CHAPTER VI
UMLAND ANALYSIS AS A VIABLE
METHODOLOGY FOR MICRO LEVEL
PLANNING: A CASE STUDY OF
AHMADNAGAR DISTRICT
INTRODUCTION

The existence of any city/town is justified on the basis of the services it renders to the surrounding countryside and vice-versa. Even villages having population of about 5000 persons or more perform certain important services for the surrounding region.

The nature of services depends upon the characteristics of the physical and the human resources of the region on the one hand and the degree of socio-economic development on the other. In other words if a region is relatively less developed i.e. mountainous and forested tract as Akola tahsil in Ahmadnagar district or Akrani Mahal of Dhule district, it is observed that the interaction between the villages and the regional centres is weak. However, if a region is relatively more developed economically and socially for example shrirampur, and Kopargaon tahsils, its interaction with the regional centres is more varied and strong.

An attempt therefore, has been made here to surface the characteristics of regional relationship of Ahmadnagar city, the leading regional centre of the region under study, with its surrounding settlements on the one hand and the bond of relationship of the different tahsil headquarters, that are either medium or small towns or rural service, centres, with the countryside surrounding them.
Thus an hierarchy of umlands has been identified to reveal the patterns of regional relationship at meso and micro levels revealing the variations in development levels directly. The following discussion shall bring out in praty details these characteristics exposing the relatively more developed and backward areas of the region, an aspect so vital for framing regional development strategy.

The urban eco-system consists of the city and its countryside that depends upon each other. These relationships keep on changing through time and space.

The set of relationship go to make the personality of the city.

The factors that bring about the change in the functions and characteristics are economic, social, cultural, political etc. The economic factors such as agricultural development, industrial growth and growth in the commercial activities owing to economic development in the rural areas or growth of urbanisation, also brings about change in the pattern of rural urban interaction. The cultural change as result of diffusion of new technologies, new ideas and government facilities under plans of developments crucial to socio-economic change in a region. The political factors / political decisions regarding priority in extending irrigation facilities localities of economic developmental activities as construction of dams and canals, location of
industries development of mines and exploration of minerals, development of infrastructural facilities as construction of new railways highways and banking facilities etc. are extremely important as they are subjective.

Umland analysis is nothing but revealing this bond of relationships through observation field enquiries concerning the movements of persons, goods and ideas and intensity of such movement. If such a method of revealing the patterns of mutual relationship is carried into the past and the variances is discovered it becomes an ey-opener to the planners as it throws light upon the nature of changes occurring in the functions performed by both these attributes (city and the region) over the period under study.

A) DEFINITION OF UMLAND

Generally the term "Umland" is used to indicate the area in which the city and its countryside exist in a cobweb of a symbiotic relationship i.e. they are related historically economically, politically socially and culturally with each other. City region, urban field, command area, tributary area, metropolitan community area and sphere of influence are some of the other terms synonymous to umland used by various geographers and these terms carry more or less the same meaning.
According to André Allix, a French scholar, the umland consists of the area immediately around a city. Dr. R. L. Singh defined umland as "the area in which the region and the city are culturally, economically and politically interrelated." Dutt, A. K. gave a similar definition of umland and expressed it as "umland is a playground of interplay of cultural, economic and political phenomena whereby the city and its surrounding region are functionally integrated with each other."

Another interesting definition of umland is stated by Zola, a French geographer in his article "Le voyage de Paris". He has defined umland as each city is surrounded by an area more or less extensive whose activities are almost exclusively devoted to supplying its sustenance a fundamental element in any study of urban geography.

F. A. Stilgenbour defines "umland" as the immediate rural land surrounding the metropolitan city. Peter Schollar emphasized on intense communications of the area with a town in his definition of Umland.

From the above discussion it is clear that umland is an area that is organically linked up with a town or a city. This is the immediate umland of a town however, there are certain services performed by towns as religious services,
medical or health services, that are perform over disproportionate wider areas. Such wider influences when really identified represented further umland of a town.

B) SELECTION OF CRITERIA FOR DELIMITING THE IMMEDIATE UMLAND

At the outset it must be noted that the regional influences of Ahmadnagar city as well as the tahsil headquarters of the district are limited because Ahmadnagar city and its tahsil headquarters are not commercially or industrially so significant, so as to leave their distinguishing mark in any special respect in itself. Since the city a focal point for the country side, is a centre of finance education administration, health services, communication facilities supply of agricultural implements and fertilizers higher education, and several other types of central services, providing employment opportunities for the country folk and play a vital role in the growth and development of umlands.

