



# Industrial Expansion & Location Pattern Analysis in Panchkula District, Haryana, India

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**Abstract:** *The industrial development is first and foremost requirement for socio-economic development of any area. Basically the study area was developed as subsidiary town of Chandigarh City and the area is potential for industrial development because this area is agriculturally poorly developed. Therefore, the present study was taken up to analysis the physical expansion and location pattern of industry in Panchkula District during the period 2002-2012. The Resource- Sat LISS-III of 2002 & 2012 and Google earth data along with secondary data of industry were used and these satellite data were analyzed by using ERDAS 9.0 image processing system and Arc GIS software to map industrial areas of two periods. Further, these two industrial area maps were superimposed to find out the spatial temporal changed between ten years. The area under industry has expanded only 0.04 percent during the ten year period. The area has only eight large scale industry including HMT and BHEL which have vital contribution in expansion of small and micro level engineering based ancillary units. The Barwala and Panchkula city phase I & phase II industrial areas are developed and rest small industrial sectors are yet to be developed fully.*

**Keywords:** *Remote Sensing, GIS, physical growth, LISS-III, patio-temporal.*

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## I. INTRODUCTION

As Industrialization plays a crucial role in the economic development of a region so immediately after independence the need to take solid steps for improving the industrial scene was badly felt. Rather it was realized that industrialization was the only way out which could lead the shattered economy of the nation on the path of progress and prosperity. Consequently, industry attracted the special attention of plans and the planner to accelerate economic growth of the nation. Initially the emphasis was on development of basic and heavy industries but later on the small and medium sector was emphasized with the purpose of economic development and employment generation. So planning requires, as we know, deliberate manipulation of economic and natural resources of the country. In the Indian industrial economic context, our planners have been aiming at planned development of the country, which follows a careful utilization of the scarce resources to their optimum level. So the economic forces, which constitute the locational theory, are of prime importance. An analysis of such forces would assist us in identifying the factors that influence an industry in selecting its location. Contributions towards a theory of location of industries made by classical economists were inadequate except that they made some passing references to the study of location.

Entrepreneurs locate their industries in those places where the cost of production is the lowest at the time of their establishment. This is known, as 'Location of Industries'. The concentration of a particular industry mainly in one area, as has occurred with many industries in India such as Textile industry at Bombay and Ahmadabad is known as 'Localization of Industries', and such localization of industry might be mainly due to economic reasons. Planned location of Industry is a term first used by Lord Beverage for a policy whereby the location of industry is planned to give each industrial area a variety of industry, large industries being dispersed and not localized. The great disadvantage of localization is that a change of demand affecting a localized industry may cause structural unemployment on such a scale as to produce a pocket of mass unemployment even though there is adequate employment in the rest of the country.<sup>1</sup> Planned location of industries proceeds as a first step to develop the country on regional considerations in order to check expansion of industrial cities and areas only

in certain regions. Adebisi (1999) [1] related the dwindling forest wealth to over-exploitation, illegal encroachments, unsustainable practices, forest fires, and an indiscriminate siting of development projects in the forest areas. According to him population pressure is the primary cause of overexploitation of the natural resources. Maddison (2001)[2], highlights that the growth process in the developed countries experienced a dramatic change in the employment structure, involving a shift from primary sectors into industry and, later, into services. The share of employment in agriculture had been 37 per cent in the United Kingdom and 70 per cent in the United States in 1820 which decreased to 2 and 3 per cent, respectively. Nellyyat (2007)[3] have found that the rapid economic growth attained in post globalization by most of the developing countries, has imposed considerable social costs and has become a major threat to sustainable development..



## II. STUDY AREA

Panchkula district is located in the northern part of Haryana having a locational extent between of 32° 27' to 30°57' north longitude and 76°48' to 77° 10' east longitude. It is bounded by Himachal Pradesh in the north and east, Punjab and Union Territory of Chandigarh in the west and by Ambala district in the south and southeast. Panchkula district has a sub tropical continental monsoon climate where the seasons are, hot summer; cool winter, good monsoon rainfall and great variation in temperature. In winter frost sometimes occurs during December and January. The rainfall is mostly received in summer season during monsoon and also by western disturbances in winters. Morni hills constitute the highest point of the district as well as of Haryana. The Ghaggar River is the only main river which originates in Himachal Pradesh and flows through the district upto Hanumangarh district in Rajasthan where it dries up in the desert. It is very shallow outside of the monsoons. The other rivers of the district are Sirsa and Kaushalya, a tributary of Ghaggar. Generally the slope of the district is from north east to south west and in this direction, most of the rivers/streams rainfed torrents flow down and spread much gravels and pebbles in their beds. The soils in the district are mainly light loam, silty loam, loam, and piedmont & silt clay. The underground water in the district occurs under confirmed and semi-confirmed conditions which is generally fresh and suitable for domestic and irrigation purposes.

