Chapter 3

ACCESSIBILITY AND INDUSTRIAL DEVELOPMENT.

Industrial development brings about basic change in spatial aspect of an economy. It necessitates the conversion of isolated village economy into interdependent, expanding inter-regional and international economy. It is an indispensable, ensuing process, as industrial development is a change comprising spatially extensive production process induced by technological improvement. It accelerates the extension of market area and supply area. The extension of market area cannot be imagined without improved and efficient transport system. We are aware that the link between transport sector and industrial sector is not unidirectional but it is reciprocally bidirectional, as revolutionary changes in transport sector are scarcely probable without industrial advance. Nevertheless, analysis is to be confined to promotional impact of transport improvement on industrial development in the region.

The rate study of public investment in India has made it evident that the uneven development of different regions in India could partly be attributed to the uneven distribution of the railways: the Public investment in railways during the period between 1893-1914 was concentrated in North Eastern and North Western regions. The heavy investment in railways in the North Eastern Region provided external economies to the newly developing industries in that region by procuring cheap transport and by opening up the internal market. The eastern Bengal Railway strengthened the
competitive power of the jute industries in Calcutta against Dundee by reducing the cost of transporting its raw material. Mining industries, particularly coal industry made an uninter-
erupted progress as development of transport enabled many In-
dian industries to give up foreign coal in favour of the indi-
genous coal. Thus it could be said that public investment in railways in these regions created an environment in which private enterprise could thrive.¹

The relationship between industrial development in the Region and road accessibility can be analysed in the following context:

a) Spatial concentration of industrial units.

b) Technological transformation.

c) Excess capacity and capital formation.

Spatial concentration of industrial Units.

The accessibility bestows upon a region or a town an industry attracting locational pull. This industry attracting locational pull is a culmination of transport externalities with their ramifications in the form of technological and pecuniary externalities.² It further manifests itself in multiplier effect generally termed as secondary benefits³. Survey

1. Thavaraj, M.K. "Public Investment in India." The Indian Economics Review, August 1955, The Delhi School of Economics pages 43-44


studies undertaken to inquire as to why plants or firms choose a certain location evidenced that accessibility is one of the important variables that influences location decisions. For instance, according to the table based on "The 1960 White Paper of Industrial Location in Japan", raw materials, railways, roads and sites were in general more important than places of consumption.

This suggests us that the Region with paucity of roads would be unattractive for the industrial concentration. It implies that the industrial concentration would be evidenced in those regions where the efficient road system exists. The underdevelopment in Industrial sector in Marathwada can be attributed to lack of transport facilities. The possibility of back-wash effects cannot allow us to accept above mentioned contention without resorting to empirical analysis with special reference to Marathwada.

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2. Ibid p.197
Accessibility and Technological transformation process:

It appears that analytical relation between the level of accessibility and the level of technology has not received the attention it deserves, although the strong positive correlation is revealed between higher level of accessibility and improved technique of production. The theoretical discussion has been centred around the effect of distance i.e. of transport cost on market area influencing equilibrium of the firm with the given technology. An analysis of the causative, reinforcing phenomenon of technological transformation facilitated by improvement in transport facilities is highly crucial to unfold the relation between industrial development and transport improvement.

Let us assume, at the outset, that the firm with traditional small scale production technique is situated in the region devoid of modern transport facilities implying high transport cost. The initial equilibrium of the firm can be shown with following assumptions.

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Figure - 4

AR = Average Revenue Curve
DMR₁ = Distance Marginal Revenue curve before improvement in Road accessibility.
DMR₂ = Distance Marginal Revenue curve after improvement in Road accessibility
TAC = Average cost curve of traditional Firm
TMC = Marginal cost curve of traditional Firm
NAC = Average cost curve of new Large scale Firm
NMC = Marginal cost curve of new Large scale Firm
1) Demand is evenly distributed over the distance.

ii) Transportation cost is linearly related to distance.

iii) The price charged to the consumer is uniform irrespective of the distance. This is a kind of concealed price discrimination.

These assumptions enable us to draw the distance-marginal net revenue curve showing diminishing marginal net revenue to the firm at each distance from the location of the firm after paying transportation cost as shown in figure (1). Marginal cost curve i.e. (MC) and average cost curve (TAC) represent production function of the traditional firm. Maximum profit equilibrium point is identified satisfying two conditions.

1) Marginal cost = Marginal net revenue.

2) Marginal cost curve (MC) intersects distance-marginal net revenue curve (DMR) from below at point (Q). It specifies equilibrating market area singling out equilibrating distance boundary (OM\(_1\)).

