition than on the basis of exact knowledge. At what point does an economic activity become more important enough in the city to be of special significance? Can criteria be devised that will determine which city should be labeled manufacturing or trade cities and centers for market?*

*Telangana is the 29th state of Indian union with 3,50,03,674 population and 38.12% urban growth. Around 30% of the urban population is residing in the capital city of Hyderabad. The total number of cities during 2011 census was 160. The economic activity is the main cause for the city growth. Standard deviation procedure applied for city classification. These cities with strong economic potential have great scope for rapid development by using innovative technology and there by rising as creative centers have made them to emerge and transform as smart cities. It is the purpose that this paper presents a methodology that will form a basis for such classification.*

**Keywords:** *Modern Cities, Economic Activity, Smart Cities, Innovative Technology.*

---

### **1. INTRODUCTION**

A **smart city** is an urban development vision to integrate multiple information and communication technology (ICT) solutions in a secure fashion to manage a city's assets – the city's assets include, but not limited to, local departments information systems, schools, libraries, transportation systems, hospitals, power plants, water supply networks, waste management, law enforcement, and other community services. The goal of building a smart city is to improve quality of life by using technology to improve the efficiency of services and meet residents' needs. ICT allows city officials to interact directly with the community and the city infrastructure and to monitor what is happening in the city, how the city is evolving, and how to enable a better quality of life. Through the use of sensors integrated with real-time monitoring systems, data is collected from citizens and devices - then processed and analyzed. The information and knowledge gathered are keys to tackling inefficiency.

ICT is used to enhance quality, performance and interactivity of urban services to reduce costs and resource consumption and to improve contact between citizens and government. Smart city applications are developed with the goal of improving the management of urban flows and allowing for real time responses to challenges. A smart city may therefore be more prepared to respond to

challenges than one with a simple 'transactional' relationship with its citizens. Other terms that have been used for similar concepts include cyberville, digital city, electronic communities, flexicity, information city, intelligent city, knowledge-based city, MESH city, telecity, teletopia, Ubiquitous city, wired city.

Smart city concept came into existence in India in recent decades. There are various reasons for the city growth. India is basically agriculture country. Agriculture and agricultural products has initially given scope for the emergence of market in the towns. This resulted migration from rural to urban. As the industries have been establishment as an apart of developmental policies; it accelerated the growth of the town. The modern economic policies has brought various developmental sectors such as service sectors (education, health, basic infrastructure etc) and small and medium scale manufacturing and package industries and technology oriented software industries and given scope for international trade in Indian towns. All such towns holding various economic activities; modern and traditional at various degrees of concentration are responsible for the city growth. The rate of concentration of these economic activities depends upon nature of the city and its geographical conditions. Such city attracts large population and provides the better livelihood. Bigger cities attracted more population and undergone rapid growth and as a result there was great pressure on basic services with more effectiveness. The necessity of smart city and levels of economic activities in the cities of Telangana are examined.

The cities highly concentrated with one economic activity may also have the similar concentration of another type of economic activity too. Such towns may undergo more development. Some towns do not rank high in any of the economic activities are lumped together in a single diversified group. In order to understand urban role in national and in regional economy the study of functional classification of towns is of vital importance. The term 'function' refers to the economic activity which is performed by a town. When the proportion of workers in one activity is greater than the others it indicates the dominant function of a town. The 'New Towns' are the places which are emerged and developed in Telangana after the independence have a great disparity in their development and the functional base of the towns.

Predominance of one activity over the other is the result of industrialization, specialization and division of labour. Even in pre- industrial cities, a considerable number of functions were common but they were based on simple handicraft economy and were served by a relatively unelaborated system of communications. As a result, although their inhabitants were employed in a wide range of occupations, the structure of employment in those cities was much simpler than that of the modern world, both in terms of size of labour force and division of labour.

Generally the towns are distinguished or defined by a critical size limit. It is not only size which matters, but the occupational pattern also adds a number of distinctive features to towns. In many countries they are defined on the basis of total percentage of workers employed in dominant activities rather than on the basis of population size or density.

If some activity is concentrated above certain limit than such activity dominates the town economic life and becomes its major function. Functional classifications of the towns in Telangana is been studied in detail.

The structure of any town is associated with the past and the present population, with its concomitant social and economic status, distinctive occupations and functions. Even the total population has its implications on the structure of the city, it gives information about the size of the labour force and the nature of the services, which a city is likely to offer.

## **2. REVIEW OF LITERATURE**

Arhtur Salz (1944) defines it as a specific activity with a market value which an individual continually pursues for the purpose of obtaining a steady flow on income. This activity also determines the social position of the individual.

## Evolution of Smart City Concept and its Economic Performance: A Study of Cities in Telangana State of India

According to Everett Hughes (1965) an occupation in essence, is not some particular set of activities; it is the part of an individual in any outgoing set of activities. Richard, H. Hall has defined occupation in the book *Occupational and Social Structure* as the variety of activities and their outcomes that must be taken into account in the analysis of occupations. An occupation is the social role performed by adult members of society that directly or indirectly yields social and financial consequences and that constitutes a major focus in the life of the adult.

Chauncy Haris (1943) worked out the most significant and influential of all functional classification of cities. The criteria to classify each class of city was chosen on the basis of analysis of cities of well recognized type of economic activity, an empirical solution has been evolved by assigning higher percentage of some functions than others.

Qazi Ahmad (1965) used 62 variables to classify 102 Indian cities on the basis of their functions. He found through his factor analysis that one dimension were required to account for over 70 percent of the correlations among variables. Ashok Mitra (1971, 1973) used seven categories of workers as variables grouped into three major functional type viz. Manufacturing, Trade and Transport and Services.

According to Subhash Kothawale (2011) in order to understand urban role in National as well as in Regional economy the study of functional classification of towns is of vital importance. The term 'function' refers to the economic activity which is performed by a town and when the proportion of workers in one activity is greater than the others that represent the dominant function of a town.

### 3. STUDY AREA

Telangana is the newly formed 29th state of India on 2nd June, 2014. As per 2011 census, there are total 160 cities which are categorized from class I to class VI. There are three class I cities i.e Hyderabad, Warangal and Karimnagar are identified as 'Smart cities' by the government of India. The other cities in the state with similar characteristic of the smart cities are Adilabad, Nizamabad, Nalgonda, Khammam and Mahabubnagar. All these cities are the districts head quarters (Macro administrative unit) of Telangana.