At present there are eight towns in the district viz. Panchkula UE, Pinjore MC, Kalka MC, Raipur Rani, HMT Pinjore, Chandi Mandir, Bir Ghaggar. The only Hill station in Haryana called Morni is also in this district. The origin of the name Panchkula is based on the five irrigation canals (or *kuls* as they were called, making it *Panch Kul* of five canals) that take water from the Ghaggar in the uphill section and distribute it from Nada Sahib to Mansa Devi. The district is spread over an area of 898 sq kms with a total population of 5.61 lac as per 2011 census.

### OBJECTIVES

The main objectives of the study in hand are:

1. To assess the Industrial growth with respect to physical expansion in Panchkula district during 2002-2012.
2. To analysis the pattern of physical expansion.

## III. DATABASE AND METHODOLOGY

The requisite primary data used in this study are IRS-P6 LISS-III of 2002 & 2012 & google earth Image. The industry data was collected from district industrial centre Panchkula. The secondary data like already published literature of industrial development and horizontal expansion were also put into service. The requirements of industry expansion are guiding principle for selection of the data mode and their processing by using Geospatial Techniques of Panchkula town along with other towns in the district within the last 10 years. The spatial expansion map of industrial area was prepared using satellite imagery. The industrial area was delineated through digital image analysis supervised classification with the help of ERDAS 9.0 and Arc GIS 9.3 software to analyze the changes in spatial growth in industrial area during (2002 to 2012). Ground truth observations were also performed to check the accuracy from Google earth and actual field visit. The toposheets at a scale of 1:50000 have been used for geo-referencing satellite imagery of study area. Census data also have been used to analyze the population growth. Services of District Town and Country Planning office were utilized regarding the spatial expansion of industry in the district.

**CHANGE DETECTION ANALYSIS:** Land use/ land cover change analysis was done by computing different land use/cover categories from the year 2002 to 2012. Relative Deviation (RD %) was computed as under :

$$RD = \frac{A - B}{B} \times 100$$

Where: A is the area under specified land use/cover class for the year 2012.

B is the area under the same land use/cover class for the year 2002.

## IV. RESULTS AND DISCUSSION

In recent years, the concept of industrial location has received closer attention and aroused more widespread interest than ever before. Usually economic considerations sway the location of industries but non-economic considerations might also influence the location of some industries. Industries are primarily guided by the profit motive. Maximizations of profit at minimum cost are the most important consideration in choosing particular places for the location of industries which the entrepreneurs keep in mind. Thus location of an industry is interplay of various factors which are as under.

### A. AVAILABILITY OF RAW MATERIALS:

In choice of location of an industry, nearness to sources of raw materials is a prime consideration. The pull towards the sources of raw materials would be greater in the case of industries requiring localized raw materials. Therefore mining and crusher activity is localized in Panchkula due to ample raw material of pebbles and gravel. It is due to this source that a cement industry was located in Panchkula.



#### **B. LABOUR**

An industry needs adequate supply of cheap and skilled labour. The pull of an industry towards labour centers is based on the ratio of labour cost to the total cost of production. District Panchkula has ample human resource so as to supply cheap labour for industries which has led to the location of industries in the region.

#### **C. PROXIMITY TO MARKETS:**

Industries producing perishable commodities which cannot be transported over a long distance and industries producing bulky commodities, involving heavy transportation costs are located in close proximity to markets. Industries producing for a local market are also drawn towards market. The huge population of Panchkula and the nearby area act as good market of the industrial products.

#### **D. TRANSPORT FACILITIES:**

The three modes of transportation viz. road, rail and water jointly play a vital role in location of an industry. Further, the modes and rates of transport and transport policy of Government influence the location of industries. In the location of cement industry transport relations of a centre in regard to raw materials, markets and power are the dominating factors. Therefore, cement industry tends to locate at the point of minimum transport costs in relation to raw materials, markets and power. The district Panchkula is well connected by a network of roads viz. NH 22,21A, 73 and also Panchkula-Ambala-Delhi and Panchkula-Ludhiana railway line so as to attract industries in the region.