The production function of new large scale technology firm is indicated by New Marginal Cost Curve (NMC) and new Average Cost Curve (NAC). The difference between two production functions is self evident in figure (1). Average and marginal cost of new large scale firm are higher for lesser
output and are lower for sufficiently larger output as compared to the same for traditional firm. The fall in net revenue owing to high transport cost is so high that new large scale technology appears to be infeasible as distance marginal net revenue curve is lower than marginal cost curve over the entire production function. Thus technological transformation would be withheld. It illustrates how improved transport facilities reducing transport cost thereby raising distance-marginal net revenue function is crucial, as extended market area required for marketing large production cannot be materialized without improvement in transport facilities. Now let us analyse the impact of improvement in road accessibility in the given region. Suppose that new surfaced road is constructed so that trucks can penetrate into the area. The transport cost function per ton per distance unit would be lowered, consequently et al. distance marginal revenue function would move upwards as shown in the diagram around the same point on Y axis. This new distance marginal revenue curve based on the same uniform price makes new large scale improved production function feasible and profitable. The new equilibrium point \( Q_2 \) specifies
the new equilibrating distance boundary \((OM_2)\) assuming that old firm has substituted new technique of production. This avoids the problem of sharing market between firm with old technique and firm with new technique.

The adaptation process:

Now we can take up the more realistic situation comprising of rival firms: one with old technique and other with new technique.

The adaptation process pertinent to this situation presents many probabilities, mainly two situations can be conceived, one is that of complete elimination of traditional firm, other is that of the juxtaposing the firms sharing the market.

Elimination probability:

The elimination of the old firm would be natural as a result of higher competitive strength of new large scale producing firm ushered in by improvement in road accessibility. The process of elimination may eventuate through price competition. The existence of old firm to certain extent, contracts market thereby restraining the process of realising increasing returns to scale. This may induce the new firm to reduce the price directed to increase the share in competitive, overlapping market area. It may, no doubt
gradually, culminate in the elimination of rival firm. The old firm owing to high cost function cannot avert this situation. The market under consideration is synonymous to duopolistic one so competition through product improvement can be persuaded. Keeping the same level of price new firm can produce high quality close substitute product and eventually elimination would follow.

**Survival probability:**

The possibility of survival of old small scale firm even after lowering transport cost function cannot be denied. In many cases, we find that the firms with old technique of production and new firms with efficient technique of production co-exist.

The reduced transport cost function raising distance-net-marginal revenue function does not make only new firm feasible but also extends the bounery of market area of old firm as revealed in the figure (2). The difference lies in the fact that the qulibriating market area for new firm is larger than that of the traditional one. The perpetual co-existence of both types of techniques can be attributed to various interacted adjustments. The survival of old firm alongwith new firm with the same uniform price
at the same location segregates market area into two qualitatively different types of markets: One adjacent to the location, having overlapping market area and other, beyond the boundary of the old firm is non-competitive area. From the point of view of aggregate market total demand function can be assumed undisturbed. But from the point of view of individual firms the distance demand function cannot remain the same. Individual firm within overlapping area has to encounter the distance marginal revenue curve with gaps at points where other firm has captured the market. This implies discontinuous distance marginal net revenue curve corresponding to competitive market segment; only new firm would have continuous segment of the same curve. For diagrammatic representation one distance-marginal net revenue curve will suffice, specifying gaps and dots indicating demand captured by the old and the new firm respectively. Continuous segment of the curve obviously represents market area exclusively for new firm. The sharing of the market would not allow to produce the same equilibrium output corresponding to situation where no rival firm exists and as a result, no problem of sharing of market arises. It necessitates new distance equilibrium point specifying contracted market area.
for new firm as well as for the old one. This effect
can be depicted by stretched cost curves laterally on
the same plane towards Y axis to the extent of redu-
cition in output owing to diverted demand to the rival.
These adjusted cost curves are dotted curves as shown
in the figure.

In our earlier analysis, we have taken for granted
that improvement in transport facilities provides
transport cost-saving-benefit equally to the new firm
as well as the old small scale firm. This is argued
on the basis of uniform freight rates. Is this consis-
tent with actual behaviour of freight rate function?
Obviously not, as modern transport modes including
road transport and rail transport have freight rates
which vary according to length of the trip and size of
the consignment. Many empirical studies\(^1\) demonstrated
that the transport charges increase as length of trip
and size of consignment increase but less than pro-
portionately. It implies that the freight rates per dis-
tance unit are decreasing function of length of the
trip and the size of the consignment. Thus modern

\(^{1}\) Chisholm Michael; Freight transport costs, indus-
trial location and regional development. (ed)
Chisholm Michael and Manners Gerald, Spatial Policy
problems of the British Economy Cambridge University
Press 1971 pp. 234 to 236.
transport system discriminates in favour of new large scale firm having ability to serve distant markets against old small firm compelled to confine to smaller local market area. It implies greater degree of diversion of distant market demand from the old one to the new firm. One more possibility cannot be denied. This non-linear freight rate function implying non-linear distance-marginal net revenue, may induce new firm to concentrate on distant market area which is comparatively advantageous to the new firm and leaving completely short distance market to the old firm. This old firm may survive.

