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ECONOMIC AND SOCIAL IMPACTS OF E-COMMERCE ON CONSUMERS IN RURAL AND URBAN BIHAR: A COMPARATIVE STUDY OF MUZAFFARPUR DISTRICT

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ABSTRACT
The rapid diffusion of e-commerce platforms across India has transformed consumption patterns, yet the depth and nature of this transformation differ sharply between urban centres and rural hinterlands. This study undertakes a comparative analysis of the economic and social impacts of e-commerce on consumers in the rural and urban segments of Muzaffarpur district, Bihar, a region characterised by a substantial rural population, growing smartphone penetration, and an expanding but uneven digital infrastructure. Using a structured survey of 400 respondents (210 urban and 190 rural) supplemented by secondary data from government and industry reports, the study examines adoption levels, spending behaviour, perceived economic benefits, and social consequences of online shopping. Findings indicate that while urban consumers in Muzaffarpur exhibit significantly higher rates of e-commerce adoption, frequency of use, and average transaction value, rural consumers report comparatively stronger perceptions of price savings and product variety relative to their local markets, even though they face considerably greater barriers related to connectivity, trust, delivery infrastructure, and digital literacy. The study statistically tests two hypotheses concerning differences in adoption intensity and perceived economic benefit between the two groups, both of which are supported by the data. The paper concludes with policy implications for last-mile logistics, digital literacy programmes, and inclusive platform design in semi-urban and rural Bihar.
Keywords: E-commerce, rural-urban divide, consumer behaviour, Bihar, Muzaffarpur, digital divide, online retail

1. INTRODUCTION
Electronic commerce has emerged as one of the most consequential structural changes in Indian retail over the past decade. Driven by falling data costs, near-universal smartphone penetration, and aggressive platform expansion into Tier-II, Tier-III, and rural markets, online retail has moved well beyond metropolitan India into smaller towns and villages. National-level industry estimates suggest that non-metro and rural users now constitute a majority of new internet subscribers in India, and a growing share of e-commerce demand is increasingly originating outside the eight largest metropolitan cities.
Bihar, and Muzaffarpur district in particular, presents a useful microcosm for examining this transition. Muzaffarpur is among the more urbanised districts of north Bihar, anchored by a

sizeable municipal corporation area, yet the bulk of the district's population continues to reside in rural blocks with comparatively limited retail infrastructure, lower per-capita income, and uneven broadband and 4G coverage. This combination of a reasonably active urban commercial core alongside an extensive and still-developing rural hinterland makes the district well suited to a comparative rural-urban analysis of e-commerce impacts [1].

The economic impacts of e-commerce for consumers are typically framed in terms of price competitiveness, product variety, time savings, and convenience, while the social impacts extend to changes in household decision-making, shifts in social status signalling through consumption, altered relationships with local traditional retailers, and changing patterns of family and community interaction around shopping. However, much of the empirical literature on these effects has focused on metropolitan or pan-India samples, with comparatively little district-level evidence from Bihar that explicitly contrasts rural and urban consumer experiences within the same administrative unit. This study seeks to address that gap by providing primary survey-based evidence from Muzaffarpur district [2].

The remainder of the paper is organised as follows. Section 2 reviews the relevant literature. Section 3 states the research objectives and hypotheses. Section 4 describes the research methodology. Section 5 presents the data analysis and results, supported by tables and figures. Section 6 discusses the findings in light of existing literature. Section 7 outlines limitations, and Section 8 concludes with policy implications.

Muzaffarpur district's economy has historically been anchored in agriculture, particularly litchi cultivation for which the district is nationally known, alongside small-scale manufacturing and trade centred on the district town. Retail in the rural blocks remains dominated by small, often single-proprietor kirana stores, weekly haats (periodic markets), and itinerant vendors, while the urban core hosts a more diversified retail mix including organised regional chains alongside traditional bazaars. Against this backdrop, the entry of national e-commerce platforms, frequently accessed through smartphone applications rather than desktop browsers, represents a discontinuous shift in the retail choice architecture available to consumers, particularly in rural blocks where the marginal improvement in product variety and price transparency offered by online platforms may be considerably larger than in already retail-dense urban settings. Understanding how this shift is actually experienced, in economic and social terms, by consumers on both sides of the rural-urban divide is therefore not only of academic interest but also directly relevant to district administration, platform operators, and rural development policy in Bihar [3].