**Table1.** Area and Population of Towns in Telangana (1961-2011)

Sl.No	City Name	Total Population					
		1961	1971	1981	1991	2001	2011
1	Hyderabad *		1,58,162	2,10,781	29,64,638	36,12,427	39,43,323
2	Warangal *	156,106	2,07,520	3,35,150	4,47,657	5,30,636	3,64,611
3	Karimnagar *	31,554	48,918	86,125	148,583	205,653	2,83,657
4	Adilabad	20,970	30,368	53,482	84,255	109,529	1,17,167
5	Nizamabad	79,093	1,15,640	1,83,061	241,034	288,722	3,11,152
6	Nalgonda	24,383	33,126	62,458	84,910	1,10,286	1,54,326
7	Khammam	35,888	56,919	98,757	1,27,992	1,59,544	1,84,210
8	Mahabubnagar	35,588	51,756	87,503	1,16,833	1,30,986	1,90,400

**Source:** Published book from Census of India, 2011.

**Table2.** Growth rate of Population in Telangana towns (1951-2011)

Sl.No	City Name	1961-71	1971-81	1981-91	1991-2001	2001-2011
1	Hyderabad*		25	92.89	17.93	8.39
2	Warangal*	24.78	38.1	25.13	15.64	-45.53
3	Karimnagar*	35.5	43.2	42.04	27.75	27.5
4	Adilabad	30.95	43.2	36.52	23.08	6.52
5	Nizamabad	31.6	36.8	24.05	16.52	7.21
6	Nalgonda	26.39	47	26.44	23.01	28.54
7	Khammam	36.95	42.4	22.84	19.78	13.39
8	Mahabubnagar	31.24	40.9	25.1	10.8	31.2

**Source:** Published book from Census of India, 2011

**Table 3:** Population density of Towns in Telangana (1961-2011)

Sl. No	City Name	1961	1971	1981	1991	2001	2011
1	Hyderabad *					20919.8	22836
2	Warangal *	2511.36	3774.46	6095.85	8142.18	7803.47	5361.93
3	Karimnagar *	2971.19	4606.21	8109.7	6237.74	8633.63	11908.4
4	Adilabad	1044.84	1513.1	2664.77	3592.96	6646.18	7109.65
5	Nizamabad	2145.77	3137.28	4966.39	6539.18	9466.3	10201.7
6	Nalgonda	1906.41	2594.05	4890.99	6004.95	9306.84	13023.3
7	Khammam	4134.56	6557.49	5329.57	6907.29	8610.04	9941.18
8	Mahabubnagar	4580.18	5222.6	8829.77	8527.96	9561.02	13897.8

**Source:** Published book from Census of India, 2011.

**Table 4:** Area of Telangana Towns - 1971 to 2016 and Variation (in Square Kilometers)

City / Town	1971	2016	Variation
Hyderabad	172	650	478
Warangal	14.84	57.6	42.76
Karimnagar	7.31	26.94	19.63
Khammam	5.88	22.19	16.31
Nizamabad	8.05	23.65	15.6
Nalgonda	2.81	15.07	12.26
Mahbubnagar	4.16	15.17	11.01
Adilabad	5.69	14.03	8.34

**Source:** Prepared by author

#### 4. OBJECTIVES

- To study the historical background of the smart cities identified by the Government of India in Telangana state.
- To study the concentration levels of economic activities in the smart cities
- To examine and analyze the factors responsible for the variation in concentration levels of the economic activities.
- To study the physical and geographical factors in correlation the economic factors.
- To examine the status of services in smart cities in Telangana

#### 5. METHODOLOGY

‘Smart City’ concept in Telangana state and in Indian sub-continent examines Institutional infrastructure, Physical infrastructure and social infrastructure. The essentiality for improving competitiveness, sustainability and quality of life are considered as the basic pillars of smart use. It is also important to identify the basic economic source of the city which give rise to the economic development and implementation of smart city strategies.

The study focuses on the smart governance where the plan and perspectives of the city growth and city development is examined. It identifies the levels of development in the smart cities, i.e. ‘Retrofitting development’, ‘Redevelopment’, ‘Green field development’ and ‘PAN-city development’ in respective smart cities in Telangana.

The detailed data is generated for the above perspectives of smart cities. The population and economic activities data for those towns obtained from Census of India. The study focuses on secondary data sources for the detailed study of economic structure of the smart cities.

#### 6. PROCEDURE

Procedure involves the work force of individual activity is proportionately calculated with the total workers and the average of the proportions of the individual activity is calculated. Standard deviation method is applied to indicate the degree of variation from the average and hence the towns are grouped into appropriate categories.

The method is applied to the total number of towns from 1961 to 2011. The towns providing more than one type of service in outstanding proportions are organized systematically.

Occupation has been defined distinctly by a number of economists. Further it must have multiple consequences for the individual and society.

Standard Deviation (SD) is the statistical methods to find out Mean values. Geographical Information System (GIS) is used for mapping and analysis. The classification is done based on values and divided into 3 categories. i) Mean to (Mean+ 1SD) is considered as one standard deviation (ii) (Mean+ 1SD) to (Mean+2SD) is considered as two standard deviation (iii) (Mean+2SD) to (Mean +3SD) is considered as three standard deviation.

## **7. INDIAN SMART CITY CONCEPT**

The Indian government has announced 100 smart cities across the country and allocated 1000 crores to towards 'smart city' mission. The mission intends to promote adoption of smart solutions for efficient usage of available assets, resources and infrastructure. The 'smart city' means 'A city equipped with basic infrastructure and to give decent quality of life, a clean and sustainable environment through application of some smart solutions'. The basic infrastructure like, assured water and electricity supply, sanitation and solid waste management, efficient urban mobility and public transport, robust IT connectivity, e-governance and citizen participation, safety and security of citizens.

The smart solution with public information, grievance redressal, electronic service delivery, citizens' engagement, waste to energy & fuel, waste to compost, 100% treatment of waste water, smart meters and management, monitoring water quality, renewable source of energy, efficient energy and green building, smart parking, intelligent traffic management system.

The Indian government also introduced 'Smart cities council of India' It is part of the US-based Smart Cities Council, which is a consortium of smart city practitioners and experts, with a 100-plus member and advisor organizations operating in over 140 countries.

The Indian Federal government is the union of states and the government has selected every state with at least one city. Likewise, Hyderabad being a metropolitan city got opportunity in the first phase of selection and Warangal and Karimnagar city got the opportunity in second phase of selection.

The importance of economic development in those cities is not overwhelmed. It is worthwhile to study the economic occupation of the smart cities and other cities of Telangana for its overall understanding. The economic occupations in most of the cities exhibits vestiges of the old handicraft industries and labour force engaged in modern manufacturing industry.

A further layer is provided by the workers who render services to the customers living outside the urban areas and in addition, a proportion of those in the service occupations are concerned with catering to the population of the city itself. An attempt has been made to study the 'smart cities' in Telangana and its economic importance and as well as economic occupation of towns; its employment pattern and major activities in which the majority of the urban forces is engaged. Further the economic base of Telangana towns has been examined.

Total 9 cities in Telangana have been examined from 1961 to 2011 in terms of area, population growth rate, density and economic occupation with well established statistical principles. The unique economic characteristics of town is identified based on well known statistical principle of Empirical rule (68-95-99.7) is applied and found a high degree of variation from the average of a town if it is categorized in +3 standard deviation (SD) and if any town with extraordinary performance in a particular service are categorized as >3 SD. The towns which fall below +2 SD in any service are considered as near to average cases. The study of town's is found to have a diverse level of occupations for different services. It is mentioned that the total number of activities in 1961 was identified as 9 by the population census of India. The total number of activities in 1971 was 9; the total number of activities in 1981 was 4; The total number of economic activities 1991 was 9; The total number of economic activities in 2001 and 2011 was identified as 4 only.