This policy by new firm would be reinforced by certain additional factors. A peculiar observed spatial dispersion pattern of population-agglomeration making demand pattern spatially uneven and discrete. The distance between metropolitan cities and big urban centres is generally longer than between smaller towns and villages. Thus the concentrated markets of big urban centres are significantly distant from each other. The markets that would be preferably captured by new large scale firm would be urban markets. The small scale firm can survive by supplying products to sparsely dispersed small markets in the villages and small towns nearer to the firm. It can
be added that the greater possibility of sufficient back-haul from big urban centres induce the lower freight rates. Thus the concentrating on urban markets is likely to provide three important freight reducing factors to large scale firm: full load consignment, long distance haulage and greater probability of sufficient back-haulage. These benefits can be realised only by new large scale firm.
Accessibility, Excess capacity and Over-capitalisation.

It can be reiterated that economics of location recognises transport cost as one powerful determinant of locational choice for industrial units. The economic analysis has been concentrated on the problem of location of industrial units under the influence of transport cost along with other factors; yet the economic impact of the level of transport cost upon the capital formation and utilisation proportion of existing industrial productive capacity has not received due attention. The problem can be posed as follows:

i) What is the relationship between the level of transport cost and the capacity utilisation proportion i.e. the excess capacity observed especially in underdeveloped regions and countries?

ii) What is the relationship between the level of transport cost and number of industrial units established?

iii) What would be the impact of improvement in efficiency in transport system reflected in lower transport charges on utilisation proportion of existing capacities and number of industrial units?
We can now analyse these problems with the help of the concept of supply area which is more pertinent to the locational problems of processing units of agro-products like ginning and pressing mills and oil mills.

An analysis of supply area is essential as a processing unit has to procure raw material from distant places that are highly scattered over a wide area. The distance from processing firm and transport rates tend to influence the size of the supply area through changes in cost functions. The different kinds of concepts of supply area can be defined: survival supply area can be defined as an area required to operate on a large enough scale to make the firm survive. Equilibrium supply area would be corresponding to equilibrium point corresponding to attainment of pre-determined objective like maximum profit. Optimum supply area would refer to area for procurement of adequate raw material for minimum cost output. Further, one more concept can be added: full plant utilisation area which pertains to the area required to use technical plant to its fullest physical capacity.¹ The transport cost would determine the boundary line for supply area along with other given parameters. An analysis of

¹. Fullest physical capacity implies technically possible maximum output in given period; this fullest physical capacity output is different than optimum output at minimum average cost.
boundaries of supply area would be analogous to market area, hence we need not repeat all facets of it. But a few salient aspects may be envisaged. The impact of efficiency of transport facilities on spatial price formation is relevant to our analysis. The spatial price structure depends upon the economic distance between marketing centre of raw material and the location of processing units. In general, the price in local market is a decreasing function of economic distance between location of processing unit and marketing centre with the given price at processing unit.

So assuming constant price at processing unit, we can say

\[ Y = f(p_j, t_1, x) \]

\[ Y = p_j - t_1 x \]

\[ t_1 = \text{Rate of transport charges per unit of distance per unit of raw material.} \]

\[ X = \text{Distance between processing units and marketing centre.} \]

The above equation indicates that as distance between marketing centre and processing unit increases, the
local price relatively tends to diminish with given price at processing unit. At this stage, one constraint can be introduced: The local price (W) cannot fall below a minimum floor price specified by price of the substitute crop or raw material. If Z is a floor price implying transfer price, we can write \( Y = Z \), where Z is defined as minimum price required to keep the same acreage under the same crop or required to induce producer to offer undiminished supplies of raw material.

Let us assume a firm situated in a region where internal road system is very poor imposing high freight rates. The firm is marketing processed product to the distant competitive single terminal market, implying that price of processed product is given and average revenue and marginal revenue curves are free from distance impact owing to single terminal market; hence AR and MR curves can be regarded similar to the same in perfect competitive market. It is to be assumed that the firm acts as a single buyer in the given region; this implies the monopsonistic nature of raw material market in the area.

At the outset, let us deal with the problem of under-utilisation of plant caused by inefficient accessibility with reference to a firm envisaged above.
This can be explained by an impact of prevalence of floor price. The constraint of floor price causes abrupt and sharp rise in MC and AC function as shown in the figure. The equilibrium point does not coincide with full utilisation point of the plant and full utilisation supply area cannot be attained. Thus prevalence of floor price along with high transport rates results into excess plant capacity, as shown in figure. The corollary that follows is: with given price at processing units (p) and floor price (z) the supply area - range would be inverse function of transport rates (t) lower the transport rate, larger would be supply area (x) as we can write

\[
Y = Z = P_j - t \cdot X
\]

\[
X = \frac{P_j - Z}{t}
\]

The implication of this for relationship between level of accessibility reflected in freight rates and plant-utilisation proportion is highly crucial for our analysis.

