CHAPTER VII

SUMMARY AND CONCLUSIONS

The preceding chapters worked out on the quantitative analysis of road development at tehsil level in Solapur district. The district has eleven tehsils, out of them some tehsils have less road length and restrict the process of interaction within the tehsil and intra-tehsil level. Hence, it prohibits the natural growth of regional development. It is very important to operate smooth and efficient transportation system to promote regional development. Especially roads, which is part of this transportation system is important because of its characteristics and road transportation directly or indirectly affect on human groupings. Hence, it is necessary to understand the barrier before suggest the sustainable development plan for road transport system and regional development.

It is realized that methods of studying transportation geography is different by capitalist and socialist economic system of the world. Socialist countries studies geographical aspects of the problem of optimal proportions between transport development and the development of entire national economy. The capitalist countries study the influence on transportation of the unplanned structure of economy and competition between various modes of transportation.

Man can change and modify the physical landscape into a cultural landscape with the help of transport facility because; transport arteries tied the region with rest world. The Solapur district is one of the leading districts of Maharashtra State. It has 4.8 percent area of total Maharashtra and 43,15,527 population, but less road development found as compared to it. The entire region is divided into three basic physiographic divisions: 1) the hilly region: above 600 meters, 2) The plateau region: between 450-600 meters and 3) the low land plain region: below 450 meter. The hilly region occupies 3.34 percent of total district area. Ramling hill, which lies on north-west boarder of Barshi tehsil affect locally on road connectivity in that area. In south –west part of Malshiras tehsil, Mahadev range affect on local connectivity. Due to this, Malshiras and Barshi tehsils fall in low road development in 1981. Karmala and Madha tehsils have hills, poor in terms of agriculture hence human settlement is meager. Due to this thin road network, Madha and Karmala are categorized in low
road development category. Thus, it is indirectly affected on roads development in that area. Plateau covers 80.00 percent and low land plain region occupies rest 16.66 percent area which promotes the development of roads. The district lies entirely in the Bhima, Sina and Man basins. These rivers do not form major obstacles. Some times in rainy season small streams made considerable disruption in village connectivity.

Since, the region under study is very small and belongs to Deccan plateau of India. There are no evidences of folding and faulting. The geology provides the abundant material for construction of roads. Broadly, the climate of the Solapur district is monsoonal in nature, divided into four seasons- December to February, March to May, June to August and September to November. Some climatic conditions of temperature, rainfall, wind and humidity in the district are of dry tropical regions of Maharashtra. Soil of the district can be broadly grouped into three types: i) Shallow Soil, ii) Medium Deep Black Soil, iii) Deep Black Soil. The fertile soil give large production with the help of irrigation facility and this is seen in Malshiras, Karmala, Pandharpur and Barshi tehsils. The study region was formed in the year 1838 and consisted of eight sub divisions. At present it has eleven tehsils including thirteen towns. During course of time many changes occurred in territorial boundaries largely influence on the development of roads.

Among the various social aspects, the pressure of population on roads is observed in district. The population in North Solapur tehsil denotes highest and Mangalvedha is lowest population. The same condition is revealed in case of population density of these two tehsils. An industrial area occupies a significant position because roads are developed in proportion to industrial development. Industrial areas located near to National Highway or Major State Highway to provide transport facility to industries in district.

Due to the inland location of the study region, total economy of the district is depend on roads and railways. But the merits of road transport and demerits of railways are clearly seen in the region. Only 368 km railway length is available in district. As compare to this, roads length is enhance rapidly. In the road transport, highway plays an important role in change economy of region. National Highways is benefited to Madha, Mohol, North Solapur and South Solapur tehsils. Yet the desired length of it not completed in district. But the satisfaction is that the work of four lanes is in progress from Solapur to Pune. The Major State Highway and State Highway were accounts high percent than National Highways. These roads well connected with
market centers and nodal centers of district and it radiated towards the state capital-Mumbai. The total length of this State Highways registered 221.46 percent (Actual road) growth from 1961 to 2001. The other category of roads is also recorded remarkable growth. But it have low rate of maintenance and the condition of road become very poor in case of Village Roads and some extend to District Road and Major District Road.