### **7.1. Hyderabad City**

Hyderabad city is well known to world as 'Hitech city'. It ranked 1st in "Best of the World - 20 places you should see in 2015" by National Geographic, San Francisco and "Best city for MICE (Meetings, Incentives, Conferencing and exhibition) in Asia" in 2012. It is has world's 3rd most affordable office

## Evolution of Smart City Concept and its Economic Performance: A Study of Cities in Telangana State of India

location and one of the 41 “Must Visit” cities in the world by The New York Times. Hyderabad was rated 2nd among India’s ‘Hottest IT destinations’ by Rediff Business and 2nd most attractive destination for “Doing Business in India” by The World Bank. It clearly indicated that, the Hyderabad city is in the way to serve smart world to people of city. With the advent of development of technology and smart solutions,

Hyderabad city was the capital of Andhra Pradesh state till June 2nd 2014 and presently it is the capital of the Telangana state after the bifurcation of Andhra Pradesh state. The city was built by the Nizam kings 425 years ago; later it also served as the British residency for some time between 1700AD to 1947AD. It was built on the bank of the Musi river (extinct) which passes through the center of the city. There was number of lakes which used to facilitate water for agriculture, drinking and domestic purpose.

The area of the Hyderabad increased from 172 Km<sup>2</sup> in 1971 to 650 Km<sup>2</sup> in 2016 and the population of the city increased from 1,58,162 (158 thousands) in 1971 to 39,43,323 (nearly four million) in 2011. The growth rate of the town recorded during this period was 2393%. The high growth is due to large concentration of the tertiary activities and attracted large scale of migration from surrounding area.

Hyderabad city began expansion in its area since 1900’s. Subsequent to the implementation of globalization policies in India in mid 1990’s the tertiary activities such as Trade, Commerce, Transportation, Construction industries gained propriety and created openings for the developmental activities by giving wide scope for the establishment of international industries, institutions and basic infrastructure. Manufacturing, Chemical, Pharma, Information Technology along with world class education institutions, hospitals, science and research centers, banking, housing (satellite township and housing for poor) industries have forced equip qualitative infrastructure. Basic services like international airports, rail connectivity, road network, power (electricity), sewerage and drainage, street lightening, drinking water, recreation hubs, green spaces (lung spaces) and software technology also developed to provide quick and effective services to the people which lead Hyderabad to transform into smart city.

**Table 5.** Levels of Economic Activities of Hyderabad city: 1961-2011

Year	Cultivator	Agriculture Labourers	Livestock, Forestry, Fishing, Hunting plantations, Orchards and Allied activities	Mining	House Hold industry	Manufacturing	Construction	Trade & Commerce	Transportation	Other Services
1961	< M	< M		< M	< M	+1σ	< M	+2σ	+2σ	+2σ
1971	< M	< M	< M	< M	< M	+1σ	< M	+1σ	+2σ	+2σ
1981	< M	< M			< M					+2σ
1991	< M	< M	< M	< M	< M	+1σ	+1σ	+3σ	+2σ	+1σ
2001	< M	< M			< M					+1σ
2011	< M	< M			< M					+3σ

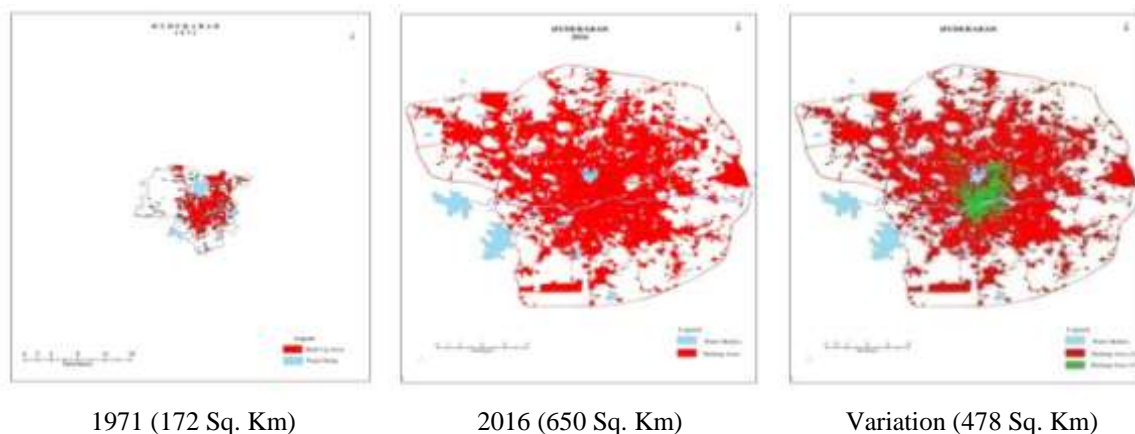
**Source:** Prepared by author M=Mean

The performance of the economic activities of Hyderabad city from 1961 to 2011 indicates that the primary activities such as Cultivators, Agriculture labourers, Mining have no significance. The secondary activities such as Household Industries and Constructions performed better than the Manufacturing industries and picked up the growth from 1991 onwards and recorded at +1σ. The tertiary activities such as Trade and Commerce, Transportation and Other services shown remarkable growth and performed very important role in spreading of the city and their level of economic activity recorded between +2σ and +3σ.

The state government has introduced IT Hub to Start-up hub of India, is the largest technology incubation center in India. Digital Telangana is the plan to reaching out to the people, under this plan, ‘MeeSeva’ is an IT based solutions giving wide range of employment opportunity to the people across the state and it provides faster, easier and transparent access to various G2C & G2B services through more than 3800 kiosks using IT Technologies.

## Evolution of Smart City Concept and its Economic Performance: A Study of Cities in Telangana State of India

‘E-Panchayat’ is to provide computerized services at the lowest level of the government through e-Panchayat initiative in 2,400 Gram Panchayats (GPs). To set up “one stop shop” to facilitate payments relating to MGNREGS, pensions, watershed and other government programs. E-Panchayat brings in transparency and accountability. **Free Wi-Fi** is provided for Hyderabad people by the State Government in order to make the entire city a fully Wi-Fi enabled city by the end of 2015.



**Figure.** Hyderabad City Expansion: 1971-2016

### 7.2. Warangal City

Warangal city is the second largest populated city in Telangana. Historically, Warangal was the capital of great Kakatiya dynasty during 13th Century. Government of India recognized Warangal as ‘Heritage city’ considering its historic importance in the context of Kakatiya dynasty. Warangal Fort and Thousand Pillar Temple are some of the ASI protected world heritage assets that attract 23 million people annually (Dept. of Tourism, Govt. of Telangana, 2015).

Warangal town is well connected with road and railway network, it has been serving as educational hub for entire southeastern part of the state. The key national and state level institutions are located in the city. NIT(National Institute of Technology), Kakatiya University, Kakatiya Medical college, Kakatiya Institute of Technology and science (KITS) etc., nearly 25,000 students are studying in these institutions.