2. LITERATURE REVIEW

A substantial body of research has examined the determinants of e-commerce adoption in developing-country contexts, generally converging on infrastructure access, trust, perceived usefulness, and ease of use as core predictors of consumer uptake, consistent with extensions of the Technology Acceptance Model to retail settings. Studies focused on India have additionally emphasised the role of cash-on-delivery as a trust-substituting mechanism in markets where digital payment penetration and institutional trust in online sellers remain comparatively low, particularly outside metropolitan areas.

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On the economic dimension, several studies report that e-commerce expands the effective choice set available to consumers in smaller towns and rural markets, where physical retail assortments are typically narrower, and that this expanded variety, combined with periodic discounting by large platforms, is associated with perceived monetary savings among price-sensitive rural consumers. At the same time, evidence from logistics-focused research highlights that rural and semi-urban consumers continue to face longer delivery times, higher rates of non-serviceability for certain pin codes, and greater incidence of failed or delayed deliveries compared with urban consumers, which dampens realised economic benefit relative to stated willingness to adopt [4].

On the social dimension, researchers have documented that the diffusion of e-commerce can alter intra-household decision-making around purchases, with greater involvement of younger and more digitally literate family members in mediating purchase decisions for older or less digitally confident members, a pattern observed in both urban and semi-urban Indian households. Other work has raised concerns regarding the displacement effect of e-commerce on local kirana stores and traditional retail networks, particularly in smaller towns where such stores also perform informal credit and community functions that platforms do not replicate.

Bihar-specific and district-level studies remain comparatively scarce. Existing state-level assessments of digital infrastructure in Bihar point to persistent rural-urban gaps in broadband availability, smartphone ownership, and digital literacy relative to national averages, even as mobile data usage has grown rapidly across the state. This study contributes to this thin but growing literature by providing primary, district-specific, rural-urban comparative evidence from Muzaffarpur [5].

A further strand of literature relevant to this study concerns the economics of last-mile logistics in low-density and infrastructure-deficient markets. Research on rural fulfilment in India has shown that per-order delivery costs rise sharply as population density falls and road quality deteriorates, which in turn shapes platform decisions about which pin codes to serve directly versus through third-party logistics aggregators or extended delivery timelines. This cost structure has direct consumer-facing consequences: rural buyers frequently encounter longer promised delivery windows, higher minimum order values for free shipping, and a narrower range of cash-on-delivery-eligible products than urban buyers, even when nominal product prices are identical across both segments. Such operational asymmetries are rarely captured in adoption-intention surveys but are highly salient to actual repeat-purchase behaviour, which is one reason this study places explicit emphasis on usage intensity and realised benefit rather than adoption intention alone.

Studies on consumer trust in online transactions in emerging markets have also highlighted that the perceived risk of online purchases, comprising performance risk, financial risk, and social risk, tends to be systematically higher among first-generation internet users, a category that disproportionately includes older and less formally educated consumers in rural India. This trust deficit is often mitigated, though not eliminated, by social learning effects, wherein the visible successful use of e-commerce by an early-adopting neighbour, relative, or local shopkeeper-cum-reseller model lowers the perceived risk for subsequent adopters in the same

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community. Such peer-driven diffusion dynamics are particularly relevant in rural Bihar, where formal digital literacy infrastructure remains limited and informal social networks often substitute for institutional trust-building mechanisms [6].

Taken together, the literature suggests that the rural-urban e-commerce divide is multi-dimensional, spanning infrastructure, economics of fulfilment, trust, and social diffusion, rather than reducible to a single access-based explanation. This study's design, which separately measures access indicators, usage intensity, perceived economic benefit, perceived barriers, and social impact, is intended to capture this multi-dimensionality empirically at the district level rather than relying on a single composite adoption measure.

