CHAPTER 7
SUMMARY AND CONCLUSIONS

This study describes and analyses the temporal and spatial patterns of growth of a modern planned state capital, Chandigarh, in terms of the growth of population, its socio-economic characteristics and the morphological attributes, vis a vis the plan proposals. Brief comparative references have also been made to the growth of two other planned state capitals, Bhubaneswar (Orissa) and Gandhinagar (Gujarat).

The three planned state capitals, Chandigarh, Bhubaneswar and Gandhinagar, owe their establishment to a similarity of circumstances, namely, the formation of new states. In case of Chandigarh, however, the circumstances were far more urgent and compelling, due to Punjab’s partition in 1947 followed by an unprecedented refugee crisis and the necessity of rehabilitation of the displaced persons. The Punjab Government’s decision to build a new state capital, rather than append the administrative function to one of the existing large cities in the region was motivated by several factors. Firstly, the prevalent political and economic crisis necessitated the location of administrative functions at one place. Secondly, the existing large cities such as Shimla, Jalandhar, Ludhiana, Amritsar and Ambala were found to be lacking in additional space and resources. Thirdly, at the symbolic level, the need was to establish a new capital to replace the loss of Lahore, the historic capital city, and also represent the spirit of free India. The rhetoric on the occasion of the establishment of Chandigarh was memorable: ‘Let this be a town symbolic of the freedom of India ….. an expression of the nation’s faith in the future’. Therefore, in case of Chandigarh, the circumstances were not just political or administrative, as was true of Bhubaneswar and Gandhinagar, but social and psychological as well.

The establishment of Chandigarh was visualized as an opportunity for projecting an international image of a national expression. Consequently, the use of anything traditional, in terms of design and concepts, was seen as obsolete and backward. This prompted the state government to search abroad for a suitable architect / planner. In 1949, an American, Albert Mayer, was invited to plan the city. However, following the death of his associate, Nowicki, in 1950 and the inability of the Punjab Government to
pay his fees in dollars, Mayer expressed his unwillingness to continue with the project. In the same year, Le Corbusier, a French planner, agreed to undertake the project. A team of foreign architects, Jane Drew, Maxwell Fry and Pierre Jeanneret, as well as Indian architects were to assist Corbusier. Since the priorities on which modern urban planning in Free India were to be based were as yet undefined, the Chandigarh Project provided Corbusier and his team a free hand. In comparison, although the planning of Bhubaneswar was also entrusted to a foreign architect, Otto Koenigsberger, the Orissa Government wished to project the traditional aspects of the Oriya culture. Since Koenigsberger was not in favour of designing the city within architectural limits imposed by traditions, the initial development of Bhubaneswar was marred by conflicting vision and ideals. In the case of Gandhinagar, although the plan was not prepared by a foreign planner, modern concepts underlie the city plan. Interestingly, the plan of Gandhinagar seems a mirror image of the Chandigarh plan.

Two distinctive features set these planned state capitals apart from other Indian towns and cities. Firstly, the former were planned for a specific population size. While Chandigarh was planned for a population of five lakh persons, Bhubaneswar and Gandhinagar were planned for a comparatively smaller size (40,000 and three lakh persons respectively). Secondly, and more importantly, the then contemporary western planning concepts underlie the master plans of all the three cities. As a result, the means adopted to achieve the major concerns of town planning, namely, safety, efficiency and comfort, in Chandigarh, Bhubaneswar and Gandhinagar were functional segregation of landuses, the use of neighbourhood units as the basic element of the plan, traffic management through a hierarchy of roads, extensive open spaces and green belts at the city, Sector and individual building levels, and the establishment of high minimum standards for the provision of urban services. It was for the first time in India that these concepts were applied on such a large scale. It was natural, therefore, that the planning of these three cities resulted in the establishment of a new vernacular in Indian town planning and architecture. Further, the perspective of long term planning inherent in the master plans of these three cities was in sharp contrast to the accretive and incremental pattern of development of most other Indian towns and cities.
The layout pattern, grid iron in Chandigarh and Gandhinagar and leaf-like in Bhubaneswar, was adopted to facilitate intra-city accessibility and an organized future expansion. In Chandigarh, the rectangular grid plan divides the city into Sectors, each identified by a number. Each Sector, measuring 800 by 1200 metres, and having the same basic plan, was conceived as a self contained, inward oriented unit, approximately one sq. km. in area. It was deemed as the ‘container of family life’ and ‘wherein one could move from house to shopping to recreation to all day-to-day activities in safety and pleasure’. The population size of each Sector was fixed according to the proposed plot size and the economic status of the resident population. The population of the Sectors varied between 600 and 26,000 persons. In Bhubaneswar, six units were designed, approximately 1.44 sq. km. each in area, and denoted by a name and number. In Gandhinagar, the layout and numbering of Sectors is similar to the Chandigarh plan. The Sectors in Gandhinagar measure approximately 0.75 sq.kms. in area. In all the three cities, legal statutes were enacted to regulate development within the city and on its peripheries.