#### **E. POWER:**

Source of energy plays a vital decisive influence in the location of industrial units because an industry needs cheap power. Water, wind, coal, gas, oil and electricity are the chief sources of power. Both water and wind powers were widely sought as sources of power supply before the invention of steam engine. Initially industrial location in Panchkula was due to the cheap energy from the Bhakra Nangal Hydro power. So energy exercised a dominating pull on the location of the industries.

#### **F. SITE AND SERVICES:**

The public utility services and amenities attached to a particular site like level of ground, the vegetation and allied activities influence the location of an industry to a some extent In view of the above Government of India has launched the scheme of developing 'Industrial Estates' to accelerate and to disperse industrial activity over a wider area in the country. The main aim of providing Industrial Estates is to encourage backward regions which are not industrially developed. Initially HMT was set up at Pinjore to develop this otherwise industrially backward region.

#### **G. FINANCE:**

The availability of capital at cheap rates is a vital factor influencing industrial location. For example, the rich Parsi led to the concentration of cotton textile industry in Mumbai.

#### **H. NATURAL AND CLIMATIC CONSIDERATION:**

These include the topographic condition of a region, water and drainage facilities etc. These factors also determine the location of industries. Ever since the dawn of modern technology, the importance of this factor is losing ground gradually. But its influence has not vanished yet, since the creation of favorable climatic conditions with the help of scientific research involves additional cost.. District Panchkula is also bestowed with rich resource of water. Even the climatic conditions are quite favorable for setting up of industries in the region.

#### **i. EXTERNAL ECONOMIES:**

It is also being enjoyed when a large number of industrial units in the same industry were located in close proximity to each other. In the case of Panchkula the ancillary industries of auto parts flourished due to the establishment of HMT in the early sixties.

#### **J. GOVERNMENT POLICIES:**

It plays an important role in the industrial location. Industries tend to locate in the regions where the government declares a tax holiday or subsidies. HMT was located under the planner's policy to develop heavy industries and also the industrial development of this region. As Industrialization plays a crucial role in the economic development of a region so immediately after independence the need to take solid steps for improving the industrial scene was badly felt. Rather it was realized that industrialization was the only way out which could lead the shattered economy of the nation on the path of progress and prosperity. Consequently, industry attracted the special attention of plans and the planner to accelerate economic growth of the nation. Initially the emphasis was on development of basic and heavy industries. It was under these plans that HMT was set up in 1963 in the Third Five Year Plan at Pinjore. This was the maiden beginning of a large scale Public Sector Undertaking in the region so as to open the doors for future industrial development of the region in the form of innumerable ancillary industries. Even the post liberalization period and the enactment of MSMED Act,2006 has accounted for substantial impact on the manufacturing sector thereby leading to rise in the number of industries on the industrial map of the study area.

But the availability of infrastructure facilities is basic prerequisite that determines the pace of economic development and industrial development of an area. The basic industrial infrastructure facilities includes roads, railways, transport, communication, water, labour, capital, industrial estates, technical and management educational institutions etc.



The district is well connected by roads and railways so as to get the raw material from other places and supply the finished goods to the local as well as far off markets. Panchkula as urban industrial centre is well served by a network of roads (NH 22, NH21A and NH 73) and the railway line of Kalka-Ambala-Delhi and Panchkula-Ludhiana. So the region is well developed with respect to transport and communication. Demographically the absolute population of the district has increased from 3.1 lacs in 1991 to 5.6 lacs in 2011 with a growth rate of 80.83 percent in the last two decades. This vast human resource provides ample supply of labour to the industries. Since the region has good number of technical and management institutes in the district as well as nearby, so there is no dearth of technical and skilled labour supply to the industries. The district has sufficient water resource both surface and underground to cater to the water requirements of the district. The seasonal river Ghaggar and its tributaries pass through the district. The district has around five industrial estates/areas developed by HSIIDC and HUDA to provide plots to the entrepreneurs at nominal price for setting up an industry. Apart from this HSIIDC provides loan facility for establishing an industry. The above said infrastructural facilities create healthy industrial environment for industrial development of the district. Presently there are five industrial Estates/Areas in District Panchkula viz. Industrial Area Barwala, Industrial Estate Kalka, Industrial Estate Phase-1 Panchkula, Industrial Area Phase-1 and Phase-II, Panchkula. The former three were developed by HSIIDC and the later two were developed by HUDA. Out of these Industrial areas Phase-II is the largest with 432 plots. Table-1 and figure-1&2 present the industrial areas of Panchkula district.