Initially Nagpur Plan ensues twenty years plans establish the landmark in the road development planning. Nagpur Plan classified roads and envisaged about connectivity of nodes as per their importance. This plan also determines the standard and specifications of each type of roads category. At the end of Nagpur Plan Solapur District has 2075.61 km total road length.

As per the changing pattern in the field of agriculture, industrial and economic sector need review of Road Development Plan. So that Bombay Plan (1961-1981) came in to force. Continues growth in urbanization and population gear up in the road services and urgent need to construction of new road or upgrade the present roads. Due to the famine conditions the figure of total roads in kilometer has swelled up to 9054 km which was greater than target of this plan. This was only because of the inclusion, first time village roads constructed through various program (Rojgar Hami Yojana) to give the employment to famine affected village population.

Under the influence of energy crises, environmental degradation, technological change and change in techniques formulate Lucknow Plan (1981-2001). This plan takes bold step of making Expressway on the basis of other counties. But up to the end of this plan, in study area there were neither found expressway nor achieve the physical target of road length which was amended time to time (1987, 1993 and 1997). So that next twenty year Road Development Plan was prepared in 2012.

In the Vision 2021 Plan for the Solapur District first time attention is given towards Palkhi Marg and started it to convert in State Highway and Major District Road. The route of Saint Dyneshwar Palkhi is Alandi to Pandharpur which passes through Pune, Hadapsar, Sasvad, Jejuri, Nira, Lonand, and Dharmapuri. It has total length of 211 km but within district it was only 80 km. The route of Saint Tukaram Palkhi is Dhehu to Pandharup which passes through Pune, Hadapsar, Yavat, Patas, Vasud, Baramti, Indapur, Akluj, Lonand Fata, and Tondale Bondale. It has total length 214 Km but within district it was only 32 km.
Soviet scholars have developed a topology that takes into account the network density and degree of connectivity and the proportion of transportation and level of development. In this research work indices of graph theory i.e. alpha beta and gamma compare the tehsil level topological properties of the network. The obtained data through these indices were appropriately similar to present situation of study region. Thus these indicators perfectly suited. That’s why the above choice of technique of analysis the transportation network of study region is correct and the obtained results are empirically verified as below.

In 1981, Mangalvedha (0.80) witnessed high road density followed by North Solapur (0.70), Akkalkot (0.69) Madha (0.66), Karmala (0.63), Malshiras (0.63), Pandharpur (0.62), South Solapur (0.62) and Sangola (0.60) tehsils falls in moderate density spread over major study region. Relatively small patch of low density area located on Barshi (0.59) and Mohol tehsil (0.59). In 2001, Malshiras (1.01), Mangalvedha (0.98) Sangola (0.99), Madha (0.94), Mohol (0.91), Akkalkot (0.88), Barshi (0.95), South Solapur (0.85), North Solapur (0.82) and Pandharpur (0.81) tehsils score highest road density and formed large area over Solapur district and only tehsil, Karmala (0.74) registered moderate road density.

The calculated values of alpha, beta and gamma index for 1981 shows variation as per their properties, hence tehsils come under high, medium and low category in above indices according to scores. As per ranks Karmala stood first and Madha was ranking last. As the same time in 2001 Malshiras tehsil ranks first while Karmala tehsil was having lowest rank because of fewer connections of roads as compared to nodes.

The mean value of alpha index shows 23.53 percent growth in 2001, as compared to score of 1981 (0.34). The mean value of beta index registered 9.52 percent growth in 2001, as compared to data of 1981 (1.68). The mean value of gamma index shows 7.02 percent growth in 2001 as compared to data of 1981 (0.57). Six tehsils of Solapur district denote grid pattern of road in 1981 and other tehsils inclined towards delta pattern. In 2001, more than eight tahsils registered in Delta pattern. With the above discussion the study revealed that overall growth of transportation network is registered in 2001 as compare to 1981.
For achieving the above objective, physical and nodal accessibility measured for study region gives some interesting results. Accessibility, whether it is rural or urban have been improved industrial and agricultural development and cumulatively shows the changes from agricultural economy to industrial node. It is witnessed in study region the new roads emerge from Pandharpur to peripheral region, changed physical accessibility conditions and now with the improved roads and transport facility, number of industries and service activities are located in this pocket pull the accessibility area.

