



Original Article

Impact of rural road development on market access in India

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Abstract:

Rural road development is vital for refining market contact and economic growth in India's agrarian economy. Creativities like the Pradhan Mantri Gram Sadak Yojana (PMGSY) have considerably compact travel time and costs, allowing growers to reach bigger markets and conversion to profitable production. Improved connectivity inspires the acceptance of new technologies, modification into high-value crops and greater non-farm employment opportunities. Study indicates that villages with all-weather roads have better market involvement and socio-economic outcomes. However, challenges such as regional differences, maintenance issues, and poor integration with agri-logistics remain. Improving road quality and connectivity is essential for exploiting rural development and transformation in India.

Keywords: *Rural Road Development - Market Access - Agricultural Growth - Inclusive Rural Development*

Introduction:

Rural road development plays a crucial role in conversion, agricultural transformation and poverty alleviation in rising economies, particularly in India where a significant share of the population relies on agriculture. The lack of reliable transportation infrastructure limits economic opportunities by limiting goods movement and market access. To stand this, the Indian government launched the Pradhan Mantri Gram Sadak Yojana (PMGSY) in 2000, directed at ensuring all-weather connectivity to unconnected rural areas. Over two decades, PMGSY has enriched rural transportation, linking millions to essential services and enhancing agricultural productivity, market incorporation and domestic incomes. Rural roads decrease transaction costs, travel times and post-harvest losses, allowing effective transport of unpreserved goods and facilitating farmers' access to markets and essential agricultural inputs. This interconnectedness adopts crop variation and enhances value chain combination, allowing a shift towards high-value crops supported by agro-processing units and cold-storage facilities. Investments in rural roads yield significant returns in poverty reduction and agricultural growth. Furthermore, enhanced rural connectivity promotes overall socio-economic development by improving access to health and education, supporting women's workforce participation, and generating non-farm employment opportunities. Despite the successes of road development, challenges such as variations in road quality and maintenance hinder full market access benefits. The integration of rural roads with supporting infrastructure like storage and processing facilities is essential to maximize potential economic gains.

Objectives:

1. To evaluate how rural road development enhances farmers market access.
2. To investigate the impact of improved rural road connectivity on rural households.
3. To analyze regional disparities in the performance of rural road infrastructure and identify major restrictions related to road quality.

Data and Methodology:

Only Secondary data will be collected from various sources such as **Government Reports**: Ministry of Rural Development, PMGSY (Pradhan Mantri Gram Sadak Yojana) annual reports, National Rural Infrastructure Development Agency (NRIDA), **State Government Records**: Public Works Department (PWD) and other relevant department or agencies.

Result and Discussion:

Results:

1. **Improved Physical Connectivity and Compact Travel Time:**

Rural road development under programmes such as the **Pradhan Mantri Gram Sadak**,

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Yojana (PMGSY) has largely reduced the travel time required for farmers to reach markets, service hubs and procurement points. Evaluations by **NITI Aayog (2018)** and **World Bank (2011)** show that newly connected villages experienced a **25–40% saving in travel time**, resulting in smoother mobility, reduced physical exhaustion and more frequent participation in market-related activities.

2. Decrease in Transportation Costs:

All-weather roads has lowered the cost of rural transportation by **15–30%**, as reported by **Aggarwal and Kumar (2016)** and field assessments by the **Ministry of Rural Development (MoRD)**. Farmers increased access to more reasonable transport modes, refining the overall profitability of agricultural operations, particularly for perishable products.

3. Improved Market Participation and Advanced Capacity of Sales:

Improved connectivity expressively boosted farmers' access to controlled markets and wholesale mandis. This study by **Asher & Novosad (2018)** and **Ghosh (2015)** observed a **20–35% increase in marketed excess** for crops such as vegetables, paddy and pulses. Small and marginal farmers, in particular, reduced their reliance on village traders and diversified their marketing channels.

4. Innovative Farm gate Prices and Reduced Suffering Selling:

With improved road connectivity, farmers benefitted from enhanced competition among buyers, which contributed to a **10–20% rise in farm gate prices**. Indication from **Bell & van Dillen (2014)** indicates that better access to multiple markets leads to improved price discovery, enabling farmers to avoid suffering sales and directly sell to private buyers, processors, or collection centers.

5. Enhanced Access to Inputs, Technology and Support Services:

Connected villages reported improved access to high-quality seeds, fertilizers, credit facilities, machinery rentals and extension services. The **IFPRI (Fan & Thorat, 2003)** notes that infrastructure investments directly enhance technology adoption and agricultural productivity. The availability of timely inputs also reduced crop losses and boosted yields.

6. Reduction in Post-Harvest Losses:

For unpreserved agricultural commodities, improved mobility significantly reduced transportation delays and spoilage. According to **Deininger & Xia (2018)**,

villages with better roads saw **12–25% lower post-harvest losses**, primarily due to quicker market access and proximity to cold storage or processing units.

