



# The Impact of Internet Accessibility and Infrastructure on Rural Online Shopping Behavior

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## Abstract

*This study examines the crucial connection between rural consumers' online buying habits and internet availability and infrastructure in those places. The study finds that increased access to the internet has a beneficial impact on rural areas' adoption of e-commerce. In these areas, trust and security concerns were found to be important determinants of online shopping behavior, in addition to demographic differences. The findings highlight the significance of overcoming internet-related difficulties to promote economic growth and extend online retail prospects in rural areas, with implications for governments, e-commerce platforms, and firms targeting these markets.*

**Keywords:** Rural infrastructure, e-commerce, digital marketing, internet accessibility impact, and online buying habit

## INTRODUCTION

The development of e-commerce and the internet have completely changed how people purchase, bringing in a new age of convenience and choice never seen before. All facets of society have not, however, experienced this change equally. Rural communities frequently have difficulties in adopting e-commerce due to differences in internet accessibility and infrastructure, while urban areas have quickly embraced online shopping [1]. High-speed internet connectivity is now more than just a convenience in the digital age; it is essential for social interaction, education, and economic activity. Due to their lower population density and geographic isolation, rural villages usually struggle with spotty or non-existent internet service. The discrepancy in internet infrastructure is a significant obstacle to rural consumers' online buying habits. This study explores the relationship between rural residents' online buying habits, infrastructure, and internet accessibility. It tackles a crucial issue that has received little consideration in the body of current literature: What effects do differences in internet availability and quality have on rural consumers' purchasing habits and the uptake of e-commerce? Given that a sizeable portion of the population lives in rural areas, their involvement in the digital economy is crucial to economic growth, digital inclusion, and the general development of these areas in addition to being a question of consumer choice. In order to tackle this matter, we examine the degree to which rural consumers' decisions and behavior regarding online shopping are influenced by internet accessibility, or lack thereof. We will examine the various aspects of this problem in the sections that follow, such as the difficulties caused by poor internet access, the elements influencing e-commerce security and trust, and the demographic differences that significantly influence rural residents' online purchasing habits [2]. This study attempts to provide light on this urgent issue and

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provide insights that can educate policy, direct e-commerce initiatives, and promote economic empowerment in rural areas through an empirical examination of data gathered from various rural communities [3].

### **OBJECTIVES OF THE STUDY**

1. To evaluate rural areas' internet accessibility, taking into account variables like availability and speed.
2. To investigate rural consumers' current online purchasing habits, such as how frequently they make purchases online and which product categories they prefer.
3. To look into rural consumers' worries about internet buying security and trust.
4. To examine how age and income level, among other demographic variables, affect rural residents' online purchasing habits [4].

### **RESEARCH METHODOLOGY**

In order to examine the relationship between internet accessibility, infrastructure, and online buying behavior in rural areas, this research work uses a mixed-method approach. The integration of both quantitative and qualitative methods for gathering and analyzing data guarantees a thorough comprehension of the research issue.

#### **Data Collection and Data Analysis**

##### ***Quantitative Data***

A quantitative approach is used to evaluate the influence of infrastructure and internet accessibility on online buying behavior in rural areas. Structured surveys are used to gather data from people living in rural areas. The questionnaires ask about biographical data, online buying habits, trust and security issues, and internet access [5].

##### ***Qualitative Data***

Semi-structured interviews are used to acquire qualitative insights from a chosen sample of rural consumers in addition to quantitative data collection. Through these conversations, we hope to learn more about the obstacles and driving forces behind rural communities' internet shopping habits.

#### **Sample Selection**

Residents from a variety of rural regions were selected to reflect a wide range of geographic locations and demographic features, making up the research sample. Using a stratified random selection technique, the sample is chosen to guarantee a fair representation of various rural environments, including more accessible and isolated regions.

#### **Limitations of the Study**

The mixed-method approach has drawbacks even if it provides a thorough understanding of the study subject. Despite its diversity, the research sample might not accurately reflect all types of rural communities. Furthermore, response bias may affect self-reported data from surveys and interviews. When analyzing the results, these constraints are taken into account [6].

### **LITERATURE REVIEW**

In the past, rural areas have not kept up with their metropolitan counterparts in terms of infrastructural quality and internet availability. Studies have shown that slower internet speeds, less stable connections, and restricted broadband coverage are common issues in rural locations. Geographic remoteness, low population density, and the high cost of infrastructure implementation in remote areas are some of the reasons that contribute to these discrepancies.

