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HARYANA: LEVELS OF ROAD TRANSPORTATION

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Abstract

Road transportation is a catalytic infrastructure that not only activates but also facilitates other infrastructural facilities. This study therefore, is focused on road transportation facility of the state of Haryana. The study is based on data collected from different secondary sources. The study concludes that during the last decade of 2001-2011, total surfaced roads in India increased from 137.50 km per lakh of population to 167.03 km recording a growth rate of 21.5 per cent, while Haryana witnessed -2.3 per cent decline in this category of roads during the period, as metalled roads in Haryana declined from 108.6 km per lakh population in 2001 to 106.1 km in 2011. Similarly, Haryana with 2.1 per cent population of the country accounts for 1.08 per cent length of different highways and 1.65 per cent of total surfaced highways in India. Besides, Haryana has 3.8 per cent of total vehicles in the country against its share of 2.1 per cent of population. Similarly, Haryana has 161 registered motor vehicles per kilometre of surfaced metalled road length against the national average of 70 motor vehicles. Thus, the state has 2.3 times more pressure of motor vehicles on its roads than the national average. As a result 13 persons die and 27 get injured in accidents every day on its roads suggesting a serious concern for the road transport planners.

Introduction

Among the indicators of infrastructural development, the place of roads is most dominant particularly, taking into account the means of transportation. The role of transportation in the distribution of economic development as well as political and social gains is an issue that has received renewed interest in recent years (Patra, 2014). In a highly competitive world economy, transport cost is a significant determinant of competitiveness, where an integrated and efficient transport network plays pivotal role in integrating regions (Parber, 2008). Among the various modes of land transportation, road

transportation is very significant for the development of a society because it is an economic mode of transport for short and medium distances and easy access to remote and inaccessible areas (like hilly, tribal, desert, forest, border and backward areas) (Patra, 2014). Transportation by road has the advantage over the other means of transport because of its easy accessibility, flexibility of operations, door to door service and reliability (Upadhyay, 2012). Roads play a key role in inter-modal transport development by establishing links with airport, railway stations, and ports (Saxena, 2005). Without connecting roads these modes of transportation are

meaningless.

Road transportation plays an important role in promoting the development of the backward regions and integrating them with the mainstream economy by opening them to trade and investment (Sahoo, 2011). There exists a direct relationship between transportation and proportion of workers engaged in different non-primary activities in an area (Mondal, 2004). The efficiency and the available facilities of transportation are one of the parameters of economic health of a region. Motor vehicles offer undeniable advantages such as speed and convenience needed during early stage of development, therefore motor vehicles are vital to economic growth (Shalizi and Carbajo, 1994). Transportation has played indispensable role in the growth of modern economic system, as economic activities such as agriculture, manufacturing, mining; marketing etc. is directly linked with transportation facilities (Saxena, 2005). The efficiency and the available facilities of transportation are one of the parameters of the economic health of a region (Goel, 1989).

Transport is the key component of physical connectivity. The transport has both direct as well as indirect impacts. Direct impacts include higher productivity, besides low cost movements of goods and persons both in terms of money and as well as time (Behera, 2008). In developing countries like ours rural roads by improving accessibility provide opportunity for economic development (Durai, et al., 2000). Roads are basic condition for the provision of other infrastructural facilities such as construction of houses, educational infrastructure, health infrastructure, hydro-electric projects, and transport equipment like vehicles, fuel etc. Warr (2005) noted that between 1997-98 and 2002-03, rural poverty in

Lao PDR (Lao PDR is a land-locked country located in Southeast Asian Region; bordering Myanmar, Cambodia, China, Thailand and Vietnam) declined by 9.5 per cent of the rural population. He concluded that about 13 per cent of this decline in rural poverty was attributed to improved road access alone. Rural roads play a significant role in poverty reduction through linking rural farming to market, improve their productivity and increase income level (Oraboune, 2008).

One of the most important indirect benefits of accessibility by road is that it opens up the areas to schools and health facilities. Schooling improves human resources leading to increase in income associated with better productivity both in primary and secondary sectors of economy. There exists a direct relationship between the availability of medical facility and the road infrastructure (Pandey and Yadav, 2012). Another unnoticed indirect impact of roads is their monetary importance for the areas through which these pass. Higher the linkages an area has with roads more is the accessibility and value of land. Further, not only the road linkages but width and hierarchy of roads also control the price of land. Areas located along the national highways always attract more buyers; hence draw more values than the areas located on the state highways and other roads. Therefore, the land use, such as petrol pumps, hotel, tourist spots, bus-stand, government establishments, big industrial houses etc. that can afford very high cost of land can emerge along the national highways. Thus, roads can be viewed as a key determinant and consequence of the social and spatial transformation and development of a society (Patra, 2014). Roads therefore, are not just a mean to facilitate transportation, but these are socio-economic life-lines of the areas through

which they pass. Considering these aspects of roads, the present study pertaining to levels of road transportation in Haryana has been taken up.