As planned towns, Chandigarh, Bhubaneswar and Gandhinagar were implants into their respective urban systems. The changes in the rank position of these cities within their respective urban systems provides an important indicator of their success as planned cities. In the first census in 1961 after its inception, Chandigarh was registered as a Class II town with a population of 89321 persons, and was ranked sixth among the 184 urban centers of the pre-Reorganised Punjab state. It was the largest among the twelve Class II towns in the state. In 1971, Chandigarh emerged as a Class I city with a population of 218743 persons. Its rank improved to the fourth position among the 109 urban centres of the Reorganised Punjab. It was the largest city among the 66 towns of the newly formed state of Haryana. During 1961-71, the city recorded a growth rate of 144.89 per cent, making it the fastest growing city in both Punjab and Haryana. Chandigarh maintained its fourth rank and the leading position in the Punjab and Haryana urban systems respectively in 1981 as well. Inspite of recording a lower growth rate (73.56 per cent) during 1971-81, Chandigarh was the second and fourth fastest growing city in Punjab and Haryana respectively. In the last census, the city maintained its fourth position among the 121 towns of Punjab. The three leading cities were Ludhiana, Amritsar and Jalandhar. In
comparison, among the towns in Haryana, the city was relegated to the second position, following the emergence of Faridabad as the state’s leading urban centre. However the higher rank of Faridabad may be taken as an exception due to the influence of Delhi. Despite a modest growth of 34.47 per cent during 1981-91, Chandigarh was the fourth fastest growing city in both Punjab and Haryana. Thus, the high rank of Chandigarh within the urban hierarchy of both Punjab and Haryana, and its consistently high growth rates since 1961 provide sufficient evidence of the ability of the city to compete quite successfully with large and historic urban centres in both the states.

The trends of growth in the regional urban system identified for Chandigarh can also be observed for Bhubaneswar and Gandhinagar. From the sixth rank among Orissa’s towns and a Class III town status in 1961, Bhubaneswar emerged as Orissa’s leading city in 1991 (411,542 persons) displacing Cuttack, located 29 kms to its north, from its traditional premier position. Further, the decadal growth rates (176.07, 107.8 and 87.73 per cent during 1961-71, 1971-81 and 1981-91 respectively) in Bhubaneswar have consistently been the highest among the towns of Orissa. Gandhinagar, enumerated for the first time in 1971 as a Class II town, was ranked sixty-third among the 216 towns of Gujarat. By 1991, it had improved its position to the eleventh rank among the 264 towns in Gujarat, and was a Class I city, with a population of 121,746 persons. Its growth rates during 1971-81 and 1981-91 (160 and 94.47 per cent respectively) were among the highest in the state.

An important difference between evolved and planned towns is that, while the former are 'both in and of the country', the latter are first laid in the country and only subsequently become of the country. Therefore, the growth of interaction with the surrounding region and expansion in the umland forms yet another indicator of the success of planned cities. In the early 1960s, Chandigarh’s impact on the surrounding region was limited to an area of about 282 sq. kms. which included 171 villages and 4 towns. By the 1970s, the zone of its influence covered an area of about 1000 sq. kms., which included 395 villages and 7 towns. This expansion took place through the process of capture of the umlands of pre-existing service centres and the establishment of new types of linkages, for example, commuting and supply of milk and vegetables. At present, Chandigarh’s zone of influence has an extent of 2421 sq. kms., comprising the
formally demarcated Inter State Chandigarh Region (ISCR). The ISCR includes the adjoining area of Punjab and Haryana states and contains 984 villages and 11 urban centres. The strong impact of Chandigarh on its surrounding Region can be evidenced in the improvements that have occurred in the levels of sex ratio and female literacy, in the provision of urban services and facilities, in the development of an efficient transport network, and in the diversification of economic activities, which are now particularly focused on industrial activity. In comparison to Chandigarh, Bhubaneswar and Gandhinagar seem to have exerted only a limited influence on their surrounding regions. In the case of Bhubaneswar, even by the early 1980s it was noted that the city was ‘behaving like a superimposed structure in its so-called catchment area’. Proposals for the development of an Urban Complex, comprising Bhubaneswar and its surrounding towns of Cuttack, Jatani, Khordha and Chowdar have been mooted. At present, the development of Bhubaneswar and its vicinity is within the purview of the Bhubaneswar Development Authority (BDA) established in 1983. By far the most significant problem hindering a strong functional integration of Bhubaneswar with its surrounding region has been poor transport connectivity with most of the towns in the state as well as with the neighbouring towns of Madhya Pradesh and Bihar. Gandhinagar, still in the process of development, is yet to build up a distinct regional identity of its own, particularly in the face of the dominating influence of metropolitan Ahmadabad. Both Bhubaneswar and Gandhinagar were established in close proximity to large and historic cities, namely, Cuttack and Ahmadabad respectively. In comparison, Chandigarh, established in a region devoid of any major pre-existing town, has been able to develop in a largely competition-free regional context.