7. Regional Disparities in Impact:

- **Southern and Western states:** Karnataka, Tamil Nadu, Maharashtra – established deeper market combination, supported by robust mandi networks.
- **Eastern states:** Odisha, Bihar, Jharkhand – These states indicated moderate improvements, largely due to infrastructural gaps in storage and marketing.
- **Hilly and remote regions:** sustained to face challenges such as seasonal blockages and high maintenance costs, as highlighted in **ADB (2017)**.

Discussion:

Rural road development has occurred as a powerful driver of agricultural commercialization and rural transformation in India. Reliable with findings from **Asher & Novosad (2018)** and **NITI Aayog (2018)**, the study confirms that road connectivity enhances market access, reduces uncertainties and supports economic decision-making among farmers.

1. Reductions in travel time and transportation costs reshape farmers' market behaviour. Reliable roads encourage diversification of crops and marketing channels, shifting households from subsistence-based strategies to more commercialized farming systems (**Fan & Thorat, 2003**).
2. Enhanced connectivity improves price realization by expanding farmers' access to multiple markets. This widens the competitive space, reduces intermediary exploitation, and increases farmers' bargaining power (**Bell & van Dillen, 2014**).
3. The broader spillover effects extend beyond agriculture. Improved roads facilitate access to schools, health centers, employment opportunities, and rural enterprises in line with evidence presented by the **World Bank (2011)** and **IFPRI (2014)**.
4. The discussion recognizes that road infrastructure alone cannot guarantee maximum benefits. Regions lacking adequate market facilities, storage structures, and institutional support derive limited gains, as emphasized in **Ghosh (2015)**. Complementary investments cold chains, warehouses, digital price systems, and efficient regulated markets are essential to fully leverage the benefits of connectivity.

Generally, rural road development significantly enhances farmers' market access, but its effectiveness depends on the larger ecosystem of rural organizations, market infrastructure and policymaking context.



The PMGSY State-wise sanction details:

PMGSY-III - State-wise cost saving in 2022-23							
Sl. No.	State	Sanctioned Year	No of Road Works	Total Road Length (in km)	Pre-EC Average Cost (Lakhs/ km)	Sanctioned Average Cost (Lakhs/km)	Reduction in Cost after scrutiny of proposals (Rs. in crores)
1	Assam	2022-23	155	996.24	67.21	61.01	61.77
2	Bihar	2022-23	280	2172	78.18	63.75	313.42
3	Bihar	2022-23	263	2438.32	97.39	87.82	233.35
4	Himachal Pradesh	2022-23	45	440.18	125.41	95.9	129.90
5	Jharkhand	2022-23	336	3106.129	62.16	65.59	-106.54
6	Jammu And Kashmir	2022-23	155	1272.43	138.14	106.71	399.92
7	Madhya Pradesh	2022-23	91	973.99	65.83	66.13	-2.92
8	Rajasthan	2022-23	3	31.05	71.52	67.31	1.31
9	Rajasthan	2022-23	266	2369.342	67.96	65.2	65.39
10	Tripura	2022-23	32	231.64	107.02	92.49	33.66
11	West Bengal	2022-23	144	857.25	79.99	68.51	98.41
12	Maharashtra	2022-23	412	2551.63	71.48	79.94	-215.87
13	Karnataka	2022-23	35	230.22	61.11	60.86	0.58
14	Ladakh	2022-23	50	418.36	126.50	104.80	90.78
15	Meghalaya	2022-23	55	443.26	126.21	93.02	147.12
16	Uttarakhand	2022-23	104	1090.74	75.84	78.56	-29.67
		Total	2426	19622.78	81.90	75.68	1220.61

The PMGSY State-wise cost saving. During the year 2022-23 and 2023-24 the total savings on account of reduction in cost after the scrutiny of proposals have been Rs.1220.61 crore and 961.10 Crore respectively. Thus, total amount of savings made in PMGSY. Apart from this considerable amount of savings have also been made in clearance of RCPLWEA, PM JANMAN and VVP projects. The details of the saving done in PMGSY-III projects are given below:

PMGSY-III - State-wise cost saving in 2023-24							
Sl. No.	State	Sanctioned Year	No of Road Works	Total Road Length (in km)	Pre-EC Average Cost (Lakhs/ km)	Sanctioned Average Cost (Lakhs/km)	Reduction in Cost after scrutiny of proposals (Rs. in crores)
1	Arunachal Pradesh	2023-2024	91	720.75	109.51	89.73	142.56
2	Andhra Pradesh	2023-2024	115	916.22	62.43	62.88	-4.12
3	Rajasthan	2023-2024	35	394.65	64.57	63.69	3.47
4	Nagaland	2023-2024	40	506.69	88.95	96.64	-38.96
5	Kerala	2023-2024	112	594.752	97.51	93.22	25.51
6	Telangana	2023-2024	5	27.3	109.62	100.18	2.58
7	Jammu and Kashmir	2023-2024	59	400.05	130.7	113.12	70.33
8	Himachal Pradesh	2023-2024	254	2682.93	109.65	98.51	298.88
9	Sikkim	2023-2024	45	286.5	94.22	87.27	19.91
10	Bihar	2023-2024	32	267.66	76.07	73.92	5.75
11	Jharkhand	2023-2024	5	44.74	136.85	93.26	19.50
12	Mizoram	2023-2024	17	487.5	138.2	115.42	111.05
13	Jammu and Kashmir	2023-2024	12	134.8	112.1	105.3	9.17
14	Maharashtra	2023-2024	50	276.59	84.69	85.16	-1.30
15	Manipur	2023-2024	56	502.23	85.65	80.58	25.46
16	Punjab	2023-2024	129	1253.6	103.93	97.47	80.98
17	Tamil Nadu	2023-2024	660	2869.2	66.67	65.23	41.32
18	Tripura	2023-2024	68	549.5	114.32	93.85	112.48
19	Uttar Pradesh	2023-2024	65	459.4	121.14	123.98	-13.05
20	Uttarakhand	2023-2024	108	1197.2	84.97	80.83	49.56
		Total	1958	14572.26	93.21	86.61	961.10