Warangal is acting as hub of local trade and commercial activity for the region. Warangal is one of the key producers of long-staple cotton among Telangana districts. Enumamula market is the Asia’s biggest cotton market located in the city. Nearly, 100,000 people commute daily to Warangal city. However, the city does not have a planned CBD, which promotes business tourism in the form of hotels, conventions centers, interpretation centers and entertainment centers.

The city had good water resources, endowed with a number of lakes, meeting needs of drinking water and irrigation. However, they are not utilized to its potential. Efficient and strategic utilization of such assets will be helpful for retaining tourists to stay one more day extra, will help improving city economy.

**Table6.** Levels of Economic Activities of Warangal town: 1961-2011

Year	Cultivator	Agriculture Labourers	Livestock, Forestry, Fishing, Hunting plantations, Orchards and Allied activities	Mining	House Hold industry	Manufacturing	Construction	Trade & Commerce	Transportation	Other Services
1961	< M	< M		< M	< M	+2σ	< M	+1σ	+1σ	+1σ
1971	< M	< M	< M	< M	+1σ	+1σ	< M	+1σ	+2σ	+1σ
1981	< M	< M			+1σ					+1σ
1991	< M	< M	< M	< M	+1σ	+1σ	+1σ	+1σ	+2σ	+1σ
2001	< M	< M			+1σ					+1σ
2011	< M	< M			< M					+1σ

**Source:** Prepared by author

M=Mean

## Evolution of Smart City Concept and its Economic Performance: A Study of Cities in Telangana State of India

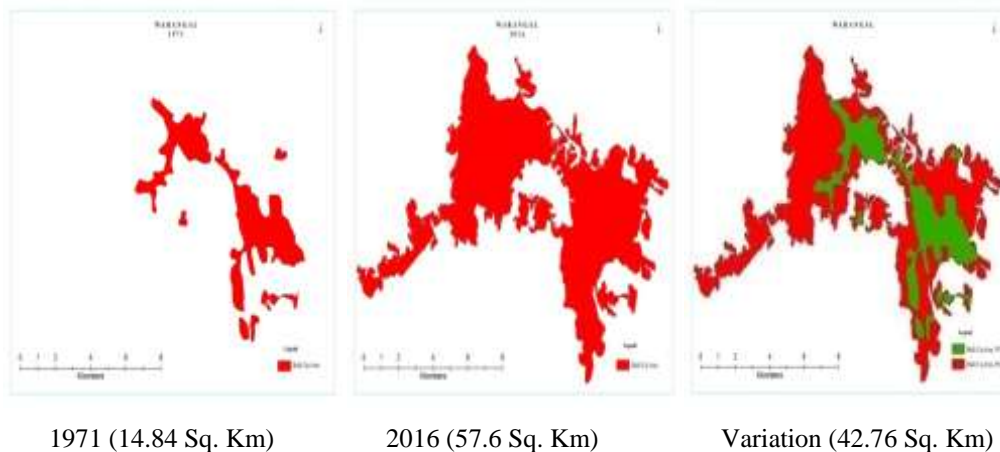
The performance of the economic activities of the Warangal city from 1961 to 1981 indicates that the primary activity such as cultivators, agricultural labourers, live stock, fishing and mining has no significance. The secondary activities such as household industries, manufacturing has significant contribution for the growth of the city since 1961. Construction activity gained its importance only in 1991 and its performance was recorded at  $+1\sigma$ . The tertiary activity such as Trade and Commerce, Transportation and Other services are constantly contributing for the city growth and the level of economic activity was recorded between  $+1\sigma$  to  $+2\sigma$ . Transportation performed a major role for the city spread.

Presence of railway zone, National highway abundant water resources endowed with the number of lakes are the important feature attracting the manufacturing industries besides the rich heritageis responsible for development of tourism industry. Finally the city turned into education hub and recreation centre. All these are the reasons forced the city to equip with basic urban services. Hence it needs to improve the smart technology to reach to the public easily and quickly. The government of India in 2016 recognised Warangal as smart city.

The administrative efficiency improved due to the use of information and communication and technology (ICT). Biometric has been used to aid in tracking attendance of employees in GWMC and staff salaries are distributed based on biometric attendance. Online system for monitoring their attendance has resulted in better service delivery. For grievance redressal, the city administration implemented dedicated grievance redressal system through “**M-Governance Mobile App**” since 2015 and toll free numbers are received through complaints from citizens, provided ‘Online grievance redressal system implemented since 2012. The city established Mee-Seva centers for all transactions.

The city has taken steps for safety and security of its citizens; it is under total 4709 CCTV vigilance and 41 block cameras installed in the city. 17 junctions monitored through CCTVs. All cameras and CCTV are linked control room.

**E-Office**-GWMC has been made as office of “e-Office – a digital workplace solution” in 2015, whereby it is becoming paper-less office. Birth-death certificates, property tax, trade license, grievance registration and redressal status, pension status, tap application, all tax and rent enquiries, department details, budget, DCB status, Government programmes and ongoing projects, GWMC employees attendance and other details are made it online.



**Figure.** Warangal City Expansion: 1971-2016

The city government made available relevant information to citizens through various channels including citizen charter through website, e-newsletter, SHGs, bulk SMS etc. The area of the city increased from 14.84 Km<sup>2</sup> in 1961 to 57.60 Km<sup>2</sup> in 2016 and the population increased from 156106 in 1961 to 364611 in 2011. The growth rate of the population during this period was 133%. Secondary and tertiary activities are the reasons for the growth of the town.

### 7.3. Karimnagar Town

Karimnagar lies at the bank of the Manair river. It was initially Municipality and later declared as Corporation in 2005.



## Evolution of Smart City Concept and its Economic Performance: A Study of Cities in Telangana State of India

The town is predominantly an agricultural center in the state, the vast agricultural area around the town is watered by the Godavari River. The presence of many large scale industries like NTPC, Kesoram Cements, Ramagundam-singareni collieries etc. are located in and around Karimnagar. The locals specialize in silver filigree, a delicate form of metal work added for the growth of the city. The area of the city has increased from 7.31 Km<sup>2</sup> in 1971 to 26.94 Km<sup>2</sup> in 2016 and the density of the city increased from 2,511 in 1961 to 11,909 in 2011. The growth rate of the population during this period was 798%. Tertiary activities are the main reasons for the growth of the city.