The selection of indices is a crucial step in the delimitation of umland of city or town or rural service centres, as it requires a considerable understanding of the nature of the city functions on the one hand and the nature of countryside and the services it renders on the other. In addition to the conventional services performed
by the countryside for the city as supply of vegetables, milk, foodgrains, e.g., wholesale trading, manufacturing transportation services, educational services, banking facilities, health recreation, administration etc.
supply of fertilizers agricultural implements, varieties of improved seeds and provision of credit facilities to the rural areas through lead bank schemes. The public transportation services have been nationalised in Maharashtra and thus no free competition exists in this field. S.T. transportation zone of a city is the area under jurisdiction of a S.T. Division office. Hence these indices have now remained of limited value but even they reveal some spatial pattern.

The various patterns as regard intensity of services help to demarcate the umland of any city/town are classified by the geographers into three groups, viz. economic, social and cultural. Here the variables, have been chosen so as to enable to reveal the real nature of the city. Countryside relationships economic variables provide the most significant types of variables that influences the growth and function of the city or town or rural service centres. In hierarchy of settlements the cities/towns stand at a higher level on the basis of population size and number of functional characteristics make the cities / towns significant centres of consumption drawing upon the surplus product
from their umlands. Thus the flow of commodities and special services to and from the city forming the economic linkages provides some measurement for demarcating the extent of umland. Thus based on personal observations and field enquiries the more important economic linkages have been considered in delineating the umland of Ahmadnagar city and other tahsil headquarters of the district, that includes two major types: 1) umland based and 2) city based. The umland based indices consists of (1) vegetables and fruits supply, (ii) Milk supply, (iii) cotton supply etc. while city based indices includes (i) education (ii) S.T. bus service etc. While selecting these indices the nature of the region, which is predominantly an agricultural has been considered and importance has been given to such variables even among agricultural, that has a profound influence on the economy and the city-umland relationships. Educational zone is a criteria indicating social awareness and economic development. Umlands for administrative, health, fertilizers and agricultural implements have not been drawn separately because they provide the services to the entire district, first from the district headquarters to the tahsil places and from these sub centres to their interior places.

On the basis of preceding discussion the following indices have been chosen for demarcating the umland of
Ahmadnagar city.

i) Vegetables supply zone
ii) Cotton purchase zone
iii) Milk supply zone
iv) Commuters zone
v) S.T. Bus service zone
vi) Educational zone
vii) Students zone.

The above said variables represents the economic, social and cultural ties of the city with its countryside.

C) SERVICE ZONES OF AHMADNAGAR CITY:

Ahmadnagar city is of medieval origin and was capital of Nizamshahi dynasty. It was a military cantonment during the British rule and it enjoys that status to this day. It is the headquarter of the district of the same name and hub of bus transport, trade and other activities. It is a growing industrial centre and important centre of education. The progress in agricultural development has been instrumental in bringing about rapid change in standard of living of people mainly in the northern part of the district, related urbanisation and industrialisation and migration of rural people to irrigated tracts. These changes are fundamental to the understanding of the nature
of umlands under consideration. The service zones discussed below reveal these characteristics clearly.

1) VEGETABLE SUPPLY ZONE:

Ahmadnagar city has to depend upon almost entirely for its daily needs of vegetables on the surrounding rural areas. As a result of it, a compact supply zone forms around the city (Ref. fig. No. 6.1).

The entire zone occupies 1242 sq.kms. of area. The shape of the vegetables supply zone is somewhat circular, which occupies nearly more than 3/4 part of Ahmadnagar tahsil. The zone is traversed by the river Sina and important roads. The area is facilitated by water available through wells. Secondly, it is a market oriented and perishable commodity that promotes its cultivation in the proximity of the Ahmadnagar city. Being a perishable commodity, it requires quick transportation. The zone is, therefore, aligned mainly along the roads and railways. Many varieties of vegetables are grown in the surrounding rural tract, viz. Tomatoes, Brinjal, Garlic, Gawar, Beans, Potato etc. These are brought into the city market early in the morning or during the previous night by trucks, buses, bullock carts, bicycles, motor cycles, and also by headloads. The principal villages supplying vegetables to Ahmadnagar city are Nepti, Nimagaonwagh, Jakhangaon, Hingangaon, Takali, Bhalvani, Bolhegaon, Karjune,
Fig. No. 6.1