The intra-city patterns of growth of population are reflective of the dynamism of a city, in terms of its status in the urban hierarchy, interaction with its surrounding region and as an individual town. Despite initial fears regarding Chandigarh’s locational and functional viability, the city has grown rapidly since 1961 (471.6 per cent during 1961-91) and with a population of 510,565 persons in 1991, has exceeded its projected size. During 1961-71, Chandigarh recorded an average growth rate of 144.89 per cent. The vitality of the city during this decade is evidenced by the fact that the population of nearly every Sector doubled. During this decade the growth of population was strongly
associated with the development of private housing and the presence of government housing for middle and low ranked employees. In both cases, the presence of small sized plots, resulting in vertical development and the consequent concentration of population, was the major contributing factor. In comparison, institutional Sectors and those developed with large sized private or public plots registered lower rates of growth. During the following decade, 1971-81, Chandigarh registered a growth rate of 73.56 per cent. The main factors influencing the growth of the city were the development of nine new Phase II Sectors, the Second Phase of Industrial Area, the construction of multistoried HIG, MIG, LIG and EWS houses by the Chandigarh Housing Board (CHB) in the Phase II Sectors and the development of such work areas, as the Air Force Base and the Cantonment, on the peripheries of the city. The highest rates of growth in the city were recorded by the newly enumerated Sectors, located on the then southern periphery of the city, and initially developed with small sized private houses. In comparison, a majority of the Phase I Sectors recorded sluggish growth rates. However, inspite of this deceleration in population growth, seventeen of these Sectors exceeded their planned population in 1981. This suggests a process of infilling and saturation operating in Chandigarh due to the limited expansion of housing facilities possible within its meticulous plan framework. During 1981-91, Chandigarh recorded a modest growth rate of 34.47 per cent. Further, of the total absolute increase of 130,905 persons, the Phase I Sectors accounted for 30.3 per cent and the Phase II Sectors for 69.7 per cent. The comparative figures for the previous decade were approximately 50 per cent each. This change in the relative figures reflects a greater concentration of population in the Phase II Sectors, related to the pull exerted by new work areas developed in the Phase II Sectors, and by such nuclei as Mohali, the Industrial Area and the Air Force Base, the development of private and institutional cooperative housing in these Phase II Sectors, and a possible push from the congested Phase I Sectors. The highest rates of growth during this decade were registered by the eight new Phase II Sectors. In comparison, twenty out of the twenty-nine Phase I Sectors registered a decline in their population. The trend of an initial rapid rate of increase followed by a deceleration and even decline, as exhibited by the Phase I Sectors, emerges as a major attribute of the growth of population at the city as well as the Sector level.
The growth of socio-economic attributes of population in Chandigarh has been positively correlated with the patterns of population growth. In addition, significant multi-collinearity can be identified among the various attributes themselves. The correlation between population growth and growth in literacy and workforce has consistently been positive, very high and very significant, reflecting the city’s functional character. In comparison, the correlation between population growth and growth in density, sex ratio and Scheduled Castes population has become increasingly strong over successive decades, indicating the changes in the demographic character of the city as it has developed over time. In 1991, the growth of all the socio-economic attributes exhibited a uniformly strong, positive and significant multi-collinearity among themselves. Chandigarh, in this sense, can be said to have reached maturity as a city.

Since its inception, Chandigarh has consistently recorded a high population density, inspite of an increase in its area. The density increased by 2819 persons per sq. km. during 1961-91. The plan proposals in Chandigarh specified the population density of various Sectors on the basis of the planned nature of a Sector, the size of plots and the professional and economic status of the resident population. The Sectors were grouped into high, medium and low density areas. On the basis of the distribution and patterns of growth in density since 1961, a few major trends can be identified. Firstly, there is a positive association between density levels and small sized plots, both private and public. In comparison, Sectors with institutional housing and those with large sized plots registered lower growth in density. Secondly, the areas of high or low growth in density generally correspond to areas of similar growth in population. Thirdly, the trend of an initial rapid growth followed by sluggish growth in density can be identified at the city as well as the Sector level. The highest rates of growth in density have generally been registered by the newly developed Sectors. In comparison, the well developed Sectors, particularly those in Phase I, have registered a decline in density. Despite such individual Sector patterns, the city as a whole merged as a densely populated area, with a density of 7333 persons per sq. km. in 1991.

Chandigarh’s low to moderate sex ratio during different decades is a characteristic feature of administrative headquarters towns in India. The consistent improvement in sex ratio that has taken place, from 625 females per 1000 males in 1961 to 817 females per
1000 males in 1991, reflects the development of a residential environment conducive for family-type living. In addition, the growth of avenues for female employment and education have also contributed to the growth in sex ratio in Chandigarh. The low level of sex ratio in the initial years of the city’s development was related to specific employment opportunities that attracted single male workers. However, even at this stage, the sex ratio was high in the earlier developed Sectors, due to the availability of family accommodation, particularly for government employees. With the development of the city, particularly, the new Phase II Sectors, which house the bulk of the city population, the entire southern half of the city has emerged as an area of high sex ratio.

Chandigarh has consistently registered a high literacy rate since its inception. This is associated with its planned functional character as an administrative headquarters, the expansion in its functions in later years and its status as a regional educational centre. Although, the trends in growth in literacy have broadly corresponded to those of growth of population, the rate of growth of the former has consistently been higher than the latter. Within the city, the rates of growth in literacy during different decades have been the highest in the newly developed Sectors. In keeping with the general trend, most of the Phase I Sectors have recorded sluggish and even declining growth during later decades. However, inspite of registering sluggish rates of growth, the proportion of literates in a majority of Phase I Sectors continues to be very high. In 1991, thirty-seven out of the forty-seven Sectors in the city recorded a proportion of literates higher than the city average of 70 per cent. The growth of literacy in Chandigarh reveals two distinct associations. Firstly, the presence of slums, labour colonies and EWS housing tends to lower the proportion as well as growth in literacy. Secondly, there is a strong locational relationship between literacy and proximity to work areas. The nature of this relationship, however, depends upon the functional character of the work area. Thus, while the relationship is positive with such areas as the Educational Zone and the City Centre, it is negative with the Industrial Area and the Wholesale Markets.