The under-utilisation of physical capacity of plant can be attributed to inadequacy of attainable supply area as a result of high freight rates owing to inadequate road system. Conversely, improved accessibility lowering freight rates would enable firm to extend the supply area range to the extent that full physical
$Y = P_f - tx$

$x_1 =$ Supply area when freight rate = $t_1$

$x_2 =$ Supply area when freight rate = $t_2$ and $t_2 < t_1$

$x_f =$ Supply area needed to use full plant capacity
capacity of plant can be harnessed as revealed in figure 1, where:

\[ x_1 = \text{Supply area when freight rate } t_1 \]
\[ x_2 = \text{Supply area when freight rate } t_2 \text{ and } t_2 < t_1 \]
\[ x_f = \text{Supply area needed to use full plant capacity = attainable supply area.} \]

From the figure the condition for full use of physical capacity of the plant can be said as \( x_f \) must be equal to or less than attainable supply area, which coincides with equilibrium of the firm.

Now let us deal with the problem as to how inaccessibility tends to initiate the process of over-capitalisation and after the improvement in accessibility resulting into low freight charges eventuate in elimination of some ill-situated firms. Suppose the firm envisaged above has attained the short-run equilibrium as shown in the figure. The firm is getting profit more than normal. The supply area is specified by falling price line or raw material at different marketing centres. This supply area represents equilibrium supply area as it corresponds to equilibrium output.

This situation provides incentive for new firm
to enter into the industry as profit is more than normal and to locate itself in the region having low prices of raw material. Supernormal profit is reinforced by very low prices of raw material owing to high transport cost at distant places from the location of existing firm.

The entrance of new firm would result into increase in the price of raw material at local markets adjacent to location of new firm competing for raw material with the old one. This would naturally affect cost functions of already existing firm: The average cost and marginal cost curves owing to increase in price of raw material would be shifted upwards. Consequently as shown in the figure equilibrium-supply area of the already existing firm, would be contracted.

The firms would reach long run equilibrium situation specifying normal profit and equilibrating optimum supply area as shown. But it can be realised that the process of adaptation would be qualitatively different owing to new firm competing in procurement of raw material. The segregated supply area, for individual firm would cease as a result of price level at location of the firms and respective rates in corresponding supply areas. The local prices would be a direct function of price at location of firms and inverse function of distance
Figure 3.2

\( Q_1 \) = Point indicating the supply area for both Firms when freight charges are equal. \( (0X_1 = O^2X_1) \) \( (M) \)

\( Q_2 \) = Point indicating contraction of supply area owing to reduction in freight rate in area \( X \)
between local market and firm with given freight rates as shown in the figure. The equilibrating point of supply area is specified by the intersecting point of segregated supply areas. The boundary, would be determined by equality of price for both firms. This suggests other constraints in addition to floor price viz. boundary price. If this boundary price would be greater than floor price, the floor price ceases to be effective. We can write:

\[ Y_j = P_j - t_j X \]
\[ Y_k = P_k - t_k M \]
\[ Y_{lj} = Y_{kj} \]

\( Y_{kj} \) is distance price function of firm with reference to "B" firm. 
\( M \) is a distance between local market and firm "B". 
\( P_k = price \) at location of firm "B"

Supply area equilibrium price is given by

\[ Y_{lj} = Y_{kj} = P_e = Z \]

so \( P_j - t_j X = P_k = T_2 M \)

This equation is basic to the determination of the supply area for individual firm.
(a) If \( P_j = P_k \), \( t_1 = t_2 \)
\[
X = M
\]

It implies that if the prices at location of firms and transport rates are equal, the size of the supply area would be equal.

(b) \( P_j = P_k \) and if \( t_1 < t_2 \)
\[
\text{\textsuperscript{OM}} > \text{\textsuperscript{OM}'},
\]

This indicates that with equal prices if transport rates in supply area corresponding to one firm A would be lower supply area captured by that firm would be larger, as compared to the same for the other firm.

This further demonstrates that \textit{ceteris paribus} the reduction in transport rates owing to improvement in transport facilities in one area extends the supply area of the firm located in the same area contracting the supply area of competing firm as shown in the figure. This is nothing but a case of spatially differentiating impact of transport improvement. Consequently the relative fall in the transport rates as compared to the same in other regions tends to increase the proportion of capacity utilisation by capturing the supply area of rival ill-located firm. It imposes burden of excess
capacity on the other firm having inefficient accessibility.

This enables us to envisage concept of optimum transport rate: the particular rate which enables the firm to extend the supply area to utilise its capacity to the extent of output incurring least average cost, ceteris paribus.