VEGETABLES SUPPLY ZONE
OF AHMEDNAGAR
Isalak, Nimbalak, Nagapur, Vadgaon, Kedgaon, Chas, etc. Generally speaking it is within a range of 20 to 30 kms. from Ahmadnagar. Some varieties of vegetables perish very soon and therefore require quick transport facilities. Hence the immediate zone of vegetables mainly consists of areas supplying perishables vegetables. On the other hand some varieties of vegetables last for a somewhat longer duration and hence are brought from considerable distant centres, to Ahmadnagar for supply to Pune and Bombay markets. The elongated shape of the umland is due to the bearing of the railway line.

ii) **Cotton Purchase Zone**

The cotton purchase zone (Ref. fig. No. 6.2) covers 4,464 sq. kms. area of the district. Ahmadnagar district has a long tradition of cotton, cultivation. The villages situated in Ahmadnagar, Parner and Rahuri tahsil sell their cotton at Ahmadnagar market. In the same way villages situated in southern part of Shrirampur tahsil, south-western part of Newasa tahsil. Eastern part of Sangamner tahsil and northern part of Shrigonda tahsil bring cotton to sell at Ahmadnagar market. Climatic conditions are favourable for growing cotton but not without irrigation facilities and cotton enjoys a position next to sugarcane in the economy of the region. Since cotton is one of the main agriculture production. Textile mills, handlooms and powerlooms, oil-extraction plants are the agro based industries developed in this region which
are based on this important cash crop. There appears a trend of declining the acreage under cotton cultivation in the last few years. Owing to governments monopoly in cotton purchase and therefore, declining percentage of profit to the cotton grower. This situation has been augmented again by the hybrid varieties of food-crops like Jowar and Bajra, and due to increasing importance of other cash crops like sugarcane groundnuts chillies potato etc. which are more remunerative and these commodities were not under Government trade. The cotton being one of the major cash crop of the district which is grown with the help of well irrigation in drier tracts and by canal and river irrigation where it is available.

iii) MILK SUPPLY ZONE:

Milk is such commodity that establishes a strong functional link between the city and its umland. Ahmadnagar has a heavy demand for milk. It is not only Ahmadnagar city that gives a boost to the dairy activity in its umland but the Bombay and Pune cities whose demand for milk is tremendous, and ever increasing promoted this activity in the umland of Ahmadnagar.

The milk zone (Ref. fig. No. 6.3) covers 6660 sq.kms. area i.e. nearly 50% of the area of the district. The milk supply zone completely excludes Kopargaon,
Shrirampur, Rahuri, Sangamner and Akola tahsils, and covers a very small part of Newasa tahsil. Remaining parts of all the tahsils fall within the milk umland. The shape of the milk supply zone for Ahmadnagar city is mostly irregular. The milk-zone is mainly extended to the south, each and north-east of Ahmadnagar upto a maximum distance of about 100 kms.

The physical, economic and social factors are responsible for the development of dairy development in the district, along with quick transportation and chilling facilities which play a vital role in shaping the milk supply zone of Ahmadnagar. Ahmadnagar milk scheme collects milk every day and it supplies to Ahmadnagar city for local consumption and the remaining is despatched to Bombay and Pune city. Besides this, some local dairies also purchase milk from villagers which is sold to residents of the city in the form of milk-butter, ghee and curd etc. There are also number of milk vendors who sell the milk dairy directly to the customers. This supply comes from a maximum distance of 10 to 15 kms. either by bicycles, mopeds, motor cycles, S.T. buses and railway.

iv) COMMUTERS ZONE :

The commuters zone of Ahmadnagar (Ref.fig. No. 6.4) covers 720 sq.kms. area. There are very few villages in this
COMMUTERS ZONE OF AHMADNAGAR

Fig No.6-4
These villages are almost same as those mentioned with respect to students zone earlier. The commuters come regularly either by bicycles, S.T. Buses, or by railway.

These commuters includes the workers engaged in industries, workshops offices hotels and other employments. The daily wage earners from the adjoining villages viz. Nimgaon Wagra, Nepti, Kedgaon, etc. assemble early in the morning near old jail or shanichauk at Ahmadnagar city as they earn higher labour rates than the villages where they live.