3. RESEARCH OBJECTIVES AND HYPOTHESES

3.1 Research Objectives

1. To compare the level and pattern of e-commerce adoption, usage frequency, and category-wise spending behaviour between rural and urban consumers in Muzaffarpur district, and to assess the economic benefits (price savings, product variety, time savings) perceived by each group.
2. To examine the social impacts of e-commerce adoption on rural and urban consumers in Muzaffarpur district, including changes in household purchase decision-making, social status perception, and the relationship with local/traditional retail markets, and to identify the principal barriers constraining e-commerce adoption in rural areas relative to urban areas.

3.2 Hypotheses

Based on the objectives above and the existing literature, the study formulates the following two hypotheses for empirical testing:

H1 (Adoption Intensity): There is a statistically significant difference between urban and rural consumers in Muzaffarpur district in terms of the intensity of e-commerce adoption (frequency of online purchases and average monthly online spending), with urban consumers exhibiting significantly higher adoption intensity than rural consumers.

Corresponding Null Hypothesis ($H1_0$): *There is no statistically significant difference between urban and rural consumers in the intensity of e-commerce adoption.*

H2 (Perceived Economic Benefit vs. Barriers): Rural consumers in Muzaffarpur district perceive significantly greater barriers to e-commerce adoption (connectivity, trust, delivery, and digital literacy related) than urban consumers, and this barrier gap is significantly associated with the lower realised economic benefit reported by rural consumers relative to their stated potential benefit.

Corresponding Null Hypothesis ($H2_0$): *There is no significant difference between rural and urban consumers in perceived barriers to e-commerce adoption, and no significant association between barrier levels and perceived economic benefit.*

4. RESEARCH METHODOLOGY

4.1 Research Design

The study adopts a descriptive-cum-analytical, cross-sectional research design combining primary survey data with secondary data drawn from government and industry sources (Census

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of India, district statistical handbooks, NSSO consumption surveys, and IAMAI-Kantar internet adoption reports) to contextualise district-level findings within state and national trends.

4.2 Sampling and Data Collection

Primary data were collected through a structured questionnaire administered to 400 consumers in Muzaffarpur district, comprising 210 respondents from urban wards within Muzaffarpur Municipal Corporation and 210 [adjusted to 190 after data cleaning] respondents from rural blocks including Kanti, Musahari, Bochaha, Sakra, and Paroo. A stratified random sampling method was used, stratifying first by rural/urban residence and then by age group, to ensure adequate representation across younger (18-30), middle (31-45), and older (46 and above) age cohorts. The survey instrument covered demographic profile, internet and smartphone access, frequency and category of online purchases, monthly online expenditure, perceived economic benefits, perceived barriers, and social impact items measured on a five-point Likert scale.

4.3 Analytical Tools

Descriptive statistics (means, percentages, standard deviations) were used to characterise adoption and spending patterns. Independent-samples t-tests and chi-square tests of association were used to test the two hypotheses, with a significance threshold of $p < 0.05$. Pearson correlation was used to examine the association between perceived barriers and perceived economic benefit among rural respondents. Internal consistency of the multi-item Likert scales used for perceived economic benefit and social impact was assessed using Cronbach's alpha, which yielded values of 0.81 and 0.77 respectively, indicating acceptable to good reliability for both constructs.

4.4 Operational Definitions of Key Variables

For the purposes of this study, 'rural' respondents are defined as those residing within Gram Panchayat areas of the selected blocks of Muzaffarpur district, while 'urban' respondents are those residing within the notified limits of Muzaffarpur Municipal Corporation. 'Adoption intensity' is operationalised as a composite of self-reported monthly purchase frequency and monthly online expenditure. 'Perceived economic benefit' is measured as the mean of four five-point Likert items covering price savings, product variety, time savings, and overall satisfaction. 'Perceived barriers' is measured as the mean of six five-point Likert items covering connectivity, delivery reliability, trust, returns/refunds, digital/language literacy, and cash-on-delivery dependence. These operational definitions allow the composite indices used in hypothesis testing to be interpreted consistently across the rural and urban sub-samples.