**Table7.** Levels of Economic Activities of Karimnagar town: 1961-2011

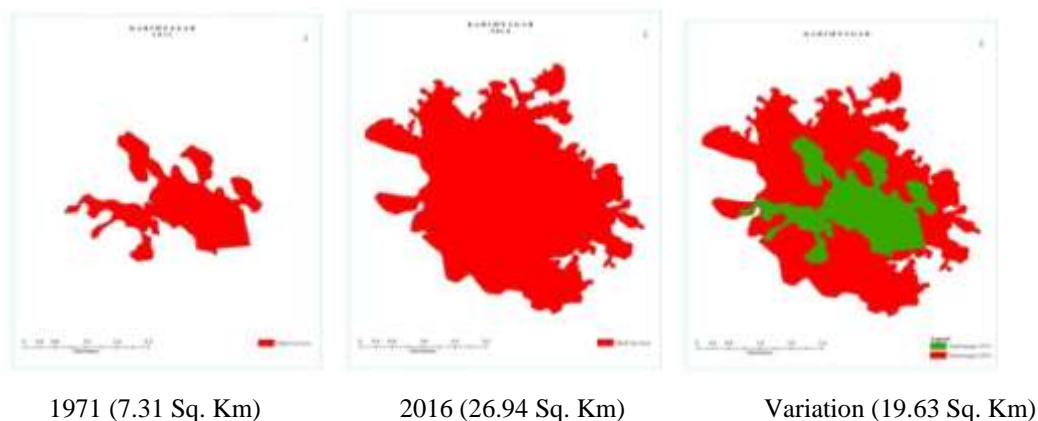
Year	Cultivator	Agriculture Labourers	Livestock, Forestry, Fishing, Hunting plantations, Orchards and Allied activities	Mining	House Hold industry	Manufacturing	Construction	Trade & Commerce	Transportation	Other Services
1961	< M	< M		< M	< M	< M	< M	+1σ	+1σ	+3σ
1971	< M	< M	< M	< M	< M	< M	< M	+1σ	+2σ	+2σ
1981	< M	< M			< M					+2σ
1991	< M	< M	+1σ	< M	< M	< M	+1σ	+2σ	+2σ	+2σ
2001	< M	< M			< M					+1σ
2011	< M	< M			< M					+1σ

**Source:** Prepared by author

M=Mean

The performance of the economic activity of the Karimnagar city from 1961 to 2011 indicates that the primary activities such as Cultivators, Agricultural labourers and Mining show no significance. Livestock, Forestry, Fishing hunting show significant role and their performance level is at +1σ in 1991. The secondary activities such as Household industries, Manufacturing do not have significant contribution for the city growth. Construction activity could perform up to +1σ in 1991. The tertiary activities such as Trade and Commerce, Transportation and Other services performance is high and the level of economic activity is recorded between +1σ to +2σ.

The smart city activities in Karimnagar city indicates that, **AMRUT** it includes the basic services to citizens, urban transport and service level improvement plan (SLIP) especially for green space and parks. The AMRUT firstly focused on improvement in service levels in the city. The first step is to assess the existing situation and service levels gaps for Storm Water Drainage. This will also include existing institutional framework for the sector. The zone wise data shall be used in identifying the gaps. These zone-wise gaps will be added to arrive at city level service gaps. Coverage of storm water drainage network in the city has 100% sustainable standards. Secondly, it focuses on urban transport included non-transport, ferries and water ways. The SLIP is to assess the existing situation and service levels gaps for organised Green Space and Parks based on standards prescribed in URDPFI guidelines and national building Codes. This shall also include describing existing institutional framework vis-à-vis development and maintenance of organised green space/ parks.



**Figure.** Karimnagar City Expansion: 1971-2016

#### 7.4. Nizamabad Town

The word Nizamabad means ‘Long Live the Nizam’ derived from Nizam dynasty. The city is the third largest city in Telangana state after Warangal city in both interms of area and population and covered 8.05 km<sup>2</sup> during 1971 and increased to 23.65km<sup>2</sup> in 2016. The city has grown with a major urban agglomeration from rural regions of the city. The city is known recognized as Municipal Corporation. The city was founded by Nizam’s rulers in the year 1905. The city is well connected with road and rail networks and the Nizam Sagar Dam was constructed in 1923 across the Manjira River.

Nizamabad is known for its medical care in northern Telangana region. The Government General hospital is one of the largest government hospitals in the state, also serving patients from the cities from neighbouring districts of Nanded and Adilabad. Considering the better infrastructure and resources available, the Government Medical College was established in 2012. Various super specialty hospitals were established at later stage.

The economy of the city is largely based on industries and private businesses, which are both under government and public sector. The main source of income is either government jobs or through the family members working in Gulf countries. Some of major industries include ‘Nizam Sugar Factory’ which was the biggest sugar factory in Asia during the reign of Nizams, and major Spice Park. As Nizamabad is the largest producer of rice in the state and there are many of Rice mills located across the district and mostly in Khanapur region. The Real estate in Nizamabad is booming since recent years, with large number of high rise apartments and commercial complexes as high as 10 floors are under construction. There had also been a large overgrowth around the city since some years.

Nizamabad town is also major education hub in Telangana. Engineering colleges University and affiliated colleges are located rural region of Nizamabad city.

The ‘Mee Seva’ centers located in all around the city and the online signed digital certificates like Income certificates, Residence Certificates and Land records created and distributed through online services. The city is under watchdog of police officials and 72 CCTV cameras located in various junctions.

**Table 8.** Levels of Economic Activities of Nizamabad town: 1961-2011

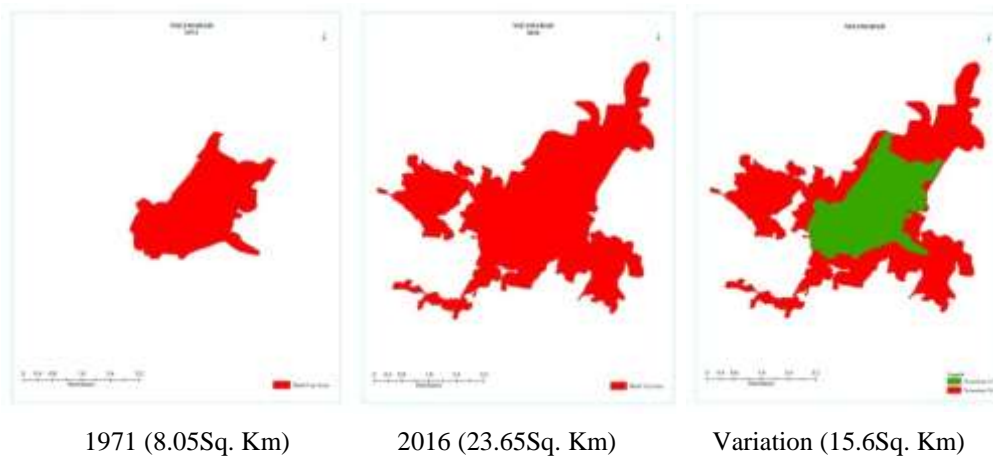
Year	Cultivator	Agriculture Labourers	Livestock, Forestry, Fishing, Hunting plantations, Orchards and Allied activities	Mining	House Hold industry	Manufacturing	Construction	Trade & Commerce	Transportation	Other Services
1961	< M	< M		< M	< M	+1σ	< M	+1σ	+1σ	+1σ
1971	< M	< M	< M	< M	< M	+1σ	< M	+2σ	+2σ	< M
1981	< M	< M			+1σ					+1σ
1991	< M	< M	< M	< M	+2σ	< M	< M	+1σ	+1σ	+1σ
2001	< M	< M			+1σ					< M
2011	< M	< M			+1σ					+1σ

**Source:** Prepared by author.

M=Mean

The performance of the economic activity of the Nizamabad city from 1961 to 2011 indicates that the primary activities such as Cultivators and Agricultural labourers, Mining and Livestocks, Forestry, Fishing hunting shows no significant role in city growth but the secondary activities such as Household industries contributed vital role since onwards and the level of its performance is recorded at +1σ. The manufacturing industries during 1951 and 1961 performed to the great extent and the level of the economic activity was at +1σ and later recorded poor performance and contribution is negligible towards city growth. The tertiary activities such as Trade and Commerce, Transportation

and Other services performed to their best level is high and the level of economic activity is recorded between  $+1\sigma$  to  $+2\sigma$ .