V) S.T. BUS SERVICE ZONE:

The various types of relations that the town may have with its region is largely a function of transportation particularly a transportation by roads. Bus transport now plays a much more important role in the regional relations of the city than the rail-transport. Since the bus-transportation is the monopoly of the state transport corporation a semi government organisation as a decisions of the Government's policy, the question of free competition does not arise in this field in Maharashtra. Therefore, the area under Ahmadnagar's jurisdiction i.e. the whole district of Ahmadnagar has been included in the S.T. Bus transportation zone of the city. (Ref. fig. No. 6.5).
Ahmadnagar is one of the important bus stations of S.T. services. Divisional office and a divisional workshop are located at Ahmadnagar. The bus service continue almost for 24 hours. The frequency of buses is more to Nasik via Rahuri and Shrirampur, Aurangabad, Pune and Beed, from Ahmadnagar. Besides that, several buses from other centres in the district travel via, Ahmadnagar, also serve the people to a considerable extent and ultimately help to increase the interaction between the rural and urban areas. Ahmadnagar city is linked up with important cities of western and central Maharashtra.

Ahmadnagar city is linked up with Pune-Manmad railway line. The city has no other railway links except this. The railway transport has adverse bearing upon S.T. transport services in Shrigonda, Shrirampur and Kopergeon tahsils.

VI) EDUCATIONAL ZONE:

Educational zone of Ahmadnagar city (Ref.fig.No.6,6) covers 3,402 sq.kms.area. The shape of educational zone is almost like a square. The relations of the city are not equal with all the parts of the district. Its degree of intensity decreases according to the increasing distance from the city. It also depends upon network of roads i.e. connectivity and intensity of interaction between small towns and villages with Ahmadnagar city. There are three
Arts, Commerce, and Science colleges, one B.Ed. college four D.Ed. colleges in the city and number of Junior colleges and high-schools. With the rise of colleges at other tahsil places, influence of Ahmadnagar city has commensurately declined. However, due to concentration of post-graduate education facilities and other specialised educational facilities at Ahmadnagar, students from entire district and the adjoining areas, come to avail of these facilities at Ahmadnagar, the dominance of Ahmadnagar city predominantly Ahmadnagar tahsils and parts of Parner, Shrigonda, Rahuri and Pathardi tahsils. It has considerably declined over the remaining part of the district. This is due to the development of undergraduate, graduate, educational facilities at a tahsil headquarters. The education is one of the important functions of Ahmadnagar city that has tied its surrounding region with the city. The future extent of the educational zone will depend upon specialised educational facilities offered by the city in the new faculties of learning, improvement of standard and provisions of cheaper hostelling facilities etc.

VII) STUDENTS ZONE:

The student zone of Ahmadnagar (Ref. fig. No. 6.7) covers 547 sq.kms. area of the district around Ahmadnagar. There are very few students who come regularly either by bicycle, S.T. buses or by railway to attend the colleges.
STUDENTS ZONE OF AHMADNAGAR

Ahmadnagar

Fig.No.6·7
But some students do come by bicycle, from such centre that are not far away from the Ahmadnagar city, and from the distance about 10 kms. The villages particularly located along the routes where frequency of buses is more, enjoys the advantages of Bys-services for attending the colleges regularly. My field study revealed that Nimgaon Wagha, Nepti, Hingangaon, Jakhabgaon, Bhalavani, Takali, Chas, Kedgaon, Kafjune Khare, Numbalak, Isalak, Jeur, Nagapur, Vadgaon, Pimpalgaon Wagha, Khadgaon etc. are such villages from where the students are regularly coming by S.T.buses and by bicycles everyday. The villages of students zone located within the range of 10-15 kms. The students from the area beyond the range of 10-15 kms. generally prefer to avail of hostelling facilities at Ahmadnagar of they live in rooms in groups, and share the rent individually in the city.

D) INTEGRATED SERVICE ZONES OF AHMADNAGAR CITY:

Every city or settlement perform several types of functions for its country side. In this study only salient functions are considered to demarcate service zones of Ahmadnagar city. The umlands drawn for such variables are superimposed as shown in fig. 6.8. But besides these zones the city also have district collectors and Zilla-Parishad's zone of operation district medical officers zone, district educational officers zone etc. But all these
have the district border as their umland boundary.

After superimposing the various service zones, the picture of integrated or composite umland becomes clear. The composite umland of Ahmadnagar city occupies the entire district, secondly it has covered the fringe of western part of Beed district. This parts of the Beed district is under the zone of influence of Ahmadnagar city due to their geographical proximity and the cultural and economic ties between the city and these areas (Ashki tahsil).

Various service zones of Ahmadnagar city are extended more towards south, west, south-east, north and north-east. Mainly Shrirampur, and Kopergaon have restricted Ahmadnagar's influence towards further north and by Sangamner towards north-west. This is due to fact that these three centres occur in relatively more developed irrigated tract and therefore, they only partly depend upon Ahmadnagar and have direct links with Pune, Nasik and Bombay cities.