The proportion of workers in Chandigarh has declined from 39 per cent in 1961 to 34 per cent in 1991. This decline has been inspite of a diversification of the city’s functional base and the growth of tertiary and quaternary functions. Interestingly, the proportion of female workers in the city has increased from 6.78 per cent in 1961 to
15.23 per cent in 1991. The growth in workforce at the city level conforms to the familiar trend of an initial rapid growth followed by decelerating and sluggish rates of growth. The same trend can be identified at the Sector level as well. Thus, while the newly developed Sectors have registered the highest growth during any decade, the older well developed Sectors have recorded a decline in workforce. Interestingly, most of these older Sectors also recorded a decline in their population, reiterating the trend of a dispersal of population from the older Phase I Sectors to the relatively new Phase II Sectors. The pattern of distribution of workforce in Chandigarh reveals a concentration of workers in the central parts of the city, a pattern similar to the one observed in evolved towns also, and in proximity to major work zones in other parts of the city.

The traditional association of the Scheduled Castes population with unskilled and informal activities in urban areas suggests that with the growth of the city, there would be an increase in the proportion of this section of society as well. This generalization holds true for Chandigarh also. The proportion of Scheduled Castes population in the city has consistently increased from 8.5 per cent in 1961 to 15.88 per cent in 1991. Also the decadal growth rates of the Scheduled Castes population have been higher than the growth rates of total population as well as of other socio-economic attributes. While the growth of the Scheduled Castes population at the city level conforms to the familiar trend of an initial rapid increase followed by sluggish growth rates, the trends and patterns at the Sector level represent an aberration over those observed for other attributes. Firstly, the areas of high growth are not solely confined to the newly enumerated Sectors during any decade. Secondly, the growth and concentration of Scheduled Castes population in the city is closely related to the availability of housing, especially EWS and LIG housing. Thirdly, the Scheduled Castes population is mainly concentrated on the peripheries of the city, a location similar to the one observed in evolved towns. Also, the peripheral areas in Chandigarh are the sites of slums and labour colonies, located in proximity to major employment avenues in institutional and informal activities. In comparison, the areas with a low proportion of Scheduled Castes population include Sectors having a relatively inner location and limited employment opportunities in institutional or commercial activities.
The growth and distribution of population and its socio-economic attributes in Chandigarh reveals the influence of certain determining factors. These include the stage of development of a Sector, its functional character, the type of housing provided, size of plots, the socio-economic status of the resident population group, proximity to major institutional areas, general location within the city, and the presence of slums and unauthorized settlements. These factors are a product of the plan framework, whether as plan proposals or as a result of a lacunae in the provisions. Depending upon these factors, a direct or inverse relationship can be identified between the value of an attribute at the beginning of the decade and its growth during the decade. The earlier developed Phase I Sectors generally progress from a direct relationship of high value and high growth during 1961-71 to high value but low or even negative growth during 1981-91. In comparison, the newly developed Phase II Sectors exhibit an inverse relationship of low value but high growth. The low density northern Sectors have generally maintained a direct relationship of low value and low growth. The institutional Sectors with restricted housing also have the same direct relationship for all attributes, except workforce and Scheduled Castes population. In case of these two attributes, an inverse relationship of high value but low or negative growth can be identified. Further, many of the above mentioned factors operate in evolved towns as well. However, while in the traditional towns, these factors are a function of the ecological processes, in case of Chandigarh, they are the result of detailed plan proposals.

The trends of growth and distribution of socio-economic attributes of population identified for Chandigarh can be observed in Bhubaneswar and Gandhinagar as well. The exceptions include the growth of Scheduled Castes population in case of Bhubaneswar, the growth in sex ratio in case of Gandhinagar, and the growth in density in both these towns. These exceptions are related to specific plan details or the regional character of population. The most distinctive trend of a deceleration or even decline in the rates of population growth and the growth of socio-economic attributes over successive decades noted in Chandigarh, Bhubaneswar and Gandhinagar suggests that in the planned state capitals, the growth of these attributes tends to proceed along a fairly predictable and well-defined direction. The crucial factor seems to be the plan provisions and the pace of development, particularly in relation to housing. Since the expansion in
housing facilities is limited to a certain extent only, a plateauing of the population growth seems inevitable. Therefore, most of the earlier developed areas in these cities have emerged as areas of stagnation and even decline. This may be compared to the decline in the core in many evolved Indian towns. However, while the decline in the planned cities is due to the plan proposals, the decline in the latter is due to a structural deterioration in the living environment.

The existence of a planned physical framework pre-empts the traditional morphogenetic approach from being applied in a study of the morphological attributes of planned towns. Therefore, a more appropriate approach in a morphological study of Chandigarh, and other planned towns, is by means of the functional impact of the plan provisions.