Objectives of the study

Major objectives of the study in hand are:

- to analyze the position of Haryana with respect to India in development of road transportation and
- to highlight the spatial patterns of the levels of road transportation in Haryana.

Hypotheses

- Higher the level of road transportation more is the degree of urbanization.
- Educational enrollment and levels of road transportation are positively related.
- Levels of health services are directly proportional to the levels of road connectivity.
- Higher the level of road transportation more is the degree of industrial development.
- Agricultural productivity and road connectivity are supplementary to each other.

Database and Methodology

The study is based on secondary data collected from Statistical Abstracts of Haryana, 2011-12, 2012-13, Statistical Abstract for Roads in Haryana, 2014 and Census of India, 2011. However, some information from other secondary sources such as newspapers, working papers, reports etc. has also been drawn. Normally, two indicators; road length per 100 km² of area and road length per lakh of population are taken to calculate levels of road development. In this study, two additional

parameters, number of motor vehicles per km of road length and per lakh of population have also been taken up to assess the development of road transportation in Haryana. To bring the roads of different categories on equal level, weightage (scores; 6, 4, 2, 1) has been assigned according to their importance. Scores per lakh of population and per 100 km² of area have been calculated. Similarly, considering the carrying capacity, weightage has been assigned to various kinds of motor vehicles. Number of weighted motor vehicles per km of weighted metalled road length and per lakh of population has also been calculated. For inter-district comparisons in levels of road transport development, 4 indicators: i) weighted metalled road length per 100 km² of area; ii) weighted metalled road length per lakh of population; iii) number of weighted motor vehicles per km of weighted road length and; iv) number of weighted motor vehicles per lakh of population have been taken into account. An index has been calculated by dividing the district values with state average. Average composite index has been arrived at by summing up the indices and dividing the result by number of indices. Simple statistical and cartographical techniques have been applied to analyze and interpret the data.

Study Area

The state of Haryana extending between latitudes 27° 39' 0" to 30° 55' 5" north and longitudes 74° 27' 8" to 77° 36' 5" east is located in the north-western part of India. It came into existence on 1st November, 1966. The total area of the state is 44212 km². The state with 1.34 per cent share in the area accounts for 2.10 per cent of the total population of India. The state has predominantly plain topography, barring Siwalik Hills system in the north and

narrow Aravali range stretching into Haryana for about 90 kms in the north-east to south-west direction up to Delhi. The central plain of Haryana is a part of Indo-Gangetic plain which has been formed by the deposition of alluvial sediments brought by the Himalayan Rivers.

Administratively, the state is divided into 21 districts, 80 tehsils and 125 blocks. The total population of the state as per 2011 Census is 25351462 persons of which 65.12 per cent lives in rural areas comprising 6841 villages and 34.88 per cent in the urban areas comprising 154 towns. During the previous decade (2001-2011) the population of Haryana on the whole recorded 19.90 per cent growth rate while there are districts like Gurgaon and Faridabad which recorded 73.14 per cent and 32.54 per cent growth rate during the same period. During this period, the share of rural

population declined from 71.08 per cent to 65.12 per cent, while the share of urban population increased from 28.92 per cent in 2001 to 34.88 per cent in 2011. Haryana is predominantly an agricultural state as 55.86 per cent of its total workers are engaged in agriculture and 84.6 per cent of its total area is under agriculture. Per capita income of the state at current prices is 2nd highest after Sikkim in India.