TABLE-1 INDUSTRIAL AREAS IN DISTRICT PANCHKULA

Sr. No	Name of Ind. Area	Land Developed (In Hectare)	No of Plots	No of allotted Plots	No. of Units in Production
1.	I/Area Barwala	102	335	327	201
2.	I/Estate Kalka	12.82	59	59	59
3.	I/Area Phase-1, Panchkula	104	402	384	356
4.	I/Area Phase-II, Panchkula	118	432	416	373
5.	I/Estate Phase-I, Panchkula	22	90	90	78

TABLE -2 ANALYSIS OF INDUSTRIAL AREA DURING 2002-2012

Sr. No.	Categories	2002	2012	(%) of geographical area of 2002	(%) of geographical area of 2012	Change From 2002 to 2012	RD %From 2002 to 2012
1	Industry	1.0621	1.3985	0.11	0.15	0.04	31.67
TGA = 898 Sq.km							

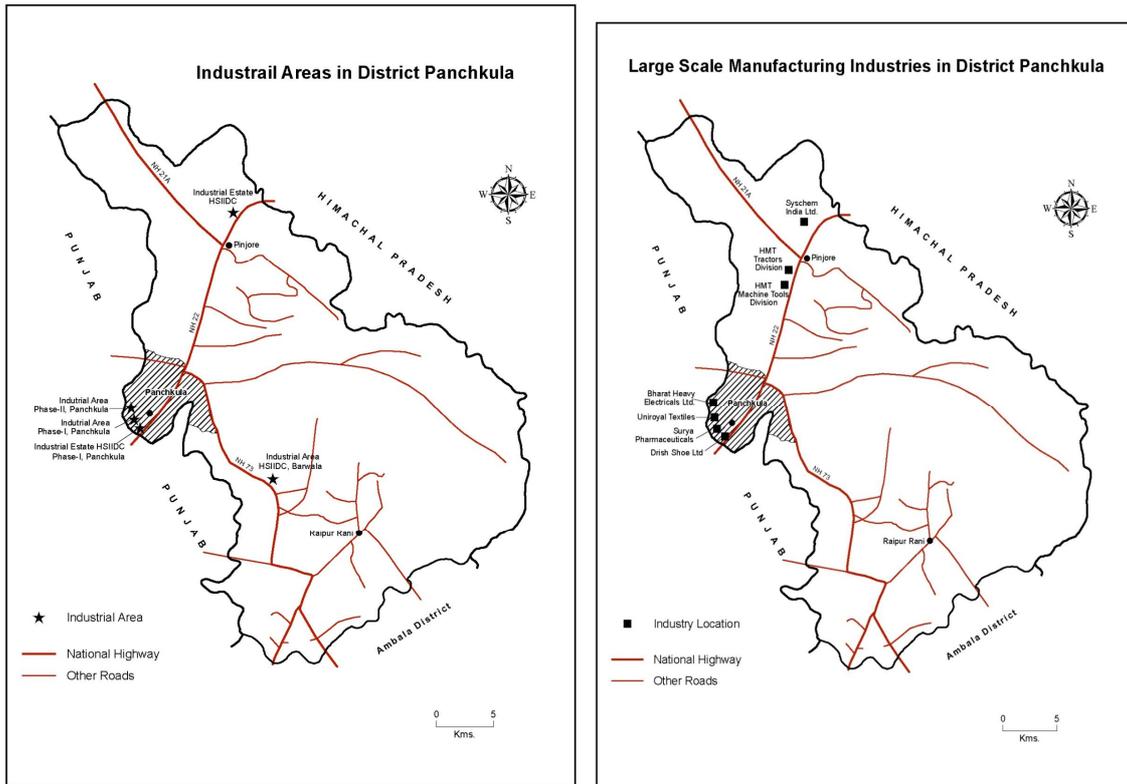


Fig :1&2 . Location and Large scale Manufacturing industry of study area

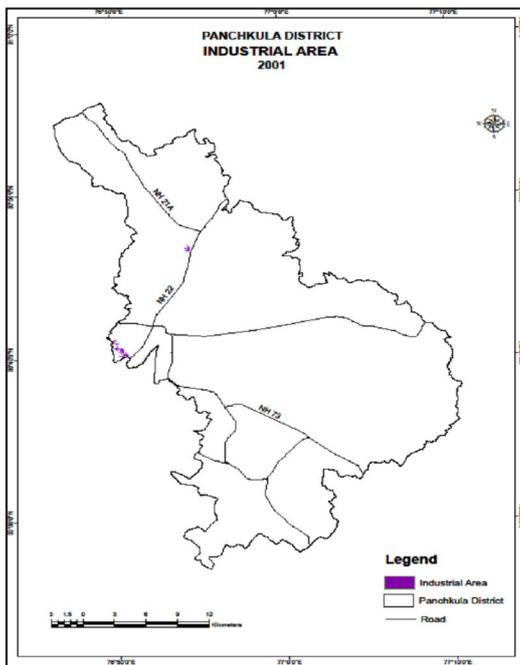


Fig: 3 Industrial Areas in 2002

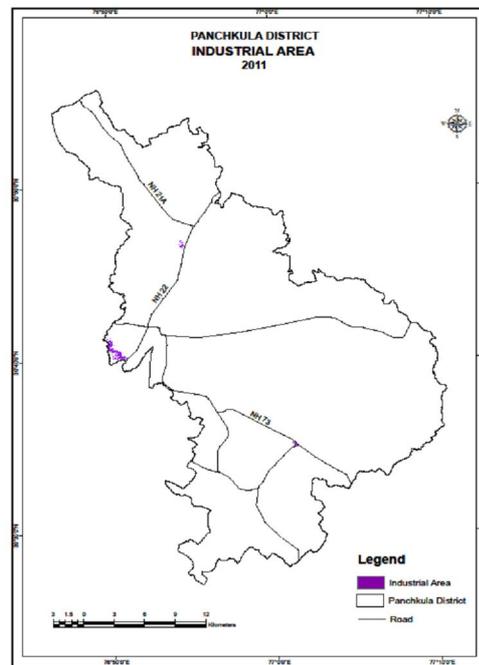


Fig: 4 Industrial Areas in 2012



As far as the large scale units are concerned presently the district has about 8 industries which fall in the category of large scale industry. Among these HMT and BHEL are two Public sector undertakings which had played a great role in the industrial development of the district while the remaining industries are in the private sector. These large scale industries have provided the necessary impetus and initial beginning for development of the region on industrial map of the state. There are also two units in the medium scale enterprises in the district and out of these one each is located in Industrial areas of Barwala and Panchkula. The fig-2 represents the spatial location of large scale industries of the district.

Apart from these large scale industries there are innumerable micro and small scale industries located in the district the number of these units is to the tune of 1970 which are located in the different industrial estate/areas of the district. The majority of these industries are engineering