Zoning, the unifunctional separation of landuses, is the guiding principle of the Chandigarh plan. Through its use, Corbusier hoped ‘to develop the town as a living organism, with its various limbs interconnected to each other and yet performing their distinctive functions’. At the town level, the location of major functions, namely administration, business and commerce, education, industry etc. was specified. With the development of the city, these zones were expected to act as morphological and social nuclei. The area allocated to various landuses was also specified. Particular attention was given to such landuses as circulation, recreation and open spaces, whose poor development in evolved towns had contributed to the emergence of major urban problems. Further, the landuse within the basic unit, Sector, was also specified. At the individual building level, the ‘Frame Control’ provisions were provided to regulate the intensity of construction, including, for example, the extent of built-up and open space, building height, architectural style etc. The objective of introducing zoning at various levels in Chandigarh was to provide ‘the best possible man-made environment in which to work, reside and relax’. However, the basic characteristic of zoning, the separation of work and residential areas, contravenes the traditional attribute of proximity of residence to work areas, a basic determinant of the morphological patterns in most Indian towns. It has been suggested that the functional segregation of landuses, with its attendant problems, for example, the economy of travel, is inappropriate for developing societies which lack the required change in social structure and production processes.
The salient features of the housing provisions in Chandigarh include, firstly, a minimum standard of accommodation, comprising two rooms with services. The objective was to pre-empt conditions of overcrowding, prevalent in most parts of urban India. Secondly, since Chandigarh was an administrative centre, government housing provisions received special attention and public housing, scaled to the income and the rank of the government employees, was provided. It was, perhaps, for the first time in Indian town planning history that even the lowest level employees, such as sweepers and peons, received consideration in the government’s housing programme. Thirdly, private construction was controlled by strict regulations. The provision of services was prohibited on the second floor of houses to discourage excessive subletting. Further, institutional housing was provided in all major institutions such as the Panjab University and the PGI, and lastly, the plan proposals provided for an intermixing of different plot sizes and types of housing in various Sectors to check the emergence of socially segregated areas. The plan proposals perceived a dominant role for private housing in Chandigarh. At present, private housing and CHB constructed flats account for 52.5 per cent of the total residential plots in the city, while public and institutional housing comprise 47.6 per cent.

The present state of housing in Chandigarh is impressive, 96 per cent of the houses in the city are pucca. The comparative figure for urban India is 58 per cent. Further, while more than 80 per cent of the houses in Chandigarh are used exclusively for residential purposes, the national figure is 71 per cent. However, a quantitative and qualitative assessment of housing in Chandigarh reveals the development of residential overcrowding and congestion. While overcrowding and housing shortages were reported as far back as the mid 1960s, these conditions have intensified over time. The 1991 census reported that 37.72 per cent of the households in the city occupy only one room. Further, the ratio between the number of census houses and actual house structures is more than 1 for all the Sectors, implying a high and consistent degree of vertical development and apportioning. The plan proposals have also inadvertently contributed to congestion. For example, the specified extent of open space on each floor has resulted in a reduction in the floor space per person, particularly in the Phase II Sectors, which were planned for higher densities of population. Interestingly, the residential areas in
Chandigarh were initially laid on the principle of one household per house. This was soon changed to two families per plot. In recent years, multistoried blocks of flats have been constructed, particularly in the southern Sectors, implying a greater intensity of development in these. The rapid growth of the city population, the city's triple administrative headquarters status, and its emergence as a regional centre for education, business and commerce have resulted in a substantial demand for housing. As a result, apportioning of residential structures, irrespective of the size of house, stage of development and economic status of a Sector is a common feature in the city.

The housing provisions in Chandigarh, based on the economic status of the resident population, have perpetuated several patterns of segregation that are spatially manifest in the morphological patterns of the city. The most striking dichotomy is between the twenty-nine Phase I Sectors and the seventeen Phase II Sectors. The former were planned for 30 per cent of the city's five lakh population, while the latter were planned for the remaining 70 per cent, implying higher densities to be mediated through smaller plot sizes. The largest private and public plots are concentrated in the former group of Sectors; the activities of the Chandigarh Housing Board, generally in the form of multistoried blocks of flats are confined to the latter group of Sectors, resulting in marked differences in the skyline of the two areas. The mixing of different house types and sizes has also not been very successful in achieving the plan objective, since a hierarchy, based on the socio-economic status of the residents of a Sector, is easily identifiable. At the city level, the hierarchy operates from the north-east to the south-west. With ascending Sector numbers, the population density increases, but the socio-economic status of the inhabitants decreases. A similar hierarchy operates at the intra-Sector level as well, from sub-units A to D. Thus, in Chandigarh, distinct economic enclaves are identifiable, creating an almost formidable system of economic segregation.

The planners in Chandigarh had the rare opportunity to create a new residential architecture. The government house designs were constrained by economy, available technology and the dictates of the local climate. The result was a limited number of standard designs. This resulted in an ubiquitous standardization of public housing, that has largely been extended to private housing also. Architecturally, therefore, the city presents a monotonous landscape, which is quite in contrast to its dynamic growth.
Further, the multistoried Housing Board flats mask the essence of the Chandigarh environment of sun, space and verdue. It has also been felt that the use of vernacular traditions, for example, an inner central courtyard, would have been more suitable to the Indian climate and way of life.