Results and Discussion

Haryana in Comparison with India

Haryana is one of the most developed states of India. Share of Haryana in National Highways of India (2.47 %) is more than its share in population but in case of State Highways (1.56 %), Major District Roads (0.31 %), Rural and Other roads (0.67 %) it is much

Table 1
Haryana: Different types of Roads, Area and Population, 2014

Roads/Population	India	Haryana	Share of Haryana (%)
Population (2011)	1210569573	25351462	2.10
Area (km ²)	3287469	44212	1.34
National Highways (km)	79,243	1957	2.47
State Highways (km)	1,31,899	2064	1.56
Major District Roads (km)	4,67,763	1455	0.31
Rural and other Roads (km)	26,50,000	20287	0.67
Total (km)	3329105	25763	0.77

Source: Compiled by Authors

Table 2
India and Haryana: Various Indicators of Road Development

Indicators	Kilometre	
	India	Haryana
Total Road Length per-100 km ² of Area	115.68	94.38
Total Road Length per-lakh of Population	313.20	164.59
Total Surfaced Road Length per-lakh of Population	193.42	148.72
Length of National Highways per-100 km ² of Area	2.16	3.43
Length of National Highways per-lakh of Population	5.86	5.99
Length of State Highways per-lakh of Population	13.54	9.94
Total other PWD Roads per-lakh of Population	83.05	90.35
Total Rural Surfaced Road Length per-lakh of rural Population	103.10	26.02
Total Urban Surfaced Road Length per-lakh of Urban Population	77.40	73.48

Source: Compiled by Authors

less than its share in population (Table 1). Otherwise also, Haryana has 94 km of road length per 100 km² of area against the national average of 116 km. Further, Haryana recorded 164.59 km of total road length, 148.72 km of total surfaced road length and 9.94 km of state highways per lakh of population against the national averages of 313.20 km, 193.42 km and 13.54 km, respectively (Table 2). Taking into account total rural surfaced road length per lakh of rural population and total urban surfaced roads per lakh of urban population, Haryana accounted for 26.02 km and 73.48 km against the national averages of 103.10 km and 77.40 km, respectively (Table 2). Thus, in development of roads the state is much behind India as a whole. However, in case of Public Works Department (PWD) roads (90.35 km)

and National Highways (5.99 km) per lakh of population, Haryana has slight edge over the national averages of 83.05 km and 5.86 km, respectively (Table 2).

Further, in 1970-71 Haryana (73.50 km) was little ahead than India (72.60 km) in surfaced metalled road length per lakh of population. Haryana maintained its lead up to 1990-91 when the state recorded 130.91 km of metalled road length against the national average of 121.02 km per lakh of population. Haryana left behind India by 29 points in 2000-01 and the gap increased to 61 points in 2010-11 (Table 3). Overall, during the last five decades (1971-2011), India recorded about three times more growth in metalled roads per lakh of population than Haryana (Table 3). However, it must be noted that in case of India there is much

Table 3
India and Haryana: Decade-wise Length of
Total Surfaced Metalled Roads per-lakh of Population

Decade	India	Haryana
1970-71	72.60	73.50
1980-81	103.07	136.59
1990-91	121.02	130.91
2000-01	137.50	108.59
2010-11	167.03	106.06
Growth Rate (%) 1971-2011	130.07	44.30

Source: Compiled by Authors

Table 4
India and Haryana: Registered Motor Vehicles per-lakh of Population, 2011

Type of Vehicle	India	Haryana
Trucks and Lorries	311	1085
Light Motor Vehicles	273	451
Buses	102	141
Taxis	148	79
Light Motor Vehicles (Passenger)	332	374
Two Wheelers	8415	13295
Cars	1278	3375
Jeeps	163	447
Tractors	439	1922
Others	226	41
Total	11685	21210

Source: Compiled by Authors

scope for expansion of road length, because vast tracks are without roads or have *kutchra* roads, while in Haryana, there is little scope for expansion, as almost all the villages are connected with metalled roads.

Second segment of road transportation is related to the number of motor vehicles on roads. Without motor vehicles, the roads are meaningless. Leaving aside taxis and other vehicles, Haryana is far ahead than the national averages for all types of motor vehicles on roads per lakh of population. Haryana has 1.8 times more vehicles per lakh of population than the national average in 2011. Likewise, the state has 3.8 per cent of total vehicles in the country against its share of 2.10 per cent in total population. It speaks about the socio-economic prosperity of the state. The state recorded 4.38 times tractors, 3.49 times trucks and lorries, 2.64 times cars, 1.58 times two-wheelers and 1.38 times buses, more than the national average in 2011 (Table 4).

From the above discussion it can be deduced that Haryana has much more motor vehicles per lakh of population than the national average which reflects socio-economic prosperity of the state. However, on account of metalled road length per lakh of population, India has surpassed Haryana and the gap is continuously increasing. Haryana has

15th place among the 29 states of India in terms of length of roads per 100 km² of area while barring Bihar and Jharkhand it has lowest position among all the states in terms of length of roads per lakh of population in 2011-12.