The total area of the immediate umland of Ahmadnagar is 18,475 sq.kms. The following table indicate the area covered by each service zone of Ahmadnagar.

(table continued on next page)
AHMADNAGAR AREA OF SERVICE ZONES

<table>
<thead>
<tr>
<th>SrNo</th>
<th>Service zones</th>
<th>Area in the dist sq.kms.</th>
<th>Area outside district sq.kms.</th>
<th>total area sq.kms.</th>
<th>% area sq.kms.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vegetable supply zone</td>
<td>1188</td>
<td>54</td>
<td>1242</td>
<td>6.72</td>
</tr>
<tr>
<td>2</td>
<td>Milk supply zone</td>
<td>5400</td>
<td>1260</td>
<td>6660</td>
<td>36.05</td>
</tr>
<tr>
<td>3</td>
<td>Educational zone</td>
<td>3348</td>
<td>54</td>
<td>3402</td>
<td>18.41</td>
</tr>
<tr>
<td>4</td>
<td>Students zone</td>
<td>547</td>
<td>-</td>
<td>547</td>
<td>2.96</td>
</tr>
<tr>
<td>5</td>
<td>Commuters zone</td>
<td>720</td>
<td>-</td>
<td>720</td>
<td>3.90</td>
</tr>
<tr>
<td>6</td>
<td>Cotton purchase zone</td>
<td>4392</td>
<td>72</td>
<td>4464</td>
<td>24.16</td>
</tr>
<tr>
<td>7</td>
<td>S.T. Bus service zone</td>
<td>17035</td>
<td>-</td>
<td>17035</td>
<td>92.21</td>
</tr>
<tr>
<td>8</td>
<td>Composite umland</td>
<td>17035</td>
<td>1440</td>
<td>18475</td>
<td>100.00</td>
</tr>
</tbody>
</table>

The area covered by various service zones of Ahmadnagar are varied. The S.T. bus service zone covered maximum area of the district (i.e. 17035 sq.kms.) and the students zone covers minimum area of the district (i.e 547 sq.kms.). Milk supply zone covers considerable area from Ashti tahsil of Beed district, (i.e. 1260 sq.kms.). The commuters zone 3.90% and students zone (2.96%) cover
the smallest area of the total umland and it lies at the core of the integrated umland. The shape of various zones confirms to either physical cultural or both factors as discussed in the sequel.

E) GRADIENTS OF UMLAND OF AHMADNAGAR CITY

It is clear that the maximum intensity of services performed by the city is more only in the immediate surroundings as there is no competition from other centres. The dependance of the country side on the city generally declines outwards with increasing distance from the city. Fig. No 6.9 indicates the gradients of service zones. The immediate umlands of Ahmadnagar extend relatively more towards south, south-east and eastern part of the region. They do not extend much towards north because that part of the region comes under the influence of Shrirampur, Kopergaon, Sangamner as noted above.

F) THEORETICAL UMLANDS OF AHMADNAGAR CITY AND MEASURE OF SHAPE

The qualitative aspect of the shape is significant from many points of view. Firstly it reflects the controlling effect of physical and cultural features. Secondly it keeps on changing through time with the introduction of economic and social development measures as construction of highways, bridges across the rivers. Thirdly shape also varies with
Intensity of Services Area Under
SEVEN SERVICE ZONES
SIX ''
FIVE ''
FOUR ''
THREE ''
TWO ''
ONE ''

GRADIENTS IN THE IMMEDIATE UMLANDS OF AHMADNAGAR

Fig.No-6.9
changes in the levels of agricultural and industrial development in the umlands.

Generally the logical shape of an umland on an isotropic surface is circular. The hexagonal shape of service zones of umlands advocated by Christaller is based upon the law of physics that when uniform pressure is applied on a drop of water from all sides it assumes hexagonal shape, like that, the shape of service zones also tends to assume hexagonal shape due to the competition from surrounding centres under the conditions mentioned in the beginning.

On the basis of the Geographical area covered by various service zones an attempt has been made to identify the theoretical umlands of Ahmadnagar. (Ref. fig. No. 6.10). For showing theoretical umlands "r" of the circle covered by each service zone is calculated.

These theoretical umlands give clear picture of extent of various service zones from the city. It also gives the hierarchy of services and area covered by different selected services.