As considered to nodal accessibility, it is largely influenced by size and spacing of towns. It is evident from the above study that the population size of town is considerably determined by the accessibility. The rate of the process of urbanization is high when it is accessible and vis-a-versa. The major finding related to accessibility from the research is listed below.

Barshi (0.00), Malshiras (0.00), Akkalkot (0.33), Pandharpur (0.57) tehsils registered less than one percent area in the 0-5 Km buffer zone from arterial road. Karmala registered as low as 2.60 percent area in this tier due to lack of arterial road. Obviously highest percent of area (59.27 percent) found in North Solapur tehsil. Followed by Mohol (57.11), Sangola (42.82), South Solapur (39.83), Mangalvedha (38.08) and Madha (25.94) orderly comes due to close proximity to nearness of National Highway which passes tehsil boundary. The tehsil which denotes lowest area of percentage in the tier 0-5 km category has highest percent of area in 10-15 Km and beyond 15-Km, and vis –a- versa.

The new roads initiated from Pandharpur to rest nodes change the pattern of physical accessibility in 2001. Another remarkable change found due to Mangalvedha to Jath road degree and categorized in State Highway hence not present in accessibility figure 2001. Barshi (0.00) and Akkalkot (0.33) remain same in term of area lying under the 0.5 Km tier. North Solapur (58.89), Mohol (51.22), Mangalvedha (50.56), Pandharpur (44.60), South Solapur (39.83), Malshiras (36.32), Karmala (33.64), Sangola (30.65) and Modha (30.70) tehsils denotes the orderly number as per their registered areas.

In 2001, in case of direct connectivity Pandharpur and Solapur scored highest direct connection (5) followed by Kurduvadi (4), Karmala, Mangaledha and Barshi (3) Sangola, Akkalkot and Mandargi (2) and Dudhani (1) have respective direct connections. In terms of indirect connectivity these ten nodes arrange as per their
scores then they stood as Pandharpur, Solapur, Kurduvadi, Karmala, Barshi, Mangalvedha, Songola, Akkalkot, Maindargi, and Dudhani. As per the shortest path matrix results Solapur ranked first followed by Pandharpur, Kurduvadi, Mangalvedha, Akkalkot, Barshi., Karmala, Sangola, Maindargi and Dudhani.

In 2011, direct connectivity scores of the centers are shown in bracket Pandharpur (6) Akluj (5) Kurduvadi (5), and Solapur (5) scored highest direct connection. Followed by Karmala (4), Mangaledha (3), Barshi (3), Sangola (3), Akkalkot (2) and Mandargi (2) and Dudhani (1) centers have respective direct connections. In terms of indirect connectivity nodes arrange as per their scores then they stood as Pandharpur, Kurduvadi, Akluj, Karmala, Solapur, Barshi, Songola, Mangalvedha, Akkalkot, Natepute, Maindargi, and Dudhani. As per the shortest path matrix results Pandharpur stood first. Followed by Solapur, Kurduvadi, Akluj, Mangalvedha, Karmala, Barshi, Akkalkot, Sangola, Natepute, Maindargi. Dudhani falls least in terms of shortest path matrix.

To find out the relation of transport and development of study region, scale free values of the transport indicators and development indicators were generated. The results are summarized as under:

The general stage of development suggested by Rastows observed (agriculture society to industrial society) in district. The transport development is not associated in Karmala and Mohol tehsil in the 1981. Only Mangalvedha tehsil is perfectly development according to transport development.

The total scenario of transport and development has change in 2001. The tehsils Karmala and Mangalvedha revealed the perfect low transport development and low regional development. On the other hand, North Solapur and Malshiras emerge with high transport development and high regional development. The study highlighted that the transport and development of district is yet in developing stage and tehsil wise data also shows wide regional variations.