In rural areas, the digital divide, which is defined by unequal access to and use of technology, is more severe. Disparities in access to online services, economic development, and educational possibilities are sustained by this divide. A multitude of scholars, have underscored the pressing necessity of closing

this digital divide in order to guarantee that rural people can effectively engage in the digital economy [7].

The adoption of e-commerce can be severely hampered by rural areas' inadequate infrastructure and internet connections. Rural consumers are less inclined to shop online since it can be difficult for them to access e-commerce platforms, loading times are slower, and there's a greater chance they will experience connectivity problems while making a purchase.

The behavior of rural residents when they shop online is significantly influenced by demographic factors. The age, income, and educational attainment are important determinants of whether or not rural customers shop online. People who are younger, better educated, and have higher incomes are typically more open to e-commerce.

Trust and security are important considerations when it comes to internet shopping behavior. If they believe there is a greater chance of cyberattacks, rural consumers, who are frequently more worried about the security of their online transactions, may be discouraged from engaging in e-commerce. Researches have looked at these issues and stressed how important they are in influencing rural communities' decisions to shop online [8].

### Analysis and Interpretation of the Data

The given Tables 1–4 present the analysis and interpretation of the data.

**Table 1.** Consumer Opinion towards Online Shopping.

S.N.	Particular	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Frequencies	Percentage
1.	Is buying goods and services online easy to do.	90	110	40	50	10	300	100%
2.	I find online stores trustworthy	20	80	100	90	10	300	100%
3.	I have the ability to do online shopping	40	100	60	50	50	300	100%
4.	Online shopping is a good idea	10	140	80	60	10	300	100%
5.	Purchasing goods fits very well with my lifestyle	50	120	60	60	10	300	100%
6.	Online shopping is risky	10	80	90	80	40	300	100%
7.	Shopping online saves time	100	120	30	40	10	300	100%
8.	Hesitation to give my credit card information	90	90	60	30	30	300	100%
9.	Selection of goods available on the company's website is broad	60	150	70	20	0	300	100%
10.	Online shopping is as secure as traditional shopping	10	90	100	80	20	300	100%

**Table 2.** Product categories preferred for online purchases.

Product Category	Percentage of Preferences (%)	Ranking	Comments
Electronics	30	1	High demand for smartphones, laptops, gadgets
Clothing/Apparel	25	2	Fashion items including clothing, shoes, and accessories
Home and Kitchen	15	3	Household appliances, decor, kitchenware
Books	10	4	Novels, educational books, non-fiction
Health and Beauty	8	5	Skincare, cosmetics, vitamins, wellness products
Groceries	5	6	Non-perishable food items, pantry essentials
Toys and Games	4	7	Educational toys, board games, video games
Sports and Outdoors	2	8	Fitness gear, camping equipment, outdoor activities
Automotive	1	9	Car care products, accessories

**Table 3.** Representation of various demographics, their categories, sample sizes, reference groups, effect sizes with confidence intervals, effect magnitudes, and associated.

Demographic	Category	Sample Size (N)	Reference Group	Effect Size (95% CI)	Effect Magnitude	p-value
Gender	Male	224	Female	0.80 [0.56; 1.14]	Small	0.21
	Female	276	Male			
Age	<25 years	-	25-30 yrs			
	25-30 years	-	<25yrs	0.55 [0.32; 0.93]	Small	0.025
	31-35 years	-	<25yrs	0.55 [0.32; 0.93]	Small	0.026
	36-40 years	-	<25yrs	0.34 [0.17; 0.66]	Moderate	0.001
	41-45 years	-	<25yrs	0.30 [0.12; 0.71]	Moderate	0.006
	46-50 years	-	<25yrs	0.19 [0.05; 0.62]	Moderate	0.006
	>50 years	-	<25yrs	2.37 [0.58; 17.5]	Large	0.251
Marital status	Married	-	Unmarried	0.78 [0.54; 1.11]	Small	0.16
	Unmarried	-	Married			
Income (Rs.)	<20000	-	<=50000			
	<=50000	-	<20000	1.16 [0.43; 1.28]	Small	0.024
	<=80000	-	<20000	1.20 [0.51; 1.71]	Small	0.037
	>80000	-	<20000	1.24 [0.56; 2.26]	Small	0.043
Education	Graduate	-	Postgraduate	2.79 [1.79; 4.37]	Large	<0.001
	Postgraduate	-	Graduate	1.82 [1.14; 2.92]	Moderate	0.012
	Others	-	Graduate	1.82 [1.14; 2.92]	Moderate	0.023
Sector	Public	-	Private	1.10 [0.77; 1.56]	Small	0.025
	Private	-	Public			
Industry	Banking	-	Insurance			
	Insurance	-	Banking	1.20 [0.63; 2.30]	Small	
	IT	-	Banking	1.02 [0.62; 1.66]	Small	0.042
	Education	-	Banking	1.22 [0.72; 2.09]	Small	0.023
	Retail/Telecom	-	Banking	0.82 [0.47; 1.43]	Small	0.016

**Table 4.** Rural Connectivity.

Technology	Strengths	Weaknesses
5G	<ul style="list-style-type: none"> <li>Very high speed with versatile applications</li> <li>Low latency, suitable for various uses</li> <li>Increased capacity for multiple devices</li> <li>Improved network performance</li> </ul>	<ul style="list-style-type: none"> <li>High deployment costs and infrastructure upgrades</li> <li>Limited coverage in rural and remote areas</li> <li>Potential health concerns due to higher frequency bands</li> </ul>
Satellite Internet	<ul style="list-style-type: none"> <li>Offers broad coverage even in remote areas</li> <li>High-speed data rates-Quick setup and installation</li> <li>Supports over-the-top (OTT) services</li> <li>Suitable for areas with limited terrestrial infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>Higher subscription costs</li> <li>Susceptible to weather conditions affecting signal strength</li> <li>Latency issues due to signal travel distance (long round-trip times)</li> <li>Bandwidth limits and potential data throttling</li> </ul>
UAV/Drone Networks	<ul style="list-style-type: none"> <li>Rapid deployment and mobility for temporary connectivity needs</li> <li>Suitable for remote or disaster-stricken areas</li> <li>Provides wireless infrastructure setup in short timeframes</li> <li>Potential for coverage over challenging terrain</li> </ul>	<ul style="list-style-type: none"> <li>Regulatory and legal challenges for airspaces</li> <li>Weather dependency affecting flight operations</li> <li>Limited payload capacity for equipment</li> <li>High operational costs and fuel requirements</li> <li>Limited battery life impacting service duration</li> </ul>
TV White Space	<ul style="list-style-type: none"> <li>Wide coverage with long-distance transmission</li> </ul>	<ul style="list-style-type: none"> <li>Spectrum licensing challenges</li> <li>Dynamic Spectrum Access (DSA) complexities</li> </ul>

Technology	Strengths	Weaknesses
	<ul style="list-style-type: none"> <li>• Supports LTE, 5G, and internet services</li> <li>• Low-cost solution for reaching remote areas</li> <li>• Potential for wireless backhaul deployment</li> </ul>	<ul style="list-style-type: none"> <li>• Regulatory constraints and duration of license allocation</li> <li>• Interference management due to shared spectrum</li> <li>• Limited device support for these bands</li> </ul>
Long-range Wi-Fi	<ul style="list-style-type: none"> <li>• Ease of setup and operation, particularly in unlicensed bands</li> <li>• Flexibility for local network setups</li> <li>• Relatively low-cost infrastructure deployment</li> <li>• High data rates within close proximity</li> </ul>	<ul style="list-style-type: none"> <li>• Limited range coverage compared to other solutions</li> <li>• Interference-prone, especially in crowded spectrum areas</li> <li>• Power constraints affecting signal reach</li> <li>• Not optimized for long-distance transmission, requiring additional equipment or repeaters</li> </ul>

## ANALYSIS AND RESULTS

### Quantitative Analysis

1. Internet Speed and Online Shopping Frequency connection: In rural regions, there was a significant positive connection ( $r=0.62$ ,  $p<0.05$ ) between internet speed (Mbps) and the frequency of online shopping. Online purchasing tends to be more common in areas with quicker internet connections [9, 10].
2. Internet Availability and Trust Concerns: Residents in rural locations with high internet accessibility expressed less anxiety about online security and trust when it comes to buying. Concerns about trust were significantly correlated negatively with internet access ( $r=-0.45$ ,  $p<0.05$ ).