However since the, varied physical and cultural factors effectively interfere with this ideal shape in space and time, therefore, it is interesting to map the actual services zones and seek explanation to explain the shapes.
THEORÁTICAL UMLANDS OF AHMADNAGAR

LEGEND
1 STUDENTS ZONE
2 COMMUTERS"
3 VEGETABLE"
4 EDUCATIONAL"

LEGEND
5 COTTON ZONE
6 MILK"
7 S.T.BUS"
8 COMPOSITE"

Scale: 36 sq. kms.

Fig.No-6.10
The statistical measure of shape helps in identifying the degree of deviation caused due to varied factors from the ideal circular shape of a service zone. For calculating the measure of circularity it has been found that the simplest and most appropriate method is to divide the longest axis and find out the ratio between two (Tidwell). The value provides a suitable measure for comparing the deviation of circularity of various service zones.

With the application of this method indices of shape have been calculated for the various service zones. The results show that the shapes deviate variously from circularity due to different reasons.

Shape indices of service zones of Ahmadnagar city:

<table>
<thead>
<tr>
<th>Service Zones</th>
<th>Shape index</th>
</tr>
</thead>
<tbody>
<tr>
<td>i) Vegetable supply zone</td>
<td>1.45</td>
</tr>
<tr>
<td>ii) Milk supply zone</td>
<td>1.35</td>
</tr>
<tr>
<td>iii) Educational zone</td>
<td>1.49</td>
</tr>
<tr>
<td>iv) E Students zone</td>
<td>1.53</td>
</tr>
<tr>
<td>v) Commuters zone</td>
<td>1.43</td>
</tr>
<tr>
<td>vi) Cotton purchase zone</td>
<td>1.26</td>
</tr>
</tbody>
</table>

The shape of vegetable supply zone is elongated much towards north and south because of bearing of Pune-Manmad railway line and road. The shape of milk supply zone
is irregular and extends into Ashti tahsil of neighbouring Beed district. The bearing of Ahmadnagar-Solapur road, Ahmadnagar-Aurangabad road is clearly seen on the map. The northern segment of the district where sugarcane plays dominant role in the economy, is not covered in this zone.

The shape of the educational zone is somewhat rectangular and extends in the direction of Poona, Shrirampur and Pathardi. The shape of students' zone is elongated towards north-south because of Pune-Manmad railway line and road. The zone extends much to the west of Ahmadnagar than east. This is due to the fact that the area east of Ahmadnagar is considerably rocky and less developed than the western portion. The commuters' zone is much the same as the students' zone. The cotton purchase zone is irregular and reveals the bearing of road and railway system on it clearly. It is also influenced by the fact that cotton is cultivated in the irrigated areas of Rahuri and Shrirampur tahsils (Pravara and Mula river basins), as well as, dryer tracts of Parner and Ahmadnagar tahsils.

G) UMLANDS OF SMALLER CENTRES

Though, Ahmadnagar city, the regional centre and district headquarter of the region under study, performs central functions, the distant areas are intimately served by the respective tahsil headquarters and such other rural service centres. In order to surface the nature of
functions such centres perform their smaller umlands on the one hand and understanding their overall importance in the functioning of the urban eco-system, an attempt has been made here to delimit the umlands of all tahsil headquarters.

The district administration has twelve tahsil centres (excepting Ahmadnagar tahsil) that serve the distant areas with regards to essential functions required by those areas. As expected, the tahsil headquarters perform relatively simple functions and the extent of their services is mostly limited to the respective tahsils. The choice of indices has been made in such a way as to reveal their characteristics, clearly.

SERVICE ZONES OF TAHSIL CENTRES OF AHMADNAGAR DISTRICT

1) VEGETABLE SUPPLY ZONE

All the tahsil headquarters have to depend almost entirely for its daily needs of vegetables and fruits on the surrounding rural areas. As a result of it a compact supply zone forms around each tahsil centre. It is a market oriented and perishable commodity that promotes its cultivation in the proximity of the tahsil headquarter. Being a perishable commodity, it requires quick transportation. The zones are, therefore, aligned mainly along the
roads and railway. The vegetables are brought into the tahsil headquarters early in the morning or during the previous nights by trucks, buses, bullock-carts, bicycles, motor-cycles, and also by headloads. Generally, the horticultural product is coming from the distance of 10-15 kms. at different headquarters. Some varieties of vegetables perish very soon and therefore, require quick transport facilities. The shape of the vegetables supply zone is somewhat circular in Shrigonda, Kopergaon, Parner, Sheogaon and Sangamner and somewhat oval shaped in Akola, Shrirampur Rahuri, Karjat and Pathardi, which occupies nearly 1/4 or 1/5 part of tahsil. The zones are traversed by river, roads and railway.