Metalled Roads in Haryana

Roads in India are divided into six categories on the basis of their carrying capacity and agency involved in their construction and maintenance. These are Expressways; National Highways; State Highways; District Roads; Urban Roads and Village Roads. There is no Expressway in Haryana. In 2014, Haryana had 1957 km of National Highways; 2064 km of State Highways; 1455 km of Major District roads and 20287 km other District roads & Village roads.

In 1981, Haryana had 655 km of National Highways which gradually increased to 1957 km in 2014 recording a growth rate of 198.8 per cent. During the same period, the length of State Highways declined to 2064 km from 3133 km in 1981 recording a growth rate of -34.1 per cent (Table 5). This decline in the length of State Highways was due to their conversion to National Highways. Recently, Central government upgraded the Gurgaon-Rewari via Pataudi State Highway, a stretch of 55 km into National Highway (Singh, 2015).

Table 5
Haryana: Category-wise Metalled Road Length in Kilometre

Year	National Highways	State Highways	Major District Roads	Other District Roads	Total
1981	655	3133	1584	12888	18260
1991	656	3135	1587	16417	21795
2001	1346	2461	1571	17582	22960
2011	1462	2521	1471	21434	26888
2014	1957	2064	1455	20287	22763
Growth Rate 1981-2014	198.8	-34.1	-8.1	57.4	24.7

Source: Compiled by Authors

Similarly, 8 new National Highways; i) Bhiwani-Mundhal-Jind-Meerut; ii) Adampur-Budhlada-Mansa iii) Jind-Safidon-Panipat; iv) Kaithal-Hisar-Rajgarh (Rajasthan); v) Pehowa-Kurukshetra-Yamunanagar; vi) Khangesra-Kala Amb; vii) Yamunanagar-Paonta Sahib; viii) Ambala-Saha-Shahbad have been announced (Manav and Sirhindi, 2015). Likewise, length of Major District Roads has also declined from 1584 km in 1981 to 1455 km in 2014 recording a growth rate of - 8.1 per cent due to their upgradation into State Highways. However, during 1981-2014, Other District Roads witnessed a growth rate of 57.4 per cent. Similarly, total roads increased from 18260 km in 1981 to 22763 km in 2014 recording a growth rate of 24.7 per cent (Table5).

Distribution of Roads

District-wise, weighted metalled road length per lakh of population and per 100 km² of area has been calculated and the average is presented in Table 6. It reveals that out of the 21 districts, 12 districts recorded road length more than the state average, while 9 districts witnessed less than the state average of 134.04 km. Three districts recording highest road length are Bhiwani (184.54 km), Kaithal (171.43) and Ambala (167.14 km), while Faridabad (70.67 km), Gurgaon (91.25 km) and Palwal (95.20 km) districts recorded lowest road length in the state (Table 6). It has been observed that districts with more area and less population have recorded more road length, while districts having small area and more population have witnessed less road length.

Table 6
Haryana: District-wise Weighted Metalled Road Length in Kilometre
(Average of Road Length per-lakh of Population and per-100 km² of Area)

District	Road Length (km)	District	Road Length (km)
Bhiwani	184.54	Mahendergarh	137.27
Kaithal	171.43	Karnal	130.33
Ambala	167.14	Yamunanagar	123.58
Sirsa	166.99	Jind	123.34
Kurukshetra	164.11	Sonipat	122.81
Rewari	160.54	Mewat	113.02
Fatehabad	158.65	Panipat	105.61
Jhajjar	158.28	Palwal	95.20
Rohtak	156.94	Gurgaon	91.25
Panchkula	148.57	Faridabad	70.67
Hisar	144.20	State Average	134.04

Source: Compiled by Authors

Table 7
Haryana: Number of Weighted Motor Vehicles on
Roads per-kilometre of Metalled Road Length

Year	No. of Motor Vehicles
1970-71	4
1980-81	10
1990-91`	49
2000-01	84
2010-11	200

Source: Compiled by Authors

Motor Vehicles on Road

Motor vehicles on the road are most important component to assess the levels of road transportation in any area. It is the motor vehicles that make the road functioning, otherwise roads are just an inert object without any life. Haryana has 3.8 per cent of total vehicles in the country against its share of 2.10 per cent in population. The state accounts for 1.8 times more vehicles per lakh of population than the national average in 2011. Apart from this, the number of motor vehicles is growing at a very fast rate. Taking into account the number of motor vehicles per km of road length it has been found that there were 4 motor vehicles per km of metalled road length in Haryana in 1970-71. However, the number increased to 49 in 1990-91 and to 200 in 2010-11 recording an improvement of 50 times during the last four decades (Table 7).