Probably the most costly overview in the creditable housing provisions for the city was the lack of any provision for the population employed in the informal sector. Initially, it comprised of construction labourers, who were, in fact, the first to arrive in the city. As early as 1955, Maxwell Fry admitted, 'When we began to move about, we realized that there were vast masses of people who were not included in the project estimate. We tried to make provision for them but there was no economy on which we could do it, even with the smallest house'. The temporary hutments housing the labourers were later shifted to peripheral locations in the city. Their temporary status implied a virtual lack of infrastructural facilities. In the 1970s, some of these settlements were relocated to villages on the eastern and western peripheries of the city. In addition to these labour colonies, a number of slums and squatter settlements have continuously developed in different parts of the city, particularly in the peripheral Sectors. At present, over half of the labour colonies in the city are unauthorized. There has been a seven-fold increase in the number of slum dwellers over the last three decades. Thus, it has proved virtually impossible to curb the growth of labour colonies in the city, authorized or unauthorized. The present official policy is that of relocation to new sites, for example on the southern boundary of the city with Mohali, and the provision of basic services at the existing sites. However, basic issues such as the status of the urban poor in the structure of a planned city, the concept of planning inclusive of social justice etc, are yet to be resolved.

An all pervading theme in Corbusier’s vision of city planning was an ordered circulation system. In Chandigarh, approximately one-fourth of the total plan area was allocated for circulation. In comparison, in the evolved towns, the circulation system comprises less than one-tenth of the total area. Chandigarh was planned on a grid iron pattern, with a hierarchy of eight types of roads (V8), graded to the speed and mode of traffic. The road intersections were also geared for motorized traffic. These proposals for an orderly flow of traffic were in striking contrast to the amorphous street pattern and
mélange of pedestrian, animal and vehicular traffic in most Indian towns. Interestingly, at the time of the formulation of the transport system in Chandigarh, no statistical information regarding the potential volume of traffic was available. Thus, the street widths etc. were developed arbitrarily. An assessment of the circulation system in Chandigarh reveals certain operational difficulties. Firstly, the extensive grid pattern has resulted in an exceptionally large urban scale, a dispersed pattern of development, and in magnifying distances, particularly in a city where work and residential areas are segregated. In addition, this has rendered the possibility of an efficient public transport system economically unviable. Secondly, the rapid population growth of the city, its largely middle class character and regional status have resulted in the city roads carrying three times more traffic than their potential capacities. This has undermined the effective functioning of the road system, since the objective of traffic segregation has proved almost impossible to achieve. The intra-sector slow traffic roads carry mainly fast through traffic, and the fast traffic roads carry a medley of traffic. An important lacuna in the city’s circulation system is the inadequacy of parking space, especially outside public places, Sector markets and the small sized marla houses. The consequent parking on the adjacent roads adds to the traffic congestion, or results in the conversion of open space in houses, a matter of pride for the planners, into parking space. While it is true that the road system in Chandigarh determines the city layout, the roads have also emerged as dividing lines, in contrast to their role as a cultural space in evolved towns.

The pattern of commercial landuse in Chandigarh contrasts with the one found in evolved towns in layout and functional characteristics. The wholesale market for vegetables, fruits, grain and iron is located on the north-eastern periphery of the city in proximity to the railway station, arterial roads and the goods transport area. The main retail centre is the City Centre, located in Sector 17 at the junction of the main axes, the Jan Marg and the Madhya Marg. The City Centre has civic and commercial functions and, unlike in evolved towns, is a residentially restricted area. In this aspect it resembles the CBD of western cities. The most striking aspect of the City Centre in Chandigarh is its regimented architectural style. This diminishes the traditional dynamism and vibrancy associated with this type of functional area. In an attempt to decentralize business and commercial functions from the City Centre, two additional city sub-centres are to be
developed. Every Sector in Chandigarh, excluding Sectors 1 to 6, has a shopping centre, located along the V4 road, to cater to the daily requirements of the residents, and thus promote the self-sufficiency of a Sector. The shops are a mixture of booths, SCOs (shop-cum-offices) and SCFs (shop-cum-flats). The latter type of structures are in keeping with the traditional practice of shop-owners living above their commercial establishments. However, the SCFs are mainly located in the Phase I Sectors, while the Phase II Sectors have a predominance of SCOs. The plan provisions overlooked the economic advantages gained from competition and the support of specialized services, since specialized markets were not provided for in the plan. Consequently, city-level specialist functions have developed in several Sector markets, often at the cost of the Sector-level shopping centres. Further, the restriction of Sector level shops to the southern side of the V4 roads has proved fairly difficult to enforce, since in keeping with good economic sense, most of the residential structures on the northern side have been converted to commercial units. In a recent policy decision, the Administration has regularized and permitted the use of residential buildings for non-residential purposes. Further, since the plan proposals overlooked the requirements of the informal sector, rehri markets have emerged in different parts of the city. There markets are often located adjacent to the Sector shopping centres.

The city has been successful in maintaining a relatively high standard of urban utilities, services and facilities. The emerging areas of concern for their provision in future include the increased pressure on water and electricity supplies, and the element of subsidies involved in the provision of these utilities and public health services. The city has emerged as a major educational centre for the entire north-western region. The large number of graduate, technical, professional and postgraduate institutions located in the city attract a sizeable resident student population, thus influencing the socio-economic characteristics of the city. The plan proposals provided for a school in each Sector to accommodate the school-going population of that Sector. The schools were located along the Sector green belts, taking into consideration convenient walking distance. Functionally, however, the choice of school is governed by the economic status of parents and the reputation enjoyed by a school, rather than proximity to residence.
A much larger proportion of land was allocated for recreation and open spaces in Chandigarh in comparison to evolved towns, which are generally characterized by a paucity of this landuse. In Chandigarh, open spaces have been provided at the city, Sector and individual building level. The most extensive open space at the city level is the Leisure Valley, a system of parks and gardens running north to south in the city through seven Sectors. In addition, a number of gardens have been developed in other Sectors as well. However, the generous amount of parks and open spaces is proving fairly expensive to maintain. The Sector-level green belts and open spaces have also deteriorated into barren, dusty tracts, while the open spaces within and outside individual buildings have generally been converted into extra living space or garages. The most important city level cultural space is the Sukhna Lake, located on the northern periphery of the city. It also functions as a major regional tourist spot. The city offers other avenues of recreation through cinemas, theatres, museums, stadia and clubs. There is also a fairly even distribution of religious places, which comprise an important cultural space in the Indian context.

The industrial landuse in the city was allocated a separate functional zone in the eastern periphery of the city, adjacent to the railway station. The type of industries permitted are restricted to light and service industries only. Initially the role of industries was seen as limited, since the city was essentially planned as an administrative centre. Although the nature of industries permitted continues to be restricted, industrial development is being promoted on a much larger scale.

In planned towns such as Chandigarh, the spatial patterns and manifestations of demographic and morphological attributes are mediated through the plan proposals, particularly those related to infrastructure. Thus, the spatial structure of Chandigarh is a product of both the plan proposals as well as the traditional attribute of location in relation to the City Centre. The spatial structure of Chandigarh, in terms of the annulles identified around the City Centre on the principle of contiguity, has undergone significant changes since the inception of the city. In 1961, the distribution of population, density, sex ratio and literacy in the city conformed to the familiar pattern of a decline with increasing distance from the City Centre. However, there was a small but significant increase in the value of these attributes in the Peripheral Areas, comprising slums and
squatter settlements. In comparison, the distribution of work force and Scheduled Castes population registered an increase with increasing distance from the City Centre. Such a distribution, in case of the former attribute was associated with the presence of well-developed housing facilities in the earlier developed Sectors forming the inner annules, while the peripheral location of the Scheduled Castes population conformed to the well-recognised attribute in evolved cities. In 1971, the development of nine Phase II Sectors added an element of dynamism to the city structure. Although, the distribution of population, density, sex ratio and literacy continued to be inversely related to distance from the City Centre, a more even distribution of workforce emerged within the city. The concentration of Scheduled Castes population continued to be high on the peripheries of the city.

In 1981, subtle changes from the earlier pattern emerged in the spatial structure of Chandigarh. These changes were associated with the infilling and saturation of housing in the older Sectors comprising the inner annule or the core, and the dynamism of the middle and outer areas, particularly the new Phase II Sectors. The central Sectors were no longer the area of highest concentration of city population and registered only marginal growth in their populations as compared to the other Sectors, indicating a stabilization of population in this part of the city. In addition, although the levels of population density, sex ratio and literacy continued to be inversely related to distance from the City Centre, the inter-annular differences were significantly smaller. The inertia of the core, first manifest in 1981, became more apparent in 1991. This was reflected in striking changes in the levels of population concentration, density and sex ratio, the proportions of which increased with distance from the City Centre, a complete reversal of the 1961 pattern.

The eight Phase I Sectors located immediately adjacent to the City Centre, and forming the first annule, represent the central parts of the city. There has been a consistent decline in the proportion of city population housed in these Sectors since 1961. This, along with a decelerating growth rate and a population in excess of the planned target, indicates a complete infilling of this annule. The first annule is similar to the core area of evolved towns in several of its attributes. Firstly, it is, at present, an area of decline of population owing to the saturation of housing facilities. Secondly, despite the
decline, proximity to major work areas and the presence of well-developed infrastructure have resulted in consistently high levels of congestion, crowding and competition. Thirdly, this annule has consistently recorded a very low proportion of Scheduled Castes population. This annule is characterized by a high sex ratio, very high literacy rates and moderate proportion of workers, attesting to its primarily residential character. Proximity to the City Centre has promoted significant commercial and business development in many Sectors of this annule.

The second annule, located contiguous to the first, comprises an eclectic mix of sixteen Phase I and II Sectors. In many of its characteristics, it bears a striking similarity to the first annule, for example, high levels of density, sex ratio and literacy. However, in comparison to the core, it has a higher proportion of Scheduled Caste population. The proportion of workers in it has increased since 1981. The latter attribute is specifically related to the development of new work areas in and around the Phase II Sectors of this annule. This, combined with a saturation of housing facilities in the Phase I Sectors, has contributed to a significant southward shift in both population and functions. Consequently, it is possible to identify three distinct sub-units within this annule, the northern low density high income Sectors, the central Sectors, which have emerged as areas of decline associated with high levels of crowding, and the southern Phase II Sectors, which have emerged as areas of dynamism following expansions in housing, institutions and functions.