**Figure.** Nizamabad City Expansion: 1971-2016

**7.5. Nalgonda Town:**

The area of Nalgonda town in 1971 was 2.81 Km<sup>2</sup> and increased to 15.07 Km<sup>2</sup> in 2016. The growth rate of population during this period was 532. Nalgonda was recognized with “Grade-III municipality” in 1941 and now upgraded to “Grade-I municipality. The city named based on the mountain located in the heart of city. The history of the city past from the Paleolithic people used fashioning tools and weapons out of stone. In rural-urban fringe of Nalgonda city located with Panagallu and Gollaguda villages and partial out growths of Arjalabhavi, Gandamvarigudam and Massiguda. National and state highways pass through the city. Nalgonda serves as a hub for education to the surrounding areas. Mahatma Gandhi University is located in Nalgonda. It has number of colleges specializing in engineering, medicine, pharmacy and sciences as well as vocation colleges.

**Table9.** Levels of Economic Activities of Nalgonda town: 1961-2011

Year	Cultivator	Agriculture Labourers	Livestock, Forestry, Fishing, Hunting plantations, Orchards and Allied activities	Mining	House Hold industry	Manufacturing	Construction	Trade & Commerce	Transportation	Other Services
1961	< M	+1σ		< M	< M	< M	+1σ	+1σ	+1σ	+2σ
1971	< M	< M	+1σ	< M	< M	< M	< M	+1σ	< M	+3σ
1981	< M	< M			< M					+1σ
1991	< M	< M	< M	< M	< M	< M	+1σ	+1σ	+1σ	+3σ
2001	< M	< M			< M					+1σ
2011	< M	< M			< M					+1σ

**Source:** Prepared by author

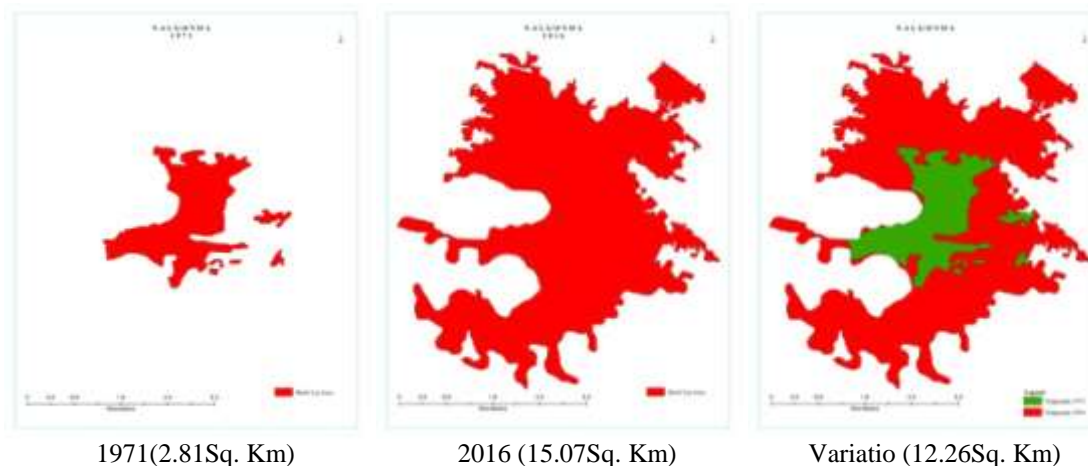
M=Mean

The economic performance in Nalgonda city from 1961 to 2011 indicates that the primary activities such as Cultivation, Agriculture labour, Mining and Livestocks, Forestry, Fishing hunting shows no significant role in city growth. Agriculture performance was significant during 1961 and Livestocks, Forestry, Fishing hunting shows significant role and its economic performance during 1971 was recorded at  $+1\sigma$ . The secondary activities role is less significant in city growth. The tertiary activities such as Trade and Commerce, Transportation and Other services performance is high and the level of economic activity is recorded between  $+1\sigma$  to  $+2\sigma$ .

Nalgonda is the good place for agriculture market. Nalgonda town also serves as administrative unit of the district. Besides all district offices location of food storage go downs, education institutions, national high ways, Railway facility are the few reasons for the growth of the town.

## Evolution of Smart City Concept and its Economic Performance: A Study of Cities in Telangana State of India

The smart technology is been used in Nalgonda town by Municipal administration, police, revenue department, irrigation, electricity, education institutions to reach to the public in a efficient manner.



**Figure.** Nalgonda City Expansion: 1971-2016

### 7.6. Khammam Town

The Khammam town located on the bank of Munneru river. The area was 5.88 Km<sup>2</sup> in 1971 and increased to 22.19Km<sup>2</sup> in 2016. The growth recorded during this period was 417%. The town has recognized as Municipal Corporation. 14 adjacent villages are part of Khammam Municipal Corporation. Khammam Municipal Corporation is the civic body of the city. Khammam is one of the Historical City of Telangana state having nearly 1000 years of traceable History. Bhakta Ramadasu Kala Kshetram, has been a prestigious National theatre, constructed by the State government of in the name of Sri. Bhakta Ramadasu (Kancherla Gopanna ) was devotee of Sri Rama. The Khammam fort, constructed in 950 AD by the Kakatiya Dynasty, is on a hill overlooking the town.

The city is connected to major cities and towns by means of road and railways. National and state highways pass through the city. There are education institutions such as pharmacy colleges, MBA, MCA and Engineering colleges.