The analysis of the pattern of development and transport of Solapur district, explained that there is hardly any significant and perfect relationship between these two. The transport development in region is not associated with the regions requirements. This factor influencing on transport development and pattern of development do not seen to go with each other. The historical factors affect on both of them. To promote transport development it has to upgrade the regional development. It is seen that with the help of providing infrastructural facility to minimize regional
gaps. But the utilization of these facilities is depending on the quiet and efficient program. In 1981, it has to seen the low transport and low development, medium transport and medium development, and high transport and high development incase only two tehsils. Pandharpur and Mangalvedha shows perfect correlation of transport and development. Medium transport development and medium regional development observed in Pandharpur. High transport development and high regional development is seen in Mangalvedha tehsil. These tehsils form small pocket in south-west area of study region. Remaining nine tehsils were not proportionally associate with transport and development. Maximum percentage of area comes in low transport and medium development category and spread over Akkalkot, Barshi, Malshiras, South Solapur and Madha tehsils. Most of the eastern part of district comes under this area.

In 2001, low transport development and low regional development denotes in Karmala and Mangalvedha tehsils. Medium transport development and medium regional development is observed in Mohol tehsil and High transport development and high regional development found in North Solapur and Malshiras tehsil. Out of eleven, five tehsils were associated with transport and development. Remaining six tehsils were not associated with transport and development. Madha demotes the high transport development but low regional development, it is necessary to upgrade development level. Barshi, Akkalkot and South Solapur, eastern part of district have high transport but medium development, it has to time to stimulate infrastructure to make to pull them in high development category.

The analysis confirmed that there is a strong coherence between the transport and development rather the spatial distribution of socio economic phenomena. It can be stated that this relation is not linear in Solapur District. The influence of spatial interaction characteristics can over write in the formation of development positions it can be both negative and positive.

**SUGGESTIONS**

The previous identity of district is not remaining same at present that, Solapur District is so backward region and a drought prone area. This is only happened due to the change in agriculture technology and irrigation facility. At present, the district is well known for highest area under sugarcane crop, fruit cultivation and highest number of sugar factories.
It is seen that the composite indices of the transport (road network) and development indices should give guideline for the planners to chalk out viable plans for harmonious development of the regional transport which is further initiate the development of the micro-regional economy. Some possible suggestions are given below for improvement of road development in the region under study.

1. The proposals for the transportation planning suggested above during twenty year plans, if properly implemented, will not only solve the problems of transport but will also enhance the efficiency of the network, the mobility of the area. But unfortunately, it has not happened in Solapur District from beginning hence it is suggested that to implement the present plan efficiently and promote the transport development.

2. The role of Public Works Department, Zilla Parishad and Nagarpalishad should have constructive attitude. They are proposing and constructing new roads in district.

3. Not only Solapur City but the other centers are not performing according to their competency (Solapur city has already crossed ten lakh populations). Hence have to create new growth pole centers to promote regional economy.

4. These centers are provided with good road transport and communication facility.

5. Akkalkot, Pandharpur and Tuljapur (Osmanabad District) and fall on the religious circuit. Here still more transport ease to desirable keeping in view of the lakhs of tourist arrivals. Presently four lane roads sanctioned but it is not in progress it should be complete as early as possible.

6. Mohol tehsil is growing cash crops in recent period hence it is promoting it in developed region. Hence in coming period it requires the proper road development.

7. Barshi tehsil is transformed due to change in agriculture sector therefore it requires new roads.

8. Karmala tehsil is now inclined towards to take cash crops due to increase in irrigation facility. It is necessary to develop roads length also.

9. Akkalkot tehsil also need to sustain its agriculture sector to improve development. Therefore the tehsil require quality roads to develop.
FURTHER DIRECTIONS FOR RESEARCH

Finding of this research work is used as stepping stone to another research which is not attempted in present work. The development of roads is pinpoint issue in developing countries like India. In this regard the following paragraphs provide some topics for further research. This will enhance the understanding of transport geography of study region.

1. Passenger Flow In and Around: A Case Study of Solapur District.
2. Urban Transport and Regional Development in Solapur District.
3. Rural Transport and Regional Development in Solapur District.
6. Travel Behavior Pattern of Women in Solapur District.
8. Transport And Tourism Promotions A Case Studies In Solapur District.