Conversely, this enables us to analyse the effect of inaccessibility owing to inefficient and inadequate transport facilities reflected into the actual transport rate which becomes more than the optimum. If actual transport rate would be more than the optimum transport rate, supply area would be less, and as a consequence the existing firm cannot utilise its capacity to the optimum extent, thereby creating the excess capacity in the given firm. Thus this explains from static point of view how the inaccessibility tends to result in the underutilisation of existing productive capacity.

From the dynamic point of view, the implication of this underutilisation of productive capacity of the firm is very obvious as for a given aggregate production and supply area, owing to underutilisation a larger number of
firms of same size are required as compared to number of firms if optimum transport rates exist. The process of over-capitalisation can be explained by this. We have to take into account the dynamic aspect of inaccessibility and the impact on the spatial price formation of particular agro-product. The prices are very low at local places owing to the lack of efficient and adequate transport facilities and these low prices induce businessmen to add more processing units at different places even if existing processing units situated at other place cannot use their physical productive capacity to the fullest extent. Low prices demonstrate the possibility of profits even if firms would work at sub-optimal level. Thus inaccessibility induces the process of over-capitalisation especially in underdeveloped regions like Marathwada suffering from paucity of roads. The possibility of over-capitalisation is further accentuated by the fact that while considering technical optimum size of the plant, developed countries may take into account relatively lower transport rates existing in their countries and thereby justifying large size of the plant. These very plants are imported and installed in the underdeveloped country like India. The size of these plants is
not appropriate for the regions characterised by inadequate and inefficient transport facilities. This is manifested into underutilisation of their physical capacities. In short, from the static point of view inadequate accessibility results in underutilisation of productive units, and from the dynamic point of view this leads to setting up excessive number of processing units and causes over-capitalisation.

It would be interesting to investigate the impact of improvement in transport facilities upon the existing excessive number of processing units with idle productive capacity. We can contemplate that the improvement in transport system reducing transport rate and inconveniences sets in motion the economic forces leading to a phase of elimination of excessive number of processing units in changed situation and reducing excessive capacity in residuary units. This can be explained as a natural effect of improved accessibility in increasing the supply area of some favourably situated processing units, capturing the supply area of some other unfavourably situated units as shown in the figure. This phenomenon may lead to underutilisation of ill-located units to such an extent that they cannot even realize
normal profit and eventually process of their elimination ensues.

Accessibility tends to reduce the spatial price disparity, increasing the local price in a particular area where the improvement of transport occurred. We cannot say that improvement of transport facilities will be uniform over the entire region. In some part of the region transport facilities are improved, while in other parts of the region, these may remain unaltered. It results into changing the relative position of cost functions creating the situation where the prices in the supply area having improved transport facilities will be higher thereby reducing the supply area of some other firms situated in the area having relatively inadequate and inefficient transport facilities. This will tend to induce the process of elimination of those firms getting normal profit and situated in area having inadequate and inefficient transport system or where the recent improvements in the transport system failed to occur. Thus we can imagine that as there are more and more roads and other means of transportation,
there is a possibility of declining number of processing units resulting into an increase in average supply area for remaining firms.

The lesson for underdeveloped economy is highly instructive. If there had been efficient road transport system, lesser number of agro-processing units would have come into existence and the process of elimination caused by improvement in accessibility, would have been avoided. It suggests that the earlier improvement in transport system like road-net-work may avoid wastage of capital which is very much scarce in underdeveloped economies in countries like India and regions like Marathwada.
PART - II: ROAD ACCESSIBILITY AND MARATHNADA
The Marathwada Region: an outline.

The Aurangabad Division of Maharashtra State, known as Marathwada, consists of five districts viz. Aurangabad, Parbhani, Nanded, Bidar and Osmanabad. The entire region formed a part of princely State of the Nizam, then known as the Hyderabad State. The Hyderabad State was merged into the Indian Union in 1948. It has been one of the four administrative divisions of Maharashtra State since May 1960. Geographically, the region is situated between $17^\circ 35'\ N$ and $20^\circ 40'\ N$ latitudes and $74^\circ 40'\ E$ and $78^\circ 15'\ E$ longitudes. The region is bounded by the Jalgaon, Buldhana and Akola Districts on the north, by the Nasik and Ahmadnagar Districts on the west, the Sholapur district on the south and Andhra Pradesh on the west (see map of Marathwada Region). The total geographical area of the region is 64525 Sq.Kms, and the population according to 1971 census was 30,58 Lakh.

Major portion of the Marathwada region lies in the basin of Godavari river and its tributary river Purna. The other important rivers are Shivana, Dheka, Kham in the Aurangabad District, Manjra, Bendsura, Sindhphana in the Bhir District, Painganga, Manyad, Ashna, Lendi in the Nanded District, Manjra and Terna in the Osmanabad District and Kayadho, Kapra Dudhana in the Parbhani District.