**Table10.** Levels of Economic Activities of Khammamtown: 1961-2011

Year	Cultivator	Agriculture Labourers	Livestock, Forestry, Fishing, Hunting plantations, Orchards and Allied activities	Mining	House Hold industry	Manufacturing	Construction	Trade & Commerce	Transportation	Other Services
1961	< M	< M		< M	< M	< M	< M	+2σ	+1σ	+2σ
1971	< M	< M	+1σ	< M	< M	< M	+1σ	+2σ	+2σ	+2σ
1981	< M	< M			< M					+2σ
1991	< M	< M	< M	< M	< M	< M	+2σ	+2σ	+1σ	+2σ
2001	< M	< M			< M					+1σ
2011	< M	< M			< M					+2σ

**Source:** Prepared by author

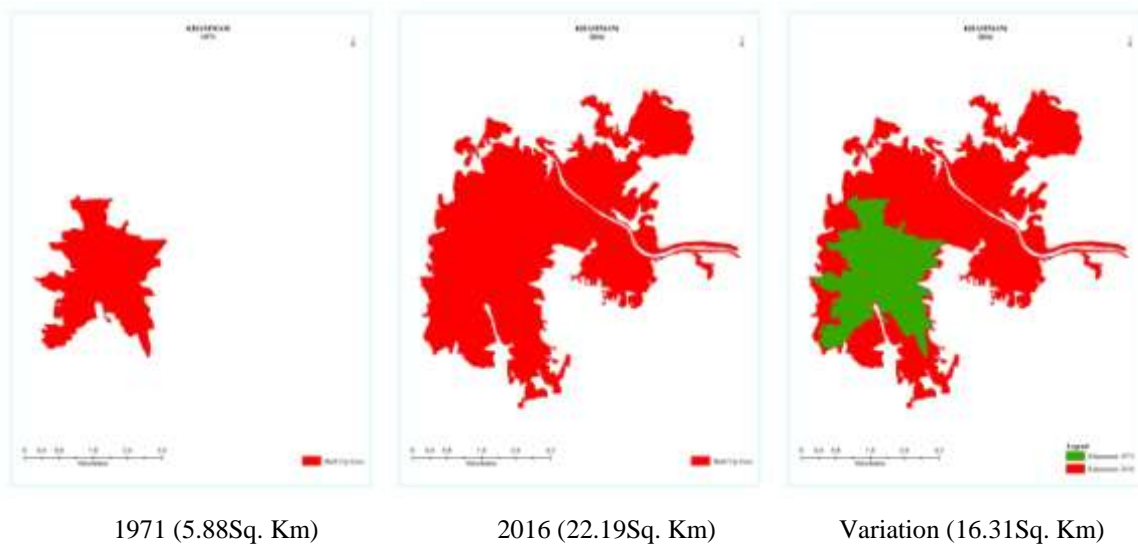
M=Mean

The economic performance of Khammam city from 1961 to 2011 indicates that, the primary activities like Cultivation, Agriculture labour, Mining and Livestock, Forestry, Fishing hunting shows no significant role in the city growth except in 1971. The secondary activities are less significant in city growth. The tertiary activities such as Trade and Commerce, Transportation and Other services performance is high and the level of economic activity is recorded between +1σ to +2σ.

Khammam serves as market for the agriculture products, fruits, and vegetables. Having many hospitals in the town Khammam meet the medical requirements of the entire south eastern part of Telangana state. Food corporation godowns education institutions besides abundant mineral related

## Evolution of Smart City Concept and its Economic Performance: A Study of Cities in Telangana State of India

factories/ industries are located in the outskirts of the town. All district administration offices are located in Khammam. Implementation of new economic policies by the government is leading to acquire smart technology to reach to the public and serve them efficiently. Abundant water resources is due to the Krishna river flowing from the town



**Figure.** Khammam City Expansion: 1971-2016

### 7.7. Adilabad Town

Adilabad town named after Adil Shahi dynasty in Bujapur sultanate in 15th century. The city was ruled by several dynasties like Satvahans, Chalukyas, Mauryas, and Mughals. The diversified cultures existing are due to the presented by Gujarati, Bengali, Marathi, and Malayalee people. The town is under watershed of the rivers Penganga, Godavari and Pranahitha. The area of the town increased from 5.69 Km<sup>2</sup> in 1961 to 14.03 Km<sup>2</sup> in 2016. The population growth rate was recorded at 458%. The fifty percent of area of city is covered with urban forests. The city is headquarter of Adilabad district it is one of the backward district in India and still receive Backward Regions Grant Fund Programme (BRGF) from Government of India.

**Table 11.** Levels of Economic Activities of Adilabad town: 1961-2011

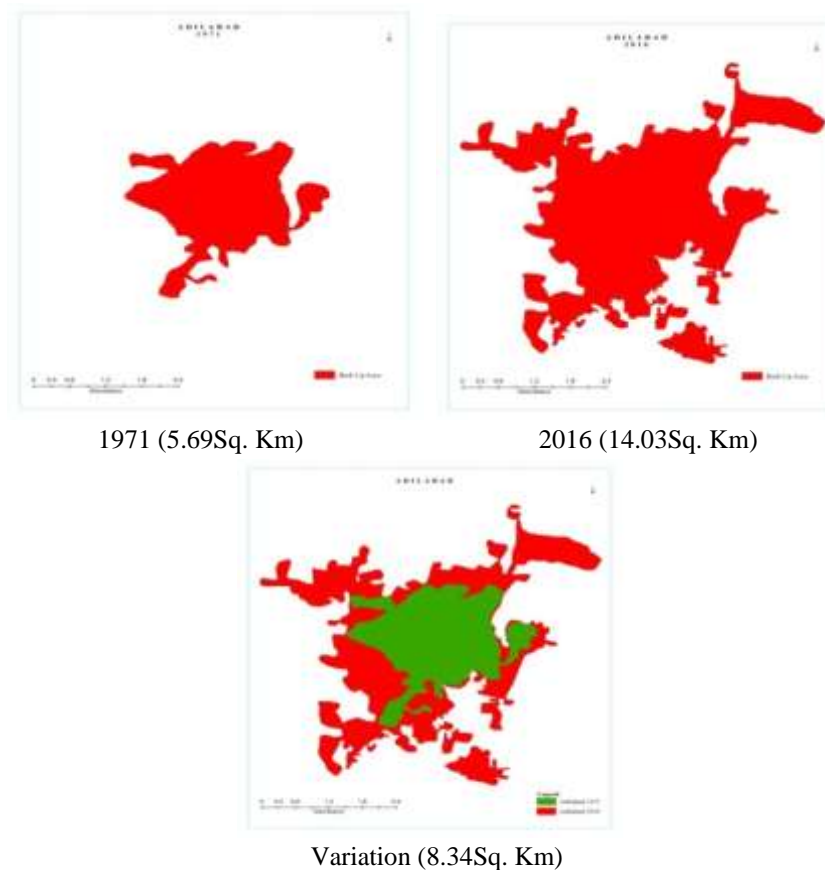
Year	Cultivator	Agriculture Labourers	Livestock, Forestry, Fishing, Hunting plantations, Orchards and Allied activities	Mining	House Hold industry	Manufacturing	Construction	Trade & Commerce	Transportation	Other Services
1961	< M	< M		< M	< M	+1σ	< M	+2σ	< M	+2σ
1971	< M	< M	+1σ	< M	< M	< M	< M	+2σ	+1σ	+2σ
1981	< M	< M			< M					+1σ
1991	< M	< M	< M	< M	< M	+1σ	< M	+1σ	< M	+1σ
2001	< M	< M			< M					+1σ
2011	< M	< M			< M					+1σ

**Source:** Prepared by author M=Mean

The performance of the economic activities of the Adilabad town from 1961 to 2011 indicates that the primary activities such as Cultivators and Agricultural labourers show no significance role. Livestocks, Forestry, Fishing hunting performance was significant in 1917 and recorded at +1σ. The secondary activities such as Household industries has no significant role in the city growth but manufacturing industry performed +1 σ during 1961 and 1991. Constriction activity is not a priority sector. The tertiary activities such as Trade and Commerce, Transportation and Other services performance is high and the level of economic activity is recorded between +1σ to +2σ.