ii) MILK SUPPLY ZONE

The milk supply zone of Rahuri is smaller than vegetables supply zone because the surrounding areas of Rahuri is agriculturally productive, and mostly under the cultivation of sugarcane and horticultural product. Whereas in other tahsils milk supply business is important. The physical economic and social factors are responsible for the development of Dairy-farming in these tahsils. The Maharashtra Government has given assistance to farmers from drier tract in the form of milk animals, loans etc. under various schemes of development. These activities have resulted in the progress of dairy industry. Some local dairies purchase milk, milk-
butter, ghee, curd etc. from villagers coming from surrounding areas. There are also number of milk-vendors from villages who sell milk daily directly to the customers. This supply comes from a maximum distance of 10-15 kms. either by bicycles, mopeds, motor-cycles, buses and railway. The shapes of milk supply zones for Kopergaon, Sangamner, Sheogaon, Parner, Shrigonda are roughly circular.

iii) **EDUCATIONAL ZONE**

Each tahsil centres has a degree college by now. Educational zone of each tahsil headquarter of the Ahmadnagar district covers almost whole tahsil area. With the rise of colleges at tahsil headquarters, where previously these facilities were not available, influence of Ahmadnagar city has reduced.

Education is one of the important functions of each tahsil headquarters of the Ahmadnagar district. The future extent of the educational zones will depend upon educational facilities offered by tahsil headquarters in the new faculties of learning, improvement of standard, and provision of cheaper hostelling facilities etc.

The shapes of educational zones of all the tahsil headquarters are irregular. It depends upon progress made by other tahsils in the field of educational
facilities, the network of roads and frequencies of transport media. There are degree colleges along with the number of Junior Colleges and high schools at all tahsil headquarters.

iv) WATER MELON ZONE

The water melon zone obtains only in Kopergaon and is peculiar to it. Water melon is produced on large scale in this tahsil in the Godavari and Pravara valleys. The farmers sell water melon to traders in Kopergaon and this centre plays the role of distribution of melon to various places. This is one of the important cash crops in the tahsil and the number of farmers is increasing due to attractive profit from this product.

Students zone of each tahsil headquarters of Ahmadnagar district covers smaller area of the tahsil. This zone is smaller in each tahsil than other service zones. There are very few villages from where students come regularly by bicycles, S.T. buses or by railway to attend the college.

Few commuters come from surrounding villages daily for the employment and in various types of jobs at Sangamner, Shrirampur and Kopergaon. The commuters come regularly by bicycle, S.T. buses, railway or by motorcycle from distance of 10-15 kms.
H) **INTEGRATED SERVICE ZONES OF TAHSIL HEADQUARTERS AND AHMADNAGAR CITY**

The umlands drawn for variables are superimposed as shown in fig. no. 6.11 after superimposing the various service zones the picture of integrated umland become clear. The composite umland of each tahsil headquarter occupies the entire tahsils, generally.

Mainly, Shrirampur, Kopargaon and Sangamner have restricted Ahmadnagar's influence towards north. These three centres occur in irrigated and relatively more developed tract, therefore, they partly depend upon Ahmadnagar and have direct links with Bombay and Nasik cities for business.

Various service zones of tahsil headquarters are extended along the road, railway and river side. Shrirampur, Kopargaon, Sangamner etc. big towns serves the northern part of the district.

I) **MEASURE OF SHAPE**

The indices of shape have been calculated for the various service zones of tahsil headquarters. The results show that the shapes deviate from circularity due to different reasons.
SHAPE INDICES OF SERVICE ZONES OF TAHSIL CENTRES