Distribution of Motor Vehicles

To understand the spatial variations in vehicular pressure on the roads, district-wise number of weighted motor vehicles on road per kilometre of weighted road length has been

calculated and presented in Table 8. There is a very high inter-district disparity in number of motor vehicles on roads. Faridabad district recorded 4505 motor vehicles per kilometre of road length against only 83 witnessed by Palwal district. Thus, Faridabad district has 54 times more vehicles on roads than Palwal district. Six districts namely Karnal (531), Ambala (581), Panchkula (639), Panipat (653), Gurgaon (2582) and Faridabad (4505) have recorded more motor vehicles on roads than state average of 460 (Table 7). Faridabad, Gurgaon and Panipat districts are industrial centers located in the National Capital Region (NCR). Panchkula district, being located close to the State Capital of Chandigarh is occupied by the higher strata of society and Ambala is an important industrial centre and cantonment, hence registration of motor vehicles is more as compared to other districts which are predominantly agricultural in economy. Thus, there are wide regional variations in concentration of motor vehicles on roads associated with locational advantages, industrial concentration and agrarian economy of the districts (Table 8).

Table 8
Haryana: District-wise Number of Weighted Motor Vehicles on Road per-kilometre of Weighted Metalled Road Length.

District	No. of Motor Vehicles	District	No. of Motor Vehicles
Faridabad	4505	Jhajjar	327
Gurgaon	2582	Hisar	285
Panipat	653	Jind	266
Panchkula	639	Mahendergarh	247
Ambala	581	Sirsa	245
Karnal	531	Fatehabad	213
Yamunanagar	454	Kaithal	202
Rohtak	426	Bhiwani	178
Sonapat	380	Mewat	159
Kurukshetra	360	Palwal	83
Rewari	334	Total	460

Source: Compiled by Authors

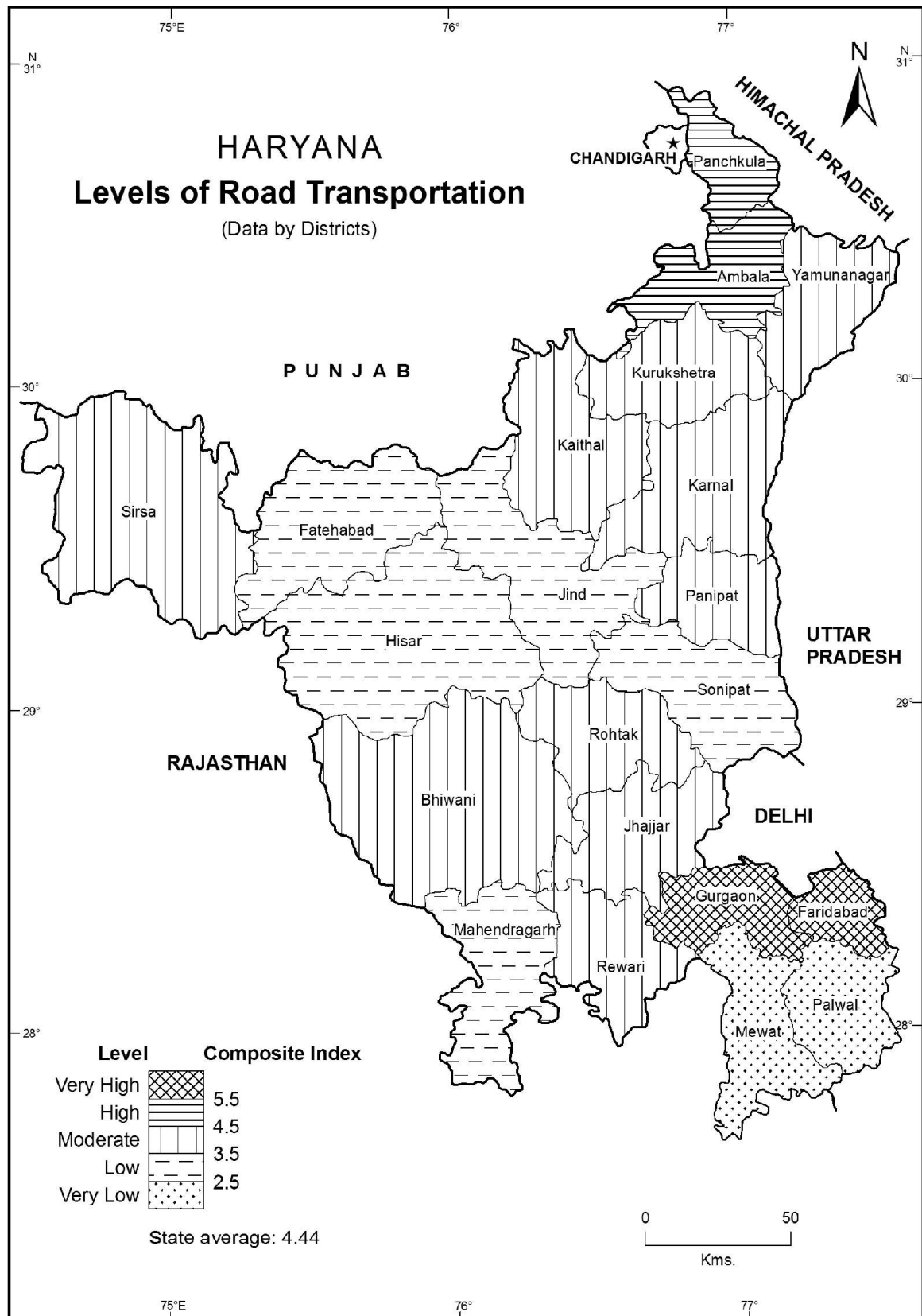


Fig. 1

Levels of Road Transportation

i) Areas of Very High Level of Development of Road Transportation

Two districts namely, Faridabad and Gurgaon by recording exceptionally very high composite index (13.43 and 9.85, respectively) of road transportation development have been distinguished as areas of very high development of road transportation (Table 9). Such a high composite index recorded by these districts is due to very high number of weighted motor vehicles (Gurgaon, 213834; Faridabad, 185028) per lakh of population and number of weighted motor vehicles per km of road length (Faridabad, 4505; Gurgaon, 2582) recorded by these districts, although metalled road length per lakh of population witnessed by these districts is lowest in the state (Faridabad, 41.7; Gurgaon, 82.83). Being located on the periphery of Delhi, most of the working population commutes between Delhi, Faridabad and Gurgaon cities, hence number of motor vehicles in these districts is very high. These districts are also very prominent industrial districts of the state occupied by the higher strata of society; therefore number of motor vehicles is very high resulting in very high level of development of road

transportation (Fig. 1).

ii) Areas of High Level of Development of Road Transportation

Ambala and Panchkula districts located in the north-eastern part of the state have been included in areas of high level of road transportation (Fig. 1). These two districts as a region have recorded, 188.83 km of metalled road length per lakh of population, 126.88 km of metalled road length per 100 km² of area, 115048 motor vehicles per lakh of population and 610 motor vehicles per km of road length. Individually, these districts have recorded very high weighted road length per 100 km² of area (Ambala, 139.5 km highest in the state, Panchkula, 114.25 km), weighted motor vehicles per lakh of population (Panchkula, 116846; Ambala 113251) and number of weighted motor vehicles per km of weighted metalled road length (Panchkula, 639 km; Ambala 581 km). These districts have witnessed high level of road transportation due to large number of motor vehicles associated with the affordability of people residing, particularly in Ambala and Panchkula cities. In general, more is the rise in income more is the marked increase in vehicle ownership (World Bank, 1986).

Table 9
Haryana: District-wise Composite Index for Development of Road Transportation

District	Composite Index	District	Composite Index
Faridabad	13.43	Sirsa	3.68
Gurgaon	9.85	Bhiwani	3.58
Ambala	5.28	Kaithal	3.52
Panchkula	5.12	Hisar	3.43
Rohtak	4.34	Sonapat	3.41
Karnal	4.22	Fatehabad	3.33
Kurukshetra	4.19	Mahendergarh	3.12
Panipat	4.00	Jind	2.94
Rewari	3.98	Mewat	2.35
Jhajjar	3.91	Palwal	1.76
Yamunanagar	3.73	State Average	4.44

Source: Compiled by Authors

iii) Areas of Moderate Level of Development of Road Transportation

By recording composite index ranging between 3.5 and 4.5, the districts of Rohtak, Karnal, Kurukshetra, Panipat, Rewari, Jhajjar, Yamunanagar, Sirsa, Bhiwani and Kaithal have emerged to be the areas of moderate level of road transport development (Table 9; Fig 1). These 10 districts on an average have recorded, 199.34 km of metalled road length per lakh of population, 105.14 km of metalled road length per 100 km² of area, 67540 motor vehicles per lakh of population and 371 motor vehicles per km of road length. Individually, there are districts like Bhiwani which has recorded 275 km of road length per lakh of population, Kurukshetra, which has witnessed 127 km of road length per 100 km² of area, Karnal having 86624 motor vehicles per lakh of population and Panipat recording 653 motor vehicles per km of road length. The region includes industrial districts like Panipat and Yamunanagar; agriculturally most advanced districts like Karnal, Kaithal, Sirsa, Yamunanagar and Kurukshetra and educationally important districts like Rohtak and Kurukshetra. Hence, the region on the whole has witnessed moderate level of road transportation.

iv) Areas of Low Level of Development of Road Transportation

Five districts namely Hisar, Sonipat, Fatehabad, Mahendergarh and Jind recording composite index of 3.43, 3.41, 3.33, 3.12 and 2.94, respectively (Table 9) are included in the category of areas having low level of development of road transportation. These districts as a group have recorded, 185.56 km of metalled road length per lakh of population, 88.95 km of metalled road length per 100 km² of area, 50338 motor vehicles per lakh of

population and 278 motor vehicles per km of road length. Leaving aside Sonipat which has some industrial base and Jind district with developed agricultural economy, all other districts located in semi-arid climatic belt are agriculturally backward, therefore development of road transportation is also low.

v) Areas of Very Low Level of Development of Road Transportation

Very low composite index recorded by Mewat (2.35) and Palwal districts (1.76) has brought these districts under the category of very low level of road transportation development. These districts as a region have recorded, 119.49 km of metalled road length per lakh of population, 88.73 km of metalled road length per 100 km² of area, 14924 motor vehicles per lakh of population and 121 motor vehicles per km of road length. All these variables are lowest in the state. Socio-economically, these districts of Haryana are most backward. Although roads are well developed in the region in terms of 100 km² of area yet their length per lakh of population is very less. Due to backwardness, the number of motor vehicles per lakh of population (14924) and per km of road length (121) recorded by these districts as a region is very low pushing these districts into areas of very low level of road transportation development.

Correlates

The study will remain incomplete unless the issues raised are answered with precision and statistical support. Therefore, Pearson's correlation has been calculated between the levels of road transportation and factors associated with road transportation (Table 10). Such an understanding is also essential for the policy makers who have to explore the factors requiring utmost attention

Table 10
Haryana: Correlation Matrix between Various Indicators

Variables	Composite Index for Development of Road Transportation	Gross Value (Rs.) from Agriculture per-hectare at Current Prices, 2008-09	Number of Workers per-lakh of Population Employed in Registered Working Factories, 2011	Number of Students per-lakh of Population in Recognized Schools of Haryana, 2011	Number of Hospital Beds in Government Hospitals per-lakh of Population, 2011	Urban Population as Percentage of Total Population, 2011
Composite Index for Development of Road Transportation	1					
Gross Value (Rs.) from Agriculture per-hectare at Current Prices, 2008-09	.242	1				
Number of Workers per-lakh of Population Employed in Registered Working Factories, 2011	.083	.276	1			
Number of Students per-lakh of Population in Recognized Schools of Haryana, 2011	.259	.291	-.209	1		
Number of Hospital Beds in Govt. Hospitals per-lakh of Population, 2011	.097	-.295	.059	-.009	1	
Urban Population as Percentage of Total Population, 2011	.880*	.372	.351	.200	.233	1

Source: Calculated and compiled by the Authors.

* Significant at the 0.01 level (2-tailed)

related to development of road transportation.

The positive correlation (0.242) between levels of road transportation and agricultural productivity although weak, yet proves the assumption, 'agricultural productivity and road connectivity are supplementary to each other' suggesting that road connectivity facilitates supply of inputs leading to agricultural development. Agricultural development eradicates poverty in rural areas; therefore to remove poverty, road connectivity should be enhanced.

Road connectivity encourages students to get them enrolled in schools. Positive correlation (0.259) between road connectivity and number of students in recognized schools of Haryana proves the hypothesis 'educational enrollment and levels of road transportation are positively related'. Hence, road transportation plays a key role in development of human resources and eradication of poverty.

Very high correlation (0.880, Table 10) observed between composite index of road transportation and degree of urbanization proves the assumption 'higher the level of road transportation more is the degree of urbanization. High degree of road connectivity has encouraged rural-urban migration and as a result the towns are not only growing in number but their size is also increasing continuously.

However, 'r' values of two assumptions; 'levels of health services are directly proportional to the levels of road connectivity' (0.097) and 'higher the level of road transportation more is the degree of industrial development' (0.083) although positive yet could not reach up to the desired level of confidence. But, it may be argued that since, degree of urbanization which is strongly associated with levels of road transportation is positively related with number of industrial

workers (0.351) and number of hospital beds (0.233) per lakh of population, therefore the assumed relationship between levels of road transportation and industrialization and development of health services cannot be ignored. Therefore, it can be concluded that higher the level of road transportation more is the socio-economic development in any area. Roads play the role of a catalytic which triggers the development in all other sectors of economy like agriculture, industry, health and education.

Fallouts of Road Transportation

However, such a high growth generating 'road connectivity' has some side effects also and most serious among these is road accidents. Motor vehicles are growing at a very fast rate. As a result, the concentration of motor vehicles on roads has increased 50 times during last four decades (Table 7). Due to such a high growth of motor vehicles on roads, the roads are gradually emerging more and more accident prone. There is a positive relationship between the growth of vehicles and occurrence of accidents (Retnaraj, 2001). It is clear from the fact that on an average, 13 persons die in road accidents and 27 get injured every day on the roads in Haryana (Table 11). In the first five months of the year 2015, 1914 deaths were reported (13 every day) and 4275 persons were injured (28 every day; Table 11). Moreover, to meet the ever growing passenger rush with 40 lakh passengers commuting daily, the Government of Haryana has decided to add 1000 new busses to Haryana Roadways fleet apart from inviting private sector. The state is facing the menace of over-sized vehicles plying on roads, causing accidents (Tribune News Service, 2015). Since, the state encloses the National Capital Territory (NCT) of Delhi from north-western, western and south-western

Table 11
Haryana: Year-wise, Number of Persons Killed
and Injured by Road Accidents

Year	Deaths	Injured
2010	4724	9891
2011	4561	9528
2012	4579	9240
2013	4509	9382
2014	4632	9847
2015		
January	373	775
February	339	801
March	419	925
April	401	828
May	382	846

Source: Sharma, 2015

Table 12
Haryana: Year-wise Number of Road Accidents,
Deaths and Injured, on NH-1 in Karnal District, 2010-13

Year	Accidents	Injured	Deaths
2010	187	116	94
2011	161	243	83
2012	160	134	94
2013	157	153	93

Source: Arora, 2014

sides, therefore, the roads connecting National Capital with states like Punjab, Himachal Pradesh, Rajasthan and Jammu and Kashmir are most accident prone roads of Haryana. For example, Karnal district stretch of National Highway No 1 faces an accident every 2nd day and a death every 4th day (Table 12). Thus, due to increasing concentration of motor vehicles on the roads, the state has emerged as one of the most accident prone states of India.

Conclusions

The study concludes that Haryana is far ahead of the national average in terms of motor vehicles on the roads but much behind in terms of road length, resulting in very high pressure of motor vehicles on roads which has its own consequences. The state recorded 165 km of

total road length and 149 km of total surfaced road length per lakh of population against the national averages of 313 km and 193 km, respectively. Conversely, Haryana has 161 registered motor vehicles per km of metalled road length against the national average of 70 motor vehicles. Similarly, Haryana accounts for 3.8 per cent of the total motor vehicles of the country against its share of 2.1 per cent of total population. Bhiwani, Kaithal and Ambala districts have recorded highest, while Palwal, Gurgaon and Faridabad districts witnessed lowest weighted road length per lakh of population. On the other hand, Faridabad (4505) and Gurgaon (2582) districts recorded highest number of weighted motor vehicles per km of weighted road length against lowest witnessed by Mewat (159) and Palwal (83)

districts. Likewise, these districts respectively have also witnessed highest and lowest ranks in composite index for development of road transportation. The study supports the assumptions that higher the degree of road connectivity more will be the percentage of urbanization, enrollment in the schools and agricultural productivity in a region leading to overall development and reduction of poverty. However, increasing pressure of motor vehicles on the roads has led to high rate of accidents and road deaths.

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