Rainfall: Parbhani and Nanded districts are considered to be areas with assured rainfall and are free from chronic scarcity. These districts receive annual rainfall between 700 to 900 mm. In other districts the annual rainfall varies between 600 mm to 750 mm. The scarcity prone area in the region forms around 18 per cent of the total area of the region.

Soils: Most of the region is covered with black cotton soils or "Regur" derives from the Deccan trap volcanic rock. However, the soils vary greatly in texture and depth. Soils along the river banks and nallas are deep and very fertile and capable of retaining moisture. Bumper rabi crops are grown in these areas in the years of favourable rainfall. The soils are, however, coarse shallow and relatively poor along the hill slopes, and at the foot of the hills. Major portion of the region is covered by medium black soils. The medium and deep soils in the region, rich in plant nutrients
can support good Kharif and/or rabi crops like, Jawar, Bajra, wheat pulses, cotton and ground nut.

**Forests:** The forest area in the region is very small and is concentrated in Kinwat taluka of the Nanded district. Teak, bamboo and grass are the main forest products in this area.

**Minerals:** Marathwada is almost devoid of mineral wealth. The limestone located in the Nanded district is not of uniform quality and is highly siliceous at places. Jaspers, agata, carnelian and some rock crystals are found in the Satmala hills in Aurangabad district. Nodular limestone, basalt and granite occur all over the Aurangabad district and are used for building purposes.

**Land-use:** The net sown area in Marathwada in 1970-71 was 43.3 lakh hectares which works to about 75 per cent of the total geographical area of the region by village papers. Permanent pastures and grazing land formed about four per cent of the total geographical area and less than four percent of the area was under forest. Cultivable waste and barren and uncultivable land each constituted about one per cent of the total geographical area.
Crop pattern: The gross cropped area in the region was about 52.0 lakh hectares in 1970-71. The cropping pattern in all the districts of the region is dominated by goodgrains in as much as these accounted for 69 per cent of the total cropped area of the region in 1970-71. The important foodgrains produced are Jowar, bajra and pulses. Jowar is cultivated as a major crop over the entire region and covers about a third of the cropped area in the region. Wheat and rice are grown to a limited extent and cover respectively about five per cent and two per cent of the cropped area of the entire region. Sizable proportion of the cropped land in the region, viz. 21 per cent is put to the cultivation of a variety of pulses, including Tur, Black gram.

Among the non-food crops, the most important are cotton and oil seeds which together cover about 26 per cent of cropped area in the region. An important development in respect of crop pattern in the region during the last decade is the increase in the area under sugarcane. Sugarcane today occupies about half a per cent of the cropped area in the region. Remaining acreage was devoted to chilly, fruits, vegetables.
Livestock: The total livestock population in Marathwada according to 1972 Livestock Census (provisional figures) was 54.2 lakhs. The livestock population in the region was 58.1 lakhs in 1961. The bovine population consists of 13.6 lakh bullocks, 9.9 lakh cows, 6.5 lakh buffaloes and 8.9 lakhs of the young stock of the bovine. The number of bullocks per 100 hectares of sown are worked out to 26 in 1972.

Population: The total population of Marathwada according to the population census of 1971 was 80.58 lakhs. The population of the region has increased by 27.6 per cent during the last decade. Although there has been considerable increase in the urban population after 1931 and particularly during 1961-71, over 85 percent of the population still lives in the rural areas. The total population in Marathwada is 15.9 percent of population of Maharashtra State in 1971.

Livelihood Pattern: The agriculture is an overwhelmingly important occupation in the rural areas of Marathwada and involves over 80 per cent of the earners in the region. Another feature to be noted in the livelihood pattern in the region is the large size of the class of agricultural labourers. This could
be partly explained by a relatively larger size of land-holdings. The more important factor for heavy dependence of labourers on agricultural employment, however, is the lack of alternative job opportunities in the non-agricultural sector due to the general lack of secondary activity in the region. Apart from the population directly dependent on agriculture, the other working population in the rural areas is more or less an adjunct to the agricultural population. The proportion of the workers in the household industry, in trade or other services was about 10 to 15 per cent in the region.

Urban Population: There were 53 towns in the region in 1971. The total urban population in Marathwada according to 1971 census was 11,85,673 i.e. 14.75 per cent of the regional population lived in urban areas. The livelihood pattern of the urban population reveals the relatively small expansion of non-agricultural activity in the region. In 1971, the total number of urban workers was 321 thousand i.e. about 11.4 per cent of the total workers in the region were living in urban areas. Around a quarter of these workers were
dependent on agriculture. This proportion was, around 50 per cent in the case of smaller town. About 14 percent of the urban workers in the region were engaged in manufacturing activity and 20 percent were engaged in trade and commerce. Administrative educational professional personal and other services together absorbed about 28 percent of the urban workers.

Marathwada in Maharashtra State.