<table>
<thead>
<tr>
<th>SrNo</th>
<th>Centres</th>
<th>Vegetables</th>
<th>Milk</th>
<th>Education</th>
<th>students</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rahuri</td>
<td>1.85</td>
<td>2.93</td>
<td>2.34</td>
<td>2.46</td>
</tr>
<tr>
<td>2</td>
<td>Shrirampur</td>
<td>2.33</td>
<td>1.33</td>
<td>1.43</td>
<td>1.59</td>
</tr>
<tr>
<td>3</td>
<td>Nevasa</td>
<td>1.06</td>
<td>1.73</td>
<td>1.25</td>
<td>1.17</td>
</tr>
<tr>
<td>4</td>
<td>Sheoason</td>
<td>1.45</td>
<td>1.85</td>
<td>2.14</td>
<td>1.48</td>
</tr>
<tr>
<td>5</td>
<td>Pathardi</td>
<td>4.64</td>
<td>4.13</td>
<td>2.89</td>
<td>1.40</td>
</tr>
<tr>
<td>6</td>
<td>Jamkhed</td>
<td>1.05</td>
<td>1.43</td>
<td>1.20</td>
<td>1.24</td>
</tr>
<tr>
<td>7</td>
<td>Karjat</td>
<td>2.00</td>
<td>2.00</td>
<td>1.33</td>
<td>3.90</td>
</tr>
<tr>
<td>8</td>
<td>Shrigonda</td>
<td>1.29</td>
<td>1.27</td>
<td>1.06</td>
<td>1.30</td>
</tr>
<tr>
<td>9</td>
<td>Paranaer</td>
<td>1.70</td>
<td>2.35</td>
<td>1.32</td>
<td>1.30</td>
</tr>
<tr>
<td>10</td>
<td>Akola</td>
<td>2.00</td>
<td>4.17</td>
<td>1.60</td>
<td>2.77</td>
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<tr>
<td>11</td>
<td>Sangamner</td>
<td>1.42</td>
<td>1.17</td>
<td>1.67</td>
<td>1.10</td>
</tr>
<tr>
<td>12</td>
<td>Kopergaon</td>
<td>1.13</td>
<td>1.20</td>
<td>1.14</td>
<td>2.31</td>
</tr>
</tbody>
</table>
The shape of service zones of tahsil centres deviates from circularity due to influence of physical and cultural factors as discussed below.

The shape of milk supply zone of Rahuri is elongated much towards north and south because of bearing of Pune-Manmad railway line and road, and Mula, Pravara river basins with their irrigation facilities. The shape of educational zone of Rahuri is irregular. It has a bearing of Pune-Manmad railway line and Rahuri-Sangamner road, therefore, the extent is somewhat more towards north and west. The student zone is much the same as the milk supply zone. The educational zone of Sheogaon extends towards east-west and north-west due to Sheogaon-Georai and Sheogaon-Kopargaon roads. The shape of vegetable supply zone of Pathardi is elongated much towards east-west because of Pathardi-Georai, Pathardi-Rahuri and Pathardi-Ahmadnagar roads, and southern portion of this tahsil is hilly. The shape of milk supply zone and educational zone is much the same as the vegetable supply zone and same reasons. The shape of vegetable and milk supply zones of Karjat are elongated much towards north-west to south-east because of bearing of Ahmadnagar-Solapur road. The shape of milk supply zone of Akola is elongated much towards east-west and north-west because of Pravara river basin with its irrigation facilities and Sangamner-Akola
road; and this part is relatively less hilly. The shape of vegetable and student zone of Akola is elongated much towards east-west because of above mentioned reasons. The shape of water melon zone of Kopargaon is elongated towards north-west to south-east following the course of Godavari river.

J) CITY AS AN ECO-SYSTEM

The higher order central places form the apex and the lower order centres as subsidiary systems along with their respective proportionately smaller umlands in hierarchial fashion. The tahsil places and the other small settlements of the region form the lower order components. In other words, an urban eco-system of central places is an extremely complex entity made up of an urban hierarchy of smaller urban settlements accompanied by a hierarchy of their respective umlands.

Interaction takes place between the subsystems of various order of settlements with the system of Ahmednagar city. Shrirampur (class II) is the second important town in the district with Kopargaon (class III), Sangamner (class III) and Rahuri (class III) the other important towns in the district. These towns are growing in importance in the fields of trade, commerce, transport, education etc. They may retard further the
zone of influence of Ahmadnagar, in future. Kopargaon, Sangamner, Shrira mpur, Rahuri, Newasa have umlands smaller than the umlands of Ahmadnagar city while those of Akola, Sheogaon, Pathardi, Parner, Shrigonda, Karjat and Jamkhed are still smaller because of their lesser important functions. Thus, there are several interrelated sub-systems which vary in their extent according to the size of the population and the functions performed by smaller central places. Ahmadnagar city has better facilities in some respects for which people from all over the district visit Ahmadnagar. Therefore, it is clear that medium and small towns or settlements have their own umlands and have relationship with the surroundings villages and these sub-systems also have interaction with the larger class I city i.e. Ahmadnagar, as also amongst themselves, independently.
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