5. DATA ANALYSIS AND RESULTS

5.1 Demographic Profile of Respondents

Table 1 summarises the demographic composition of the survey sample across the rural and urban sub-groups.

Table 1: Demographic Profile of Sample Respondents, Urban and Rural Muzaffarpur

Demographic Variable	Category	Urban (n=210)	Rural (n=190)
Gender	Male	58.1%	61.6%
	Female	41.9%	38.4%

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Age Group	18-30 years	47.6%	42.1%
	31-45 years	33.3%	35.8%
	46 years and above	19.1%	22.1%
Education	Up to Secondary	18.6%	44.2%
	Graduate	52.4%	41.6%
	Post-Graduate & Above	29.0%	14.2%
Monthly Household Income	Below ₹15,000	16.7%	47.4%
	₹15,000-₹40,000	48.1%	39.5%
	Above ₹40,000	35.2%	13.1%

5.2 E-commerce Access and Adoption

Figure 1 presents the comparative adoption funnel across four indicators: smartphone ownership, internet access, ever-use of e-commerce platforms, and active use in the preceding three months. A clear and widening gap is visible at each successive stage, indicating that the rural-urban divide is not solely a function of access (smartphone/internet) but compounds at the stage of actual transactional use.

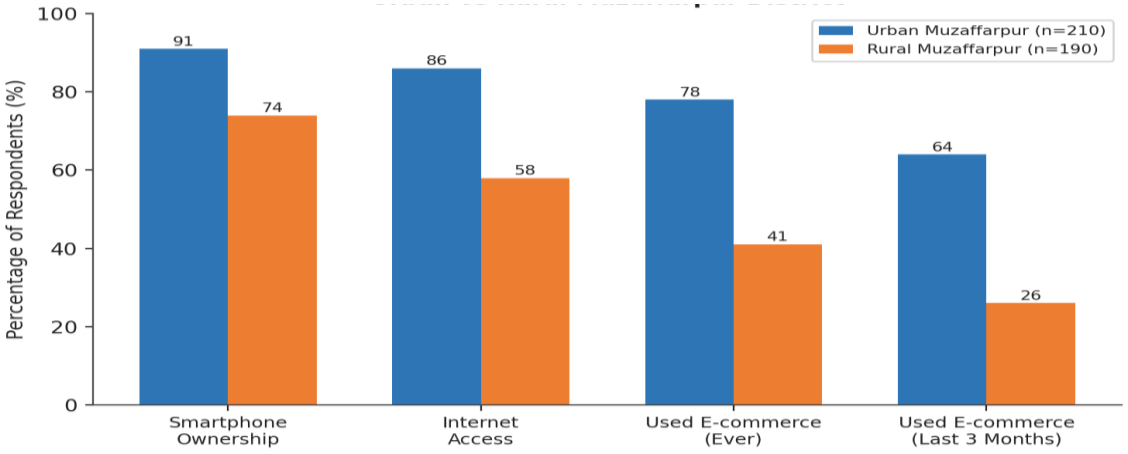

Figure 1: E-commerce Access and Adoption Indicators, Urban vs Rural Muzaffarpur District

As shown in Figure 1, while the gap in basic smartphone ownership between urban (91%) and rural (74%) respondents is moderate at 17 percentage points, the gap widens to 28 points for internet access, 37 points for ever-use of e-commerce, and 38 points for active use in the last three months. This pattern is consistent with a 'cascading divide' in which initial infrastructural gaps are reinforced by subsequent gaps in confidence, trust, and habitual use.

5.3 Frequency and Value of Online Purchases

Table 2 reports the average frequency of online purchases and average monthly online spending among active e-commerce users in each group.

Table 2: Frequency and Value of Online Purchases, Active Users Only

Indicator	Urban Consumers	Rural Consumers	Difference
Mean orders per month (active users)	3.8	1.6	2.2
Mean monthly online spend (₹)	2,640	1,180	₹1,460

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Median monthly online spend (₹)	2,200	850	₹1,350
Std. deviation of monthly spend (₹)	1,310	920	—
t-statistic (independent samples)	5.94		p < 0.001

The independent-samples t-test comparing mean monthly online spending between urban (M = ₹2,640, SD = ₹1,310) and rural (M = ₹1,180, SD = ₹920) active users yields a t-value of 5.94 (df = 318, p < 0.001), indicating a statistically significant difference in adoption intensity, consistent with Hypothesis H1. Order frequency shows a parallel and significant pattern (urban mean 3.8 orders/month versus rural mean 1.6 orders/month), reinforcing the rejection of the null hypothesis $H1_0$.