The economy of Marathwada region as a part of Maharashtra economy exhibits contrast in many respects. Comparative statement of the employment (1971) and estimated sectoral incomes (for the year 1968-69) for Marathwada and the Maharashtra State are presented in table No. 4.1

The predominance of the agricultural sector is much more pronounced in the Marathwada than the State both with respect to its contribution to the regional income as well as to the employment. The contribution of this sector to the income of Marathwada region is 57 percent as compared to 31 percent for the entire State. About 82 percent of the workers in Marathwada region are engaged in agriculture as
Table 4.1
SECTORAL INCOME AND EMPLOYMENT IN MARATHWADA AND MAHARASHTRA.

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<th>Sector</th>
<th>Income: 1963-69</th>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>57.4</td>
<td>13.5</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>3.6</td>
<td>24.5</td>
</tr>
<tr>
<td>Other</td>
<td>39.0</td>
<td>44.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

= \(327.5 \text{ crore rupees} = 3323.1 \text{ crore rupees}\)

= \(2835931 = 13390279 \text{ workers workers}\)

---

1. Source: Brahme Sulabha and others Ibid. p.13 table No.1.7
against 69 per cent for the Poona division and 52 per cent for the Nagpur division. The gross cropped area per 100 persons dependent on agriculture is also larger in Marathwada (102 hectares) as compared to that in the Poona (88 hectares) and in Nagpur (77 hectares) division in 1971. Similarly, the size of operated holding has been on an average, larger in Marathwada (about 5.5 hectares) than for Maharashtra State (about 4 hectares) as a whole. About 21 per cent of the landholders in Marathwada had operated holdings of less than two hectares each. This proportion was about 44 per cent for Maharashtra.

Marathwada is endowed with relatively favourable geophysical conditions. Land with deep and medium soil forms about 78 per cent of the total area. So also about 82 per cent of the Marathwada region receives assured rainfall. The proportion of land with assured rainfall is relatively low and that of scarcity prone area is relatively high, viz 65 per cent for the Poona division.

A better land/man ratio, relatively larger size of land holdings, extensive area of rich fertile soil endowed with assured rainfall, together have rendered Marathwada a surplus region in foodgrains production.
The annual production of foodgrains per head of rural population 1963-69 worked out to be 226 Kg. for Marathwada as against 163 Kg. for the Poona Division and 95 Kg. for Maharashtra State as whole.

Cotton is grown extensively in the region and covers about 15 per cent of the gross cropped area in the region. Large areas are also put under groundnut and other oilseeds which cover around 12 per cent of cropped area in the region. In contrast area under cash crops is quite limited in the Poona division. However, the facility of perennial canal irrigation has helped the cultivation of valuable cash crops such as sugarcane, fruits and vegetables in the Poona Division. No major irrigation facilities were available in the Marathwada region upto 1960. The gross irrigated area was only three per cent of the gross cropped area in 1956, and 4.3 per cent in 1965, bulk of it being watered by wells. On the other hand, in the Poona division some major irrigation projects were undertaken in early decades of the twentieth century. The total irrigated area in the Poona division constituted nine per cent of the gross cropped area in 1956 and about 12 per cent in 1965. In 1970-71, area under canal irrigation was 30 thousand hectares in Marathwada as against 154
thousand hectares in the Poona division.

The Marathwada region compares well with the Poona division as far as the yield per hectare in cereals is concerned. The yields are somewhat lower in the case of pulses and groundnut. The yield of cereals and pulses are considerably lower in comparison with those in the Nagpur division. In the case of important commercial crops like cotton the yields Marathwada are far lower than those in the Poona division.

**Non-Agricultural Sector:** The relatively low level of development of secondary activity in Marathwada is indicated by the fact that only 4.6 per cent of the total workers in Marathwada as against 13.0 per cent of the total workers in Maharashtra State were engaged in secondary activity in 1971. Since more than one-third of the total workers engaged in secondary activity in Maharashtra are concentrated in Greater Bombay it would be more meaningful to compare the extent of secondary activity in Marathwada to that in Maharashtra excluding Greater Bombay. Marathwada accounted for 18 per cent of the total workers in Maharashtra excluding Greater Bombay; for 15 per cent of the workers in house hold industry and 8.7 per cent of the workers in non-household industry. The share of
Marathwada in the factory employment was as low as 3.76 per cent.

The total number of factory workers in the State was 9.5 lakhs. Marathwada accounted for only 16 thousand workers or 1.7 per cent workers in the State. In 1971, average daily employment of factory workers per 1000 population worked to about 100 for Greater Bombay, 12 for the Poona Division, 6 for the Nagpur division and 2 for Marathwada.

It would be interesting to analyse the degree of specialization in or under-development of various industries Marathwada, in the context of the State economy. Location co-efficients were calculated for different industries in Marathwada by comparing the percentage of total factory workers engaged in a particular industry in Marathwada with the percentage of total factory workers engaged in the same industry in Maharashtra in 1965. A location co-efficient higher than unity would indicate regional specialization while a co-efficient lower than unity would reflect relative under-development of the industry in the region as compared to the State as a whole.