## Evolution of Smart City Concept and its Economic Performance: A Study of Cities in Telangana State of India

The Adilabad town is located in the northern part of the state. It is close to the bordering state of Maharashtra. Its location is fetching it to turn into market for trade and commerce activity. Smart technology is slowly reaching to the public to serve in a better way.



**Figure.** Adilabad City Expansion: 1971-2016

### 7.8. Mahabubnagar Town

The Mahabubnagar town has an area of 4.16 Km<sup>2</sup> during 1971 and increased to 15.17 Km<sup>2</sup> in 2016. The population growth rate was recorded as 435% during this period. The city named by the rulers of Nizam kingdom of Hyderabad city. The Mahabubnagar municipality was constituted in 1942 as a third grade municipality. It was upgraded to second grade in 1959 and later to first grade in 1983 and finally to Special grade municipality in 2004. Mahabubnagar city is connected to major cities and towns by means of road and railways.

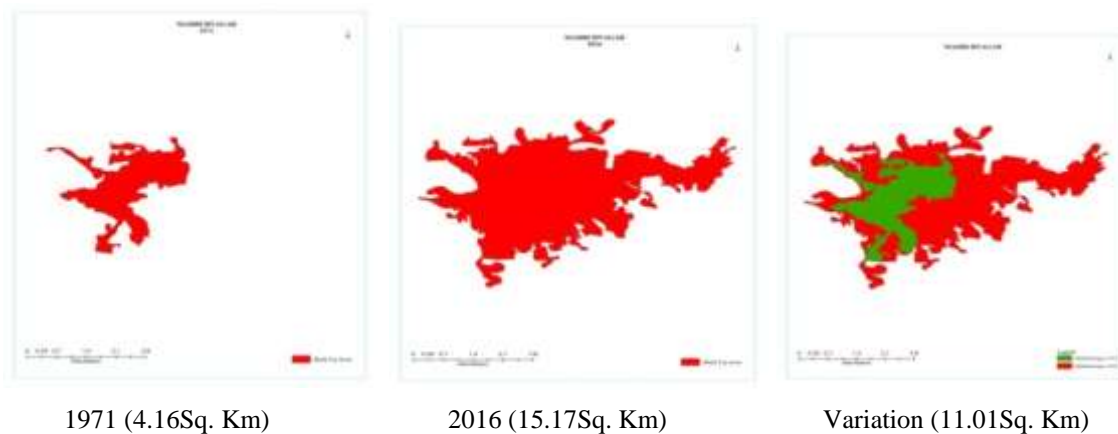
**Table 12.** Levels of Economic Activities of Mahabubnagar town: 1961-2011

Year	Cultivator	Agriculture Labourers	Livestock, Forestry, Fishing, Hunting plantations, Orchards and Allied activities	Mining	House Hold industry	Manufacturing	Construction	Trade & Commerce	Transportation	Other Services
1961	< M	< M		< M	< M	< M	+1σ	+1σ	+1σ	+2σ
1971	< M	< M	< M	< M	< M	< M	< M	+1σ	+1σ	+2σ
1981	< M	< M			< M					+1σ
1991	< M	< M	< M	< M	< M	< M	+1σ	+1σ	+1σ	+2σ
2001	< M	< M			< M					+1σ
2011	< M	< M			< M					+1σ

**Source:** Prepared by author. M=Mean

## Evolution of Smart City Concept and its Economic Performance: A Study of Cities in Telangana State of India

The economic performance in Mahabubnagar city indicates that, the primary activities like Cultivation, Agriculture labour, Mining and Livestock, Forestry, Fishing hunting shows no significant role in city growth. The secondary activities also do not show significant role. The tertiary activities such as Trade and Commerce, Transportation and Other services performance is high and the level of economic activity is recorded between  $+1\sigma$  to  $+2\sigma$ .



**Figure.** MahabubnagarCity Expansion: 1971-2016

### 8. CONCLUSIONS

Among the 100 smart cities declared by Indian government as a part of the ‘Smart Mission’ three cities of Telangana state has been identified.

The total number of economic occupation as per the census of India is broadly identified as nine and they are further divided into primary, secondary and tertiary activities.

The town/city/urban area as per the census of India is defined as ‘75% and above male population working population are working in non-agriculture activities’. It is the evident that large number of urban population is engaged in tertiary activities.

Levels of economic occupations of these three cities have been studied by using standard deviation method and found that the tertiary activities such as Construction, Trade and Commerce, Transportation and Other services are found high. They are contributing for the growth of the city.

Highly concentration of tertiary activity leading to large scale of migration from surrounding places. Migration is basically for basically for employment and for better livelihood. It is found that the migration to Class-I town is more and it is due to availability of surplus employment opportunity and it is intern responsible for the growth of allied activities and creating great demand for the qualitative infrastructure and services to the public.

The level of tertiary activities mainly construction, trade and commerce, transportation and other services performance in the other cities like Nizamabad, Khammam, Nalgonda, Adilabad and Mahbubnagar are similar to that of the smart cities of Telangana state i.e Hyderabad, Karimangar and Warangal.

The infrastructure facility in other cities in Telangana state is on par with the smart cities. The government is Telangana providing smart facilities to all the cities as a part of modern economic policies in the state. Hence all the rest of the class I cities have smart qualities of smart cities and the growth is also noticed similar to the smart cities.

It is concluded that the smart cities are evolved due to the significant performance of tertiary type of economic activity in the Telangana state. As the modern economic policies are being adopted in recent decades there is every scope for the remaining cities of Telangana state to be identified as smart city in future as they it acquire all the qualities characters of smart cities.

**REFERENCES**

- [1] Arthur Salz., "Occupations: Theory and History", Encyclopedia of the Social Science (New York: The Macmillan Company, 1944) XI 424.
- [2] Chauncy, D., Harris (1943) 'A functional classification of cities in the United States' Geogr.Rev., Vol.33, pp 86-99.
- [3] Chauncy, D., Harris (1956) " The pressure of Residential Industrial land Use" in William L., Jr.(ed), Man's Role in Changing the Face of the Earth, University of Chicago,p 887.
- [4] Everett Hughes, "The Study of Occupations", in Sociology Today ed.R.K. Merton, L. Broom and L.S. Cottrett (New York; Harpert Row,1965), p. 445.
- [5] U.S.Bureau of Census, Census of Population: 9160. Vol. I Part A, Number of Inhabitants, 1961, United States Summary, table 30.
- [6] Telangana IT Dept. Annual report-2015.
- [7] Websites: Karimnagar Municipal Corporation and Warangal Municipal Corporation.

**Citation:** *Dr.Ashok Kumar Lonavath, et al, "Evolution of Smart City Concept and its Economic Performance: A Study of Cities in Telangana State of India ". International Journal of Research in Geography, vol 3, no. 4, 2017, pp. 84-99. doi:http://dx.doi.org/10.20431/2454-8685.0304011.*

**Copyright:** © 2017 Authors. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.