Assistance from Asian Development Bank (ADB):

ADB provided the assistance to PMGSY program in the 5 States (Assam, Chhattisgarh, Madhya Pradesh, Odisha and West Bengal) for Rural Roads Sector-I Projects, Rural Roads Sector- II Projects and Rural Connectivity Investment Programme (RCIP) through loans of USD 400 Million, USD 750 Million and USD 800 Million

respectively. The ADB assistance under ongoing Second Rural Connectivity Investment Programme (SRCIP) was USD 500 Million. Rural Roads Sector I Investment Program (RRSIP) and Rural Roads Sector II Investment Program (RRSIP-II) have been completed in June 2009 and June 2014 respectively by connecting 9600 habitations



through 22,555.70 km road length in the States of Assam, Chhattisgarh, Madhya Pradesh, Odisha and West Bengal.

a. Rural Connectivity Investment Program (RCIP):

Multi-tranche Financing Facility (MFF) for USD 800 Million was signed on 17th May 2012 by ADB, DEA, MoRD and States. ADB financial support for the RCIP was

extended through MFF. RCIP was completed on 31st Dec 2019 connecting 6382 habitations through the construction of 13021.156 km roads in the States of Assam, Chhattisgarh, Madhya Prad, Odisha and West Bengal. Financing Plan of the Investment Program is given below:

Sl.No.	Source	Amount
01	Asian Development Bank	USD 800 Million
02	Government of India and State Governments	USD 425.30 Million
Total		USD 1,225.30 Million

b. Second Rural Connectivity Investment Program (SRCIP):

Government of India has obtained additional financing of USD 500 Million through MFF from Asian Development Bank under the SRCIP to assist portion of the PMGSY in Assam, Chhattisgarh, Madhya Pradesh, Odisha and West Bengal. Tranche 3 was planned for 2,800 km in Assam (800 km), Chhattisgarh (500 km), Odisha (500 km) and West Bengal (1,000 km).

Financing	Tranche-1 (in USD Million)	Tranche-2 (in USD Million)	Tranche-3 (Under Planning) (in USD Million)	Total (in USD Million)	Share (%)
ADB (Ordinary Capital resources) (41.7%)	250	110	140	500	40.81
Government of India (58.3%)	415.32	193	116.94	725.26	59.19
Total	665.32	303	256.94	1,225.26	100.00

• Loan 3611-IND (Tranche-1):

The loan for USD 250 Million was signed on 30th January 2018 and was effective from 20th March 2018. This comprised upgradation of rural roads of Assam, Chhattisgarh, Madhya Pradesh, Odisha and West Bengal. The Loan has been closed & disbursement of USD 190.73 Million was made & USD 59.27 Million was surrendered by way of savings.

• Loan 3703-IND (Tranche-2):

The loan for USD 110 Million was signed on 5th October 2018. This was comprised of upgradation of 2859 km road length in state of Madhya Pradesh. The loan became effective on 2nd April, 2019. Disbursement of approx. USD 88.68 Million was made & USD 21.32 Million was surrendered by way of savings. The project has been closed.

c. Technical Assistance under ADB project:

Asian Development Bank had earlier provided the technical assistance of USD 0.50 Million on grant basis from ADB's Technical Assistance Special Fund. Technical Assistance focused to assist RRNMU and RCTRC to contribute in the delivery of intended output of the investment program, viz.

- a. Enhancing Sustainability
- b. Enhancing resilience
- c. Promoting innovation

Conclusions:

Rural road development plays a crucial role in improving market access and reinforcement the rural economy in India. The study shows that better connectivity decreases travel time and transportation costs, allowing farmers to participate more actively in markets and secure higher prices for their produce. Small and marginal farmers, in particular, benefit through reduced dependence on mediators and improved access to inputs and services.

Road development also creates wider socio-economic improvements by enhancing access to education, health, and non-farm opportunities. Though, its effect varies across regions due to differences in market infrastructure and institutional support. Therefore, roads must be supplemented with investments in storage, cold chains, regulated markets, and digital platforms to maximize their effectiveness.

Overall, developed rural connectivity is a main driver of agricultural growth, poverty decrease and sustainable rural development in India.

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Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper

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