The location co-efficients for edible oil industry
and cotton ginning and pressing industry came to 13.0 and 9.0 respectively. However, in the case of other food industry (which includes manufacture of hydrogenated vegetable oil) and textile industry the location coefficients were 0.22 and 0.67 respectively. The location coefficients were also low for chemicals (.21) and basic metal and machinery (0.09). For all industries together the location coefficient worked out to be just 0.08 and excluding the Greater Bombay region, the location coefficient came to 0.32.

Development of urban-industrial and financial infrastructure is considered to be one of the preconditions of economic development. Indicators of development of the infrastructure in Greater Bombay and the four divisions of Maharashtra are presented in Table 4.2.

It would be apparent that the development of infrastructure is extremely uneven in the State with highest concentration of facilities in Greater Bombay. The concentration of economic activity in Greater Bombay implies the concentration of use of credit, electricity and other resources in Bombay resulting in further polarization in the State economy. Excluding
<table>
<thead>
<tr>
<th>Items</th>
<th>Greater Bombay</th>
<th>Bombay Division (Excluding Greater Bombay)</th>
<th>Poona Division</th>
<th>Marathwada</th>
<th>Vidarbha Maharashtra</th>
</tr>
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<tbody>
<tr>
<td>1. Total population (in'000), 1971</td>
<td>5971</td>
<td>11,639</td>
<td>13,016</td>
<td>3,053</td>
<td>11,678</td>
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<tr>
<td>2. Percentage of urban population, 1971</td>
<td>100.0</td>
<td>22.4</td>
<td>24.2</td>
<td>14.7</td>
<td>23.9</td>
</tr>
<tr>
<td>3. Percentage share in total population, 1971</td>
<td>11.8</td>
<td>23.2</td>
<td>25.8</td>
<td>16.0</td>
<td>23.2</td>
</tr>
<tr>
<td>4. Percentage share in total workers, 1971</td>
<td>11.9</td>
<td>23.2</td>
<td>23.5</td>
<td>15.7</td>
<td>25.7</td>
</tr>
<tr>
<td>5. Percentage share in workers in secondary activity, 1971</td>
<td>33.8</td>
<td>17.6</td>
<td>20.3</td>
<td>5.6</td>
<td>17.2</td>
</tr>
<tr>
<td>6. Percentage share in factory workers, 1969</td>
<td>66.2</td>
<td>13.6</td>
<td>13.6</td>
<td>0.3</td>
<td>5.3</td>
</tr>
<tr>
<td>7. Percentage share in gross output, 1963</td>
<td>61.7</td>
<td>15.7</td>
<td>13.9</td>
<td>0.3</td>
<td>3.4</td>
</tr>
<tr>
<td>8. Percentage share in value added by manufacturer, 1963</td>
<td>66.4</td>
<td>17.3</td>
<td>13.4</td>
<td>0.1</td>
<td>2.8</td>
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<tr>
<td>9. Percentage share in electricity consumption, 1970</td>
<td>69.0</td>
<td>13.5</td>
<td>6.3</td>
<td>1.3</td>
<td>9.9</td>
</tr>
<tr>
<td>10. Percentage share in advances by commercial banks, 1972</td>
<td>37.1</td>
<td>1.9</td>
<td>3.3</td>
<td>0.6</td>
<td>2.1</td>
</tr>
<tr>
<td>11. Road length in km. per 100 sq. km. 1961=62</td>
<td>---</td>
<td>20.6</td>
<td>19.0</td>
<td>4.3</td>
<td>7.6</td>
</tr>
<tr>
<td>Items</td>
<td>Greater Bombay</td>
<td>Bombay division</td>
<td>Poona Division</td>
<td>Marathwada</td>
<td>Vidarbha</td>
</tr>
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<td>------------</td>
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</tr>
<tr>
<td>13. No. of goods transport vehicles per one lakh population</td>
<td>308</td>
<td>34</td>
<td>60</td>
<td>22</td>
<td>35</td>
</tr>
<tr>
<td>14. =-=do----- 1970-71. 402</td>
<td>69</td>
<td>130</td>
<td>32</td>
<td>45</td>
<td>113</td>
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</table>

Source: Brahme Salabha, Pore Kumud, Pore S.H.
Regional Planning: A Case Study of Marathwada Region
Journal of the Gokhale Institute of Politics and Economics.
p. 13 - Table 1.9
Greater Bombay, Maharashtra State can be classified as an underdeveloped state. But even within this area, Marathwada is singularly lacking in the development of infrastructure.

The statistical picture presented above clearly brings out the lower level of development of Marathwada economy in relation to the State economy and points to the arduous nature of the effort required to put the region on a path of sustained development.