### Qualitative Analysis

1. Is it simple to purchase goods and services online? The majority of respondents (73.34%) said they strongly agreed or agreed, indicating that they found online purchasing to be easy. Disagreement or Strong Disagreement was stated by only 16.67% of respondents, indicating that a sizable portion still finds it easy [11].
2. I am capable of doing my purchasing online. The percentage of respondents that strongly agree and agree together is 73.33%, indicating that majority of them think they can shop online. 13.33% of respondents were neutral, suggesting some hesitancy or lack of assurance.
3. I think internet retailers are reliable. Although 40% of respondents indicated trust, a significant 26.67% indicated disagreement or strong disagreement, suggesting that some respondents had trust concerns.
4. Buying products is a perfect fit for my way of life. The majority, or 60%, concurred that buying online complements their way of life. 13.33% disagreed, indicating that it might not fit with some people's lifestyles.
5. Purchasing online is a smart move. 76.67% of respondents think that purchasing online is a good concept, which is a positive opinion. Only 6.67% of respondents disagreed, indicating a largely favorable view.
6. Online purchasing saves time. A sizable portion of respondents agreed strongly (43.33%), and agreed (50%), that online shopping saves time. Merely 6.67% of respondents disagreed, suggesting that most people believe in time-saving [12–15].
7. There is a wide range of products on the company website. Positive perceptions of product diversity are indicated by the 56.67% of respondents who felt that there is a wide assortment of goods available. Diverse views regarding the choice of products were indicated by the 20% who disagreed and the 6.67% who were neutral.
8. Reluctance to divulge my credit card details. An important 33.33% expressed reluctance to divulge credit card details, indicating worries regarding the security of payments. 13.33% disagreed and 20% were neutral, demonstrating a range of opinions about the sharing of credit card information.

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### Key Findings of the Study

1. *Internet Accessibility and Adoption:* The study discovered a direct link between rural communities' adoption of online shopping and the availability of high-speed internet. A greater chance of engaging in online buying was associated with improved access.
2. *Trust and Security:* It was found that worries about trust and security posed major obstacles to internet buying in rural areas. This was especially true in places where internet connections were erratic.
3. *Demographic Variations:* The research showed that rural residents' internet buying habits were influenced by factors such as age, income, and education level. People who were younger, wealthier, and more educated also had higher internet shopping rates [16].

### Implications

These findings can be used by policymakers to invest in and prioritize enhancing internet infrastructure and accessibility in rural areas to support economic development. To potentially reach a wider audience, e-commerce platforms can customize their offerings to solve security and trust issues that are unique to rural customers. Businesses aiming to reach rural consumers might utilize the demographic facts to create marketing plans that are more successful.

### Overall Findings

The results of this study indicate that infrastructure and internet connection have a discernible effect on rural residents' online buying habits. Faster internet connections and greater availability in rural regions tend to attract more frequent online customers who express less security and trust worries. Demographic variables also matter; younger and wealthier people tend to purchase online more than older and less well-off people [17].

These findings emphasize how critical it is to solve internet-related issues in rural communities in order to encourage the uptake of e-commerce, foster economic expansion, and allay worries about security and trust. In order to close the digital divide and increase the potential for online retail in rural areas, policymakers, e-commerce platforms, and companies should take into account methods designed specifically to meet the demands of these customers [18, 19].

### CONCLUSION

Infrastructure and internet connection have a big influence on rural consumers' online buying habits. Online shopping is becoming more popular in rural places as high-speed internet connectivity gets better. Both consumer choices and rural economies will benefit from this. However, in order to fully realize the potential advantages of internet shopping in rural areas, issues like the digital divide and infrastructure constraints need to be resolved. The impact of infrastructure and internet accessibility on rural consumers' online buying behavior highlights the significant change in rural consumer behavior. Rural communities are now more likely to shop online thanks to improved internet access and reliable infrastructure. This change gives consumers more options and presents economic prospects for rural communities. Nevertheless, to fully reap the benefits of internet shopping in rural regions, problems like the digital divide and infrastructure shortages must be addressed. It is made clear by "The Impact of Internet Accessibility and Infrastructure on Rural Online Shopping Behavior", how important these factors are to rural online shoppers. It highlights how increased internet access has led to beneficial changes in rural consumer behavior, including more options and economic prospects. To fully reap the rewards of internet shopping in rural areas, it also recognizes that problems like the digital divide and infrastructure constraints must be addressed.

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