The third annule comprises mainly of peripheral Sectors. Its seven constituent Phase I Sectors are predominantly institutional areas, having restricted residential facilities. In comparison, although a number of institutions are either located or proposed in the nine Phase II Sectors of this annule, they also have high density residential development. The year 1981 marked a significant divide in the evolution of the characteristics of this annule. Prior to 1981, this annule was characterized by a small proportion of city population, and had low levels of density, sex ratio and literacy. After 1981, this annule emerged as the most populous area in the city, having the highest proportion of city population, a high density, sex ratio and literacy. The complete reversal in these attributes was associated with the development of the Phase II Sectors, most of which were planned as high density areas. This annule has consistently recorded
one of the highest proportions of Scheduled Castes population in the city, owing to the peripheral location of its constituent Sectors, proximity to avenues of employment and the presence of EWS and LIG housing. It is easy to differentiate between the Phase I Sectors of this annule, most of which have emerged as areas of decline, and the dynamic Phase II Sectors, where much of the future development of the city is likely to take place.

The fourth annule comprises of five peripheral Sectors, and is the smallest among the five annules identified in the city. In its location, function and character, it is similar to the third annule. The annule is mainly residential in character, having institutional housing and flats developed by the Chandigarh Housing Board. It is characterized by a high sex ratio, high literacy levels and a moderate proportion of workers. The high concentration of Scheduled Castes population in it is associated with its peripheral location and proximity to work areas such as the Industrial Area.

The fifth annule comprises the functionally segregated Industrial Area, located on the eastern margins of the city. Its functional character is reflected in its low sex ratio, low literacy levels, high proportion of workers as well as Scheduled Castes population. The area's low population density is associated with the limited residential development in it.

In addition to the five identified annules, two additional areas contribute significantly to the spatial structure of Chandigarh, the Peripheral Areas and the Outgrowths. The former comprise slums, squatter settlements and labour colonies located on the peripheries of the city. Their peripheral location is a result of remedial administrative measures for the resettlement of slums and labour colonies, since the plan framework did not provide for the informal sector. The vitality of the Peripheral Areas is attested by the fact that in 1991, these housed a higher proportion of city population as compared to the two outer annules as well as the first annule or the core. The Peripheral Areas are characterized by low literacy, moderate sex ratio and a high proportion of workers as well as Scheduled Castes population. The high population density, combined with the large average size of household and mainly one room tenements, have resulted in congested living conditions.

The two urban Outgrowths in the city, developed around former village settlements, were enumerated for the first time in 1981. At present, even though they
account for less than 2 per cent of the city population, they have the highest population
densities in the city, and are characterized by low sex ratio and literacy levels, moderate
proportions of workers and a high proportion of Scheduled Castes population.

The role of socio-economic processes in shaping the spatial structure of a planned
city, such as Chandigarh, once the plan proposals are translated on the ground, raises
several issues, foremost among which concerns the management of planned towns. The
Nagarpalika Bill resulted in the establishment of Municipal Administration in Chandigarh
in 1996, which until then had been solely administered by the Chandigarh Administration. At present, there is a division of functions between the Administration and the Municipal Corporation for carrying out maintenance and development work in
the city. The multiplicity of authority is bound to seriously affect the development of the
city. Another vital issue concerns the appropriate stage at which municipal
administration can take over the management of planned cities from planning agencies.
The need for evolving a suitable municipal administrative system, specifically geared to
the functional requirements of planned towns, forms another issue. Further, the urban
infrastructure in Chandigarh is heavily subsidized. This is mainly because, the main
function of the city, administration, is non-economic. The requirement is, therefore, for
establishing some method to ensure the self-financing aspect of the city, to ultimately
reduce the element of subsidy.

Another important issue concerns the future expansion of planned towns. Unlike evolved towns, there is no provision for continuous and unlimited expansion in
Chandigarh. This has placed a premium on land in Chandigarh. This is reflected in the
decisions of the Administration to focus more on the rehabilitation of the slums and
squatter settlements at their present sites, rather than relocate to new locations. In fact,
the inadequacy of space has emerged as a major problem at all levels in Chandigarh.
This includes even for the administrative function, for which the Capitol Complex soon
proved inadequate and additional buildings had to be developed to accommodate
administrative offices. The issue of future expansion of the city is also closely linked to
periphery development. The Periphery Development Act of 1952 was intended to check
haphazard and unplanned peripheral growth, and to preserve the rural character of the
surrounding countryside. This Act lost its sanctity with the political events of 1966,
when the state of Punjab was reorganized and Chandigarh lost control over its periphery and any leeway for future expansion.

Another aspect related to the management of planned towns like Chandigarh, which were laid out according to western urban planning concepts, especially the functional separation of work and residential areas and a hierarchical system of road network, is the effective enforcement of plan proposals, particularly where these run contrary to social and economic processes. A significant aspect of the application of such concepts is the creation of an economic segregation at various levels in a country where economic and social status have for long overlapped. This also reinforces the need to integrate physical and social planning.

The establishment of Chandigarh represented a deliberate act of controlled planning. However, the extent to which all urban problems can be solved through the planning process is debatable. By its very nature, planning is contrary to human behaviour, and can only strive to minimize the gap between the two. Perhaps the most comprehensive measure of the success of a planning venture is vis a vis the plan objectives. In this context, Chandigarh has succeeded in providing a home for the displaced persons from Pakistan, in emerging as a major regional centre in north-west India, and in providing its citizens with a reasonably high standard of urban infrastructure and living environment. In the overall analysis, therefore, Chandigarh represents a success of the planning effort undertaken in difficult times as a pioneering venture. Its success in future will be determined by its ability to retain the advantages that have accrued since its inception, and its adaptability to changing circumstances and to the political, social and economic processes associated with the growth of large cities.