based which are ancillary units of the large scale industries and especially the HMT at Pinjore. These industries are mainly located in the Industrial Estate Phase I and Industrial Area Phase II, Panchkula. This industry is followed by the metal industry and agro based industry in proportion to the total number of industries. Majority of these ancillary units are working for the large industries in the district. These MSMES are in the area of Automobile and its parts, tractor parts, engineering components, wood and wooden based furniture, handloom and readymade garment, leather products etc. There are two existing clusters of Micro and Small enterprises located in the district. The one is Panchkula Auto Parts Cluster, Panchkula located in the Industrial Estate Phase I and Industrial Area Phase II, Panchkula and the other is Handloom Weavers Cluster located at Raipur Rani, Panchkula. The number of functional units in the former is 305 and in the later it is 388.

#### CONCLUSIONS:

It is concluded that with help of satellite data along with non spatial data base, the analysis of location and horizontal expansion of industrial areas can be done effectively. The industrial growth in the district has been one of the important factors in the expansion of the urbanization as there are five developed industrial areas. The study reveals that the Panchkula has experienced phenomenal growth in the urban sprawl due to industrial growth. The industrial areas physical expansion has taken place over the agricultural land nearby to urban centers. The area under industrial sector has increased from 0.11 percent in 2002 to 0.15 percent in 2012 that is 0.04percent growth in ten years. There is only 8 large scale industry in the area and among them two public sector HMT and BHEL unit contribute maximum to support the small scale engineering ancillary units.

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