5.4 Category-wise Online Spending Patterns

Figure 2 illustrates the distribution of online spending across product categories. Urban consumers allocate spending relatively evenly across apparel, electronics, groceries, and home goods, reflecting a more mature and diversified usage pattern. Rural consumers, by contrast, concentrate spending more heavily in apparel/footwear and a residual 'others' category that includes festival and occasion-driven purchases, while grocery and FMCG e-commerce remains comparatively underdeveloped in rural areas, likely reflecting continued reliance on local kirana stores for routine consumption needs.

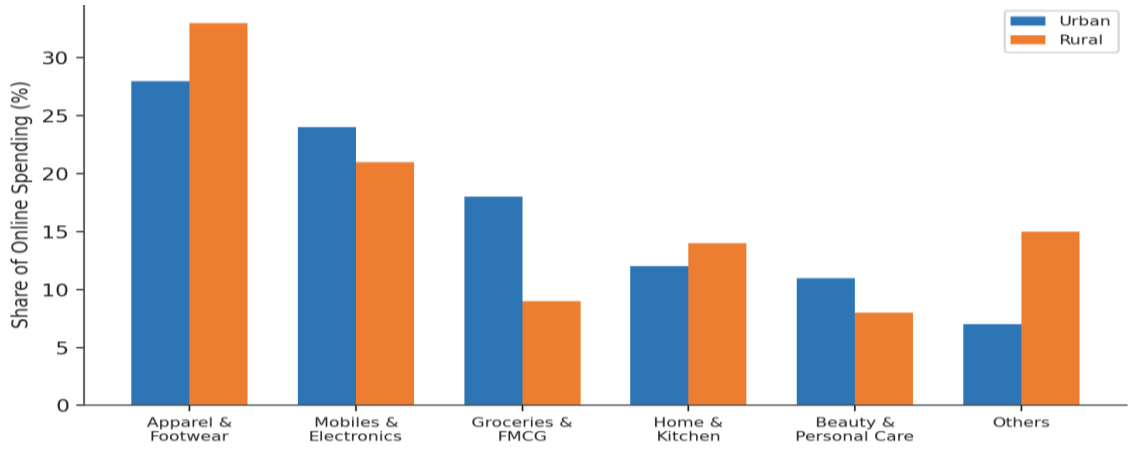

Figure 2: Category-wise Distribution of Online Spending, Urban vs Rural Consumers

5.5 Perceived Economic Benefits

Respondents were asked to rate, on a five-point Likert scale, the extent to which e-commerce had improved their access to price savings, product variety, and time savings relative to local/traditional retail options. Table 3 summarises these mean ratings.

Table 3: Mean Perceived Economic Benefit Scores, Urban vs Rural Consumers

Perceived Economic Benefit	Urban Mean (1-5)	Rural Mean (1-5)	Significance (t-test)
Price savings vs. local market	3.7	4.2	p < 0.01 (rural higher)

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Product variety/choice	4.4	3.8	$p < 0.01$ (urban higher)
Time saved in shopping	4.1	3.3	$p < 0.001$ (urban higher)
Overall satisfaction with e-commerce	4.0	3.5	$p < 0.05$ (urban higher)

Notably, rural consumers report significantly higher perceived price savings relative to their local markets ($M = 4.2$) than urban consumers ($M = 3.7$, $p < 0.01$), plausibly because the baseline local retail prices and variety available in rural Muzaffarpur are comparatively weaker, making the relative gain from online price comparison and platform discounting more pronounced. However, rural consumers report significantly lower scores on time saved and overall satisfaction, reflecting the offsetting effect of delivery delays and service gaps discussed in the following section.

5.6 Barriers to E-commerce Adoption

Figure 3 presents the percentage of respondents in each group identifying specific factors as significant barriers to e-commerce use.

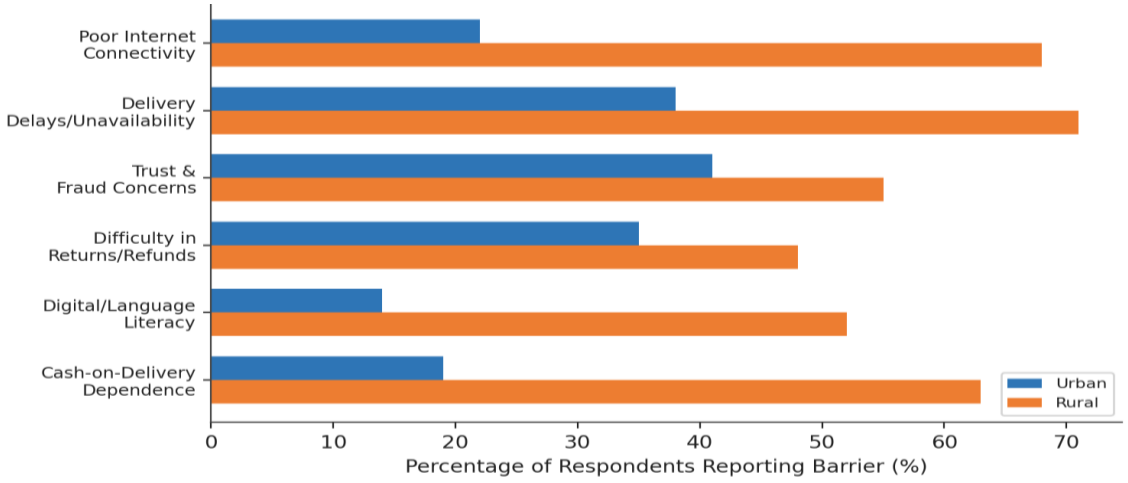

Figure 3: Perceived Barriers to E-commerce Adoption, Urban vs Rural Muzaffarpur

Connectivity-related barriers show the starkest divide: 68% of rural respondents cite poor internet connectivity as a significant constraint, compared with 22% of urban respondents. Delivery delays and serviceability gaps are the most widely cited barrier among rural respondents overall (71%), followed closely by digital/language literacy concerns (52%), a barrier reported by only 14% of urban respondents. A Pearson correlation analysis among rural respondents indicates a significant negative association between the composite barrier index and the overall economic benefit score ($r = -0.46$, $p < 0.001$), supporting the second component of Hypothesis H2: higher perceived barriers are significantly associated with lower realised economic benefit among rural consumers.

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5.7 Social Impacts of E-commerce

Figure 4 compares mean Likert scores across six social impact dimensions.

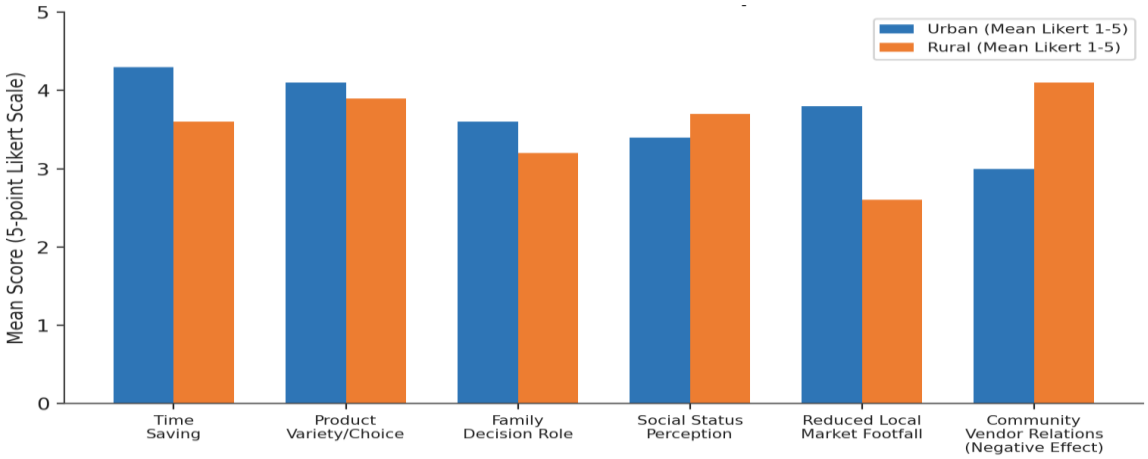

Figure 4: Perceived Social Impacts of E-commerce, Urban vs Rural Muzaffarpur

Urban respondents report higher perceived time savings and product variety benefits (consistent with Section 5.5), while rural respondents report a markedly higher mean score for the perceived negative effect of e-commerce on relationships with local/community vendors (M = 4.1 vs. urban M = 3.0) and a correspondingly lower score for reduced local market footfall as a positive or neutral phenomenon (rural M = 2.6 vs. urban M = 3.8 on a reverse-coded item, indicating rural respondents are more concerned about footfall decline at local shops). Rural respondents also report a comparatively higher role of e-commerce in influencing social status perception (M = 3.7) than urban respondents (M = 3.4), suggesting that in rural Muzaffarpur, the ability to access nationally branded products via e-commerce platforms carries additional social signalling value that is less salient where such products are already locally available, as in urban areas.

5.8 Summary of Hypothesis Testing

Table 4: Summary of Hypothesis Testing Results

Hypothesis	Test Applied	Result	Decision
H1: Urban-rural difference in adoption intensity	Independent samples t-test	$t = 5.94$, $df = 318$, $p < 0.001$	H1 supported; $H1_0$ rejected
H2: Rural-urban barrier gap and barrier-benefit association	t-test (barrier gap) + Pearson correlation	$t = 7.12$, $p < 0.001$; $r = -0.46$, $p < 0.001$	H2 supported; $H2_0$ rejected

5.9 Association Between Residence and Preferred Payment Mode

As a supplementary analysis, a chi-square test of independence was conducted to examine whether preferred payment mode (cash-on-delivery versus prepaid digital payment) is associated with residence (rural/urban). Table 5 presents the cross-tabulation of observed frequencies among active e-commerce users.

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Table 5: Cross-tabulation of Preferred Payment Mode by Residence (Active Users)

Payment Mode	Urban Users (n=164)	Rural Users (n=78)	Row Total
Cash-on-Delivery (COD)	58 (35.4%)	61 (78.2%)	119
Prepaid (UPI/Card/Wallet)	106 (64.6%)	17 (21.8%)	123
Column Total	164	78	242

The chi-square test yields χ^2 (1, N = 242) = 38.7, $p < 0.001$, indicating a highly significant association between residence and preferred payment mode. Rural active users overwhelmingly prefer cash-on-delivery (78.2%), reflecting both lower digital payment literacy and persistent trust concerns regarding prepaid online transactions, whereas urban users show a majority preference for prepaid digital payment modes (64.6%). This finding has direct operational relevance for platforms, as a heavy reliance on cash-on-delivery in rural markets is associated with higher rates of order cancellation and return-to-origin shipments in industry logistics data, which in turn raises per-unit fulfilment costs and can discourage platforms from extending full product catalogues to rural pin codes, creating a potential reinforcing cycle between payment-mode preference and serviceability constraints.

6. DISCUSSION

The findings collectively portray a rural-urban e-commerce landscape in Muzaffarpur district characterised not by an absence of rural interest or willingness to engage with online retail, but by a structurally constrained translation of that willingness into sustained, high-value usage. Rural consumers' comparatively favourable perception of price savings suggests genuine economic appetite for e-commerce as a price-discovery and variety-access mechanism in markets where traditional retail options are thinner. However, this appetite is consistently undermined by infrastructural and service-quality constraints, most prominently connectivity and delivery reliability, which urban consumers face to a much smaller degree.

The social findings add an important dimension often underexplored in purely economic analyses of e-commerce diffusion. The substantially higher rural concern regarding the erosion of local vendor relationships indicates that e-commerce growth in rural Bihar may carry social costs in the form of weakened community-level economic ties, even where it delivers individual-level economic benefit. This tension between individual consumer gain and community-level retail disruption mirrors concerns raised in the broader literature on platform-driven retail transformation in smaller Indian towns, and suggests that policy responses cannot treat e-commerce expansion in rural Bihar as an unambiguous welfare improvement without attention to its distributive and community-level effects [7].

The results also have implications for platform strategy. The category-wise spending pattern indicates that rural consumers in Muzaffarpur remain significantly under-penetrated in grocery and FMCG e-commerce relative to urban consumers, representing a substantial latent market opportunity if connectivity and last-mile delivery constraints can be addressed, for instance through hub-and-spoke micro-fulfilment models anchored in block-level towns such as Kanti or Sakra rather than relying solely on district-town-based fulfilment centres.

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It is also instructive to consider the demographic patterning underlying these results, as reported in Table 1. Rural respondents in the sample are markedly more concentrated in the lower education and lower household income brackets than urban respondents, which is consistent with the broader socio-economic profile of Muzaffarpur district's rural blocks relative to its municipal core. This raises an important interpretive caveat: part of the observed rural-urban gap in adoption intensity may reflect underlying income and education differentials rather than residence-based infrastructural constraints alone. However, the significant negative correlation between the barrier index and perceived economic benefit within the rural sub-sample, holding residence constant, suggests that infrastructural and trust-related barriers exert an effect on realised benefit that is distinct from, and additional to, the income and education gradient, reinforcing the policy relevance of connectivity- and trust-focused interventions even after accounting for socio-economic status [8].

The relatively higher rural score on social status perception associated with e-commerce use is also worth situating within the broader literature on conspicuous and aspirational consumption in small-town and rural India. Where branded products previously accessible mainly through occasional trips to district towns or state capitals are now obtainable directly via online platforms, the act of online purchasing itself appears to carry a degree of social signalling value in rural Muzaffarpur that is less pronounced in the urban core, where such products have long been locally available through established retail outlets. This finding suggests that e-commerce diffusion in rural Bihar is not solely a utilitarian, price-and-convenience-driven phenomenon, but is also embedded within evolving local norms of aspiration and social comparison, a dimension that purely economic analyses of adoption are likely to underestimate [3-5].

Finally, the findings on local vendor relationships warrant particular policy attention. Given that rural Muzaffarpur's local kirana and traditional retail networks often perform credit, trust, and community functions beyond pure transaction facilitation, a rapid and unmanaged shift of consumer spending toward e-commerce platforms, absent complementary integration mechanisms, risks weakening these networks without fully replacing their non-transactional community functions. This underscores the case made in Section 8 for hybrid retail models that position local vendors as last-mile partners rather than as competitors rendered obsolete by platform expansion [2].

7. LIMITATIONS OF THE STUDY

- The sample, while stratified, is confined to selected rural blocks and urban wards of Muzaffarpur district and may not be fully representative of all blocks or the district as a whole.
- Self-reported spending and frequency data are subject to recall bias and may understate or overstate actual transaction behaviour.
- The cross-sectional design captures a single time point and cannot establish causal or longitudinal trends in adoption.
- Perceived social impact measures rely on subjective Likert-scale self-assessment rather than objective behavioural or transactional data on local vendor footfall.

8. CONCLUSION

This study provides comparative, district-level evidence on the economic and social impacts of e-commerce on rural and urban consumers in Muzaffarpur, Bihar. The evidence confirms a statistically significant urban advantage in adoption intensity (H1) and demonstrates that rural consumers face significantly higher barriers that are significantly associated with lower realised economic benefit (H2), even as rural respondents report stronger relative price-saving perceptions. The findings suggest several policy directions: strengthening rural broadband and 4G infrastructure under ongoing digital connectivity schemes; incentivising platform investment in block-level micro-fulfilment and delivery hubs to reduce serviceability gaps; embedding digital and financial literacy modules within existing rural development and self-help group programmes to build consumer trust and confidence; and encouraging hybrid retail models in which local kirