

Geographical Analysis of Detour Index of Road Network in Kolhapur District

By

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Abstract

Roads Are Indicators Of Development In Any Region. Roads Connect One Area To Another. Various Methods Are Used In Geography For The Study Of Road Routes, Among Which Detour Index Is An Important Indicator. The Ratio Between The Direct Distance Between Two Different Places And The Distance Traveled By Actual Roads Is Called The Detour Index. In The Presented Research Paper, The Detour Index Of The Road Route In Kolhapur District Of Maharashtra State Has Been Studied

Keyword: Road Network, Detour Index, Direct Distance, Road Distance, Development

Introduction

The Detour Index Is The Ratio Of The Actual Distance Traveled Between Two Points In A Region To The Actual Distance Traveled. If The Distance Required Traveling To A Major Point In A Region Is Greater Than The Distance Traveled By Direct Travel From Other Points In The Region, The Value Of The Detour Index Decreases If The Direct Distance Is Less.

Road Transport Development Is Necessary In Areas Where Detour Index Value Is Low. In The Presented Research Paper, The Detour Index Of Kolhapur District Has Been Studied.

Objectives

Main Objectives Of The Present Research Work Is As Follows,

- 1) To Study And Analysis Detour Index Of Road Network In Kolhapur District
- 2) To Evaluate The Correlation Between Road Network And Its Detour Index In Kolhapur District.

Data Source and Methodology

Discussion Of The Present Research Paper Is Based On The Secondary Source Of Data. Road Map Is And Road Distance Between District Headquarter To Tehsil Headquarter Is Compiled From Compiled From P.W.D. Office, Kolhapur. Direct Distance Between Two Places Is Measured In Map By Using Gis Software.

Kolhapur City Is The District Headquarters Of Kolhapur District, So District Headquarters Is Taken As Main Center While Deriving Detour Index. People From Other Tehsils Of The District Have To Come To The District Headquarters For The Main Work.

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Therefore, Actual Road Distance And Direct Distance From Tehsil Hq To District Hq Have Been Considered In The Present Research. Also, Since Kolhapur District Comes Under Pune Division, The Distance Of Kolhapur City From The Divisional Headquarters Pune Has Been Taken Into Consideration.

Detour Index Is Calculated With The Help Of Following Formula,

$$D_i = \frac{D(s)}{D(t)}$$

D_i = Detour Index Of Road Network

$D(S)$ = Direct Distance Between Two Places (Tehsil And District Headquarter)

$D(T)$ = Actual Road (Travel) Distance Between Tahsil And District Headquarter

Study Region

Kolhapur District Is Located In Western Maharashtra. Kolhapur District Is Lies In Between 15°42'39" North Latitude To 17°09'58" North Latitude And 73°39'06" East Longitude To 74°38'46" East Longitude.

Kolhapur District Has 1 Municipal Corporation And 9 Municipalities And 2 Nagar Panchayats. Administratively, Kolhapur District Has Four Revenue Subdivisions Namely Karveer (Kolhapur), Ichalkaranji, Gadhinglaj And Radhanagari. , Radhanagari, Gargoti, Ajra, Gadhinglaj And Chandgad Are Divided Into 12 Tehsils Subdivisions. There Are About 1,216 Villages And 13 Towns In Kolhapur District.

According To The Year 2021-22 Total Road Length Of The District Is 8671.16 Km. Total Population Of The District Is 3876001 And Out Of Them Male Population Is 1980658 (51.11%) And Female Population Is 1895343 (48.89%) As Per The Census Year 2011.

Road Network In Kolhapur District

According To The Year 2021-22 Total Road Length Of The District Is 8671.16 Km. Out Of Them 254.25 Km Is National Highway, 986.50 Km Are State Highway, 3544.16 Are District Road And 3886.25 Km Area Rural Roads.

Tehsil Wise Total Road Length Is Presented In Table No.1

Table No. 1: Kolhapur District – Total Road Length (2021-22)

Tehsils	Total Road Length (Km)	Percentage
Shahuwadi	797.56	9.20
Panhala	672.09	7.75
Hatkanganle	937.49	10.81
Shirol	690.15	7.96
Karvir	945.77	10.91
Gaganbavda	206.05	2.38
Radhanagari	866.50	9.99
Kagal	713.14	8.22
Bhudargad	684.93	7.90
Ajra	584.73	6.74
Gadhinglaj	738.46	8.52
Chandgad	834.28	9.62
Total	8671.16	100%

Source – P.W.D. Office, Kolhapur

Karveer Tehsil Has 945.77 Km Road Network And Hatkanganle 937.49 Km Road Network. These Tehsil Coverd More Than 10% Road Networks In The District. Other Tehsil Covered Less Than 10% Road Network. Gaganbavda Tehsil Found Lowest Road Length (206.05km) And Its Share To Total Network In The District Is 2.38%.

Road Network In The District Is Not Uniform And Therefore Development Of Road Network Is Also Found Uneven (Figure No. 1).

Detour Index Of Road Network In Kolhapur District

The Values Of Detour Index Are Always Observed 0.1 To 1. The Maximum Value Od Detour Index Never Found More Than 1. The Value 1 Observed Only When Direct And Travel Distance Is Same. Therefore The Value Of Detour Index Is Rarely Found 1.

If The Difference Between Direct Distance And Road Distance Is Decreased Then Values Of Detour Index Reach To Closer To 1 And If This Difference Is Increased Then Value Of Detour Index Is Decreases.

Table No. 2 Represents The Direct And Road Distance Between Tehsil Headquarter And District Headquarter And Value Of Detour Index.

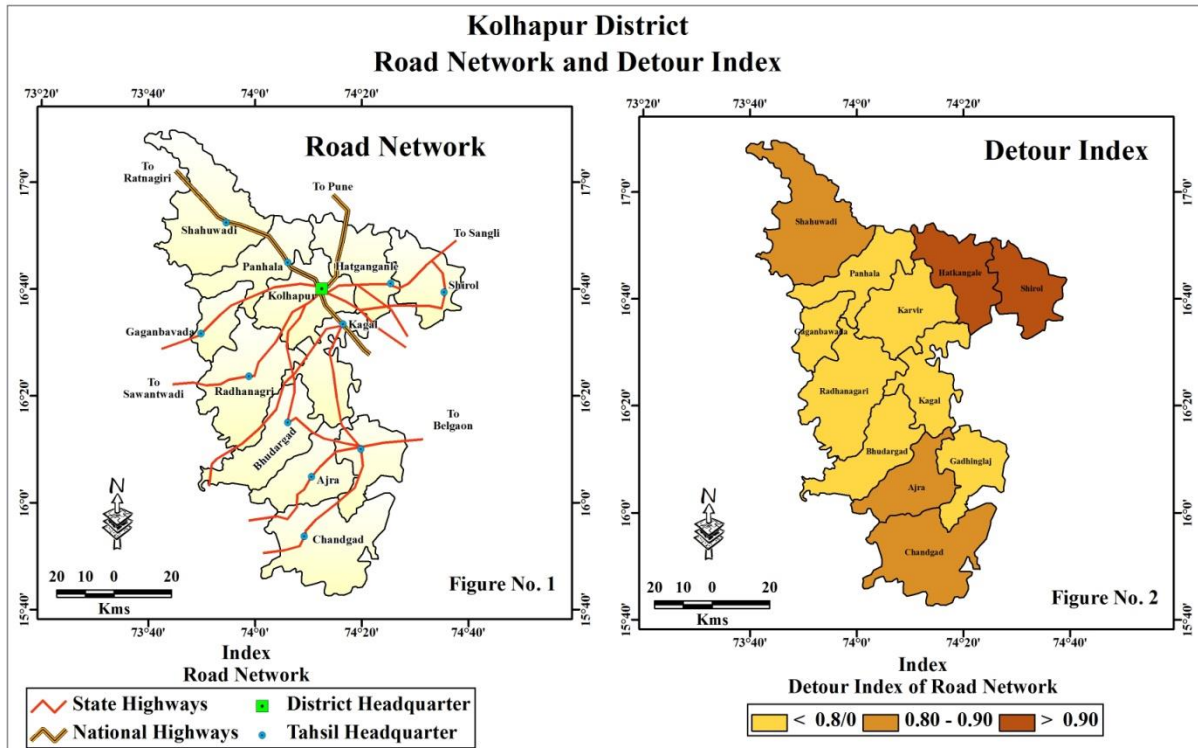
Table No.2: Kolhapur District – Detour Index Of Road Network

Name Of Center	Direct Distance (Km)	Road Distance (Km)	Detour Index
Shahuwadi To Kolhapur	39.27	46.90	0.84
Panhala To Kolhapur	15.12	21.10	0.72
Hatkanganle To Kolhapur	23.06	23.60	0.98
Shirol To Kolhapur	41.49	43.50	0.95
Gaganbavda To Kolhapur	42.56	57.90	0.74
Radhanagari To Kolhapur	38.31	49.80	0.77
Kagal To Kolhapur	14.26	19.40	0.74
Bhudargad To Kolhapur	47.54	67.10	0.71
Ajra To Kolhapur	65.67	86.30	0.76
Gadhinglaj To Kolhapur	56.92	63.50	0.90
Chandgad To Kolhapur	85.46	109	0.78
Kolhapur To Pune	206.86	230.20	0.90

Source – Calculated By Author

Detour Index Of Hatkanganle To Kolhapur (0.98) And Shirol To Kolhapur (0.95) Is Found Higher In The District And It Is Closer To 1, Because Difference Between Direct And Actual Distance Is Low (Figure No. 2).

Detour Index Of Gadhinglaj To Kolhapur And Kolhapur To Pune Is Found 0.90. There Are Not Many Turns On These Roads But Straight Roads Have Been Built. Also, The Gap Between Direct And Actual Distance Has Been Reduced Due To Flyovers On Main Roads. This Index In Shahuwadi To Kolhapur Is 0.84. There Is A Difference Of 7.63 Km Between Shahuwadi To Kolhapur Direct Distance And Actual Travel Distance. Since This Variation Is Moderate, The Index On This Route Is Also Found To Be Close To 1.



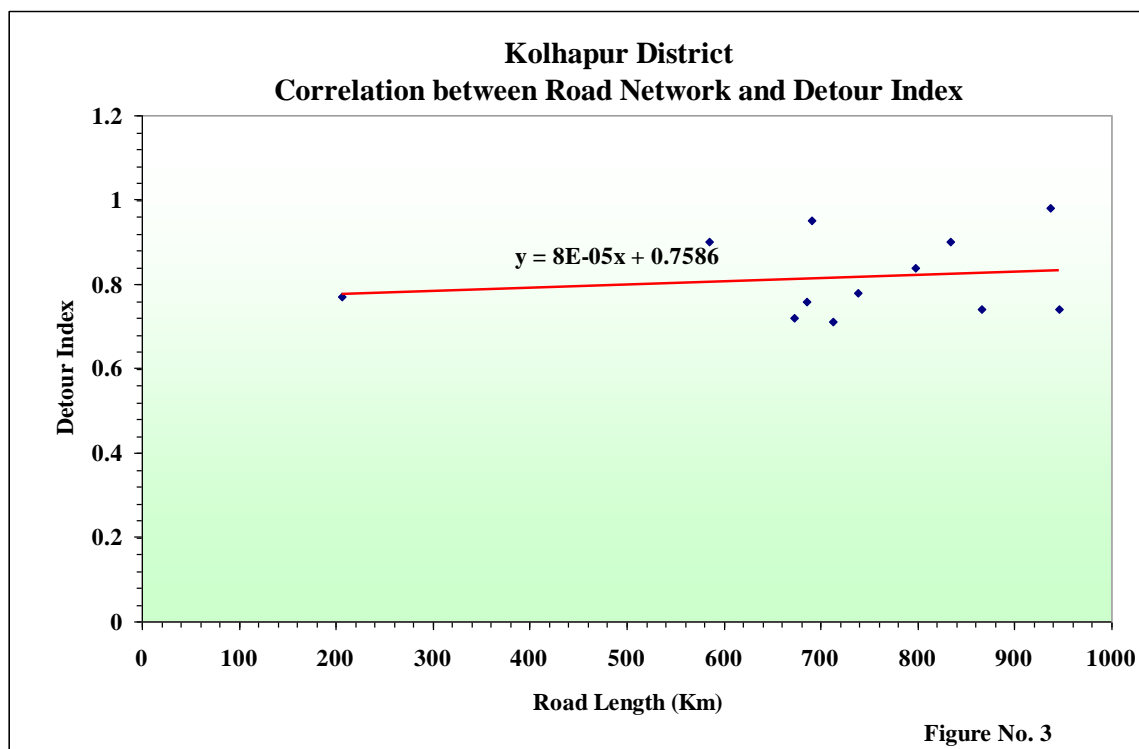
Detour Index Of Chandgad To Kolhapur (0.78), Radhanagari To Kolhapur (0.77) And Agra To Kolhapur (0.76) Is Found Above 0.75 But Less Than 0.80. From Kolhapur To These Taluks The Ground Level Has Increased. Due To This, The Actual Travel Distance Is Slightly Increased Due To The Twisting Of The Roads. The Physical Distance Between These Road Routes Is More Than 10 Km Than The Direct Distance.

The Value Of Detour Index Between Gaganbavda To Kolhapur (0.74), Kagal To Kolhapur (0.72), Panhala To Kolhapur (0.72) And Bhudargad To Kolhapur (0.71) Ranges From 0.71 To 0.74, Which Is The Lowest Value In The District. From Kolhapur, Kagal And Panhala Are Near The Tehsil Headquarters. But Since This Route Passes Through The City, It Has Got Twists And Turns. Hence The Value Of Detour Index Is Low Even Though The Difference Between Direct Distance And Actual Travel Distance Is Less.

Gaganbawda And Bhudargad Are Far From Kolhapur And There Is A Difference Of More Than 15 Km Between The Direct Distance And The Actual Road Distance. Since Gaganbawda Is At A Higher Altitude, The Road Up To It Has Many Twists And Turns, So This Index Is Low.

Correlation Between Road Network And Detour Index

The Relation Between Road Network And Detour Index Is Found Positive But Is Low Degree Positive ($R = +0.16$). That Is, To The Extent That The Road Network Has Been Developed In Kolhapur District, The Actual Travel Distance Has Been Reduced To Some Extent. But This Correlation Is Low-Level Dynamic, Meaning That Further Development Of The Road Network May Further Reduce The Actual Travel Distance (Figure No. 3).



Conclusions and Suggestions

The Detour Index Gives An Idea Of The Distance Between Two Main Destinations Rather Than The Direct Distance And Gives An Idea Of Road Development.

Panhala And Kagal Are Close To The Tehsil Headquarters Kolhapur City But The Actual Travel Distance Is Comparatively More. It Is Necessary To Construct Flyovers To Reduce This Distance And Avoid Traffic In The City.

There Are Few Number Of Flyovers On Main Roads To Reach Bhudargarh And Gaganbawda Tehsils Which Are Far From Kolhapur. Many Roads Are Built Parallel To The Rivers. Due To This, The Distance On The Road Increases And The Actual Journey Takes Time. It Is Necessary To Make This Distinction In Such Areas So It Will Save Both Time And Distance.

Building New Flyovers Is A Costly Undertaking, But Keeping Current And Future Needs In Mind Will Reduce Fuel Costs. Also, The Cost Of The Flyover Will Be Covered Due To The Saving Of Time.

Roads Are The Only Option For Internal Transport In Kolhapur District. Citizens Have To Come To Kolhapur City From All Parts Of The District For Work. Therefore, It Is Necessary To Reduce The Distance Between Two Places By Developing Roads In A Modern Manner.

Correlation Between Road Route And Detour Index In The District Is Positive But It Is Low Level Which Can Further Reduce The Actual Travel Distance Between Different Two Places In The District. This Is Needed Today For Future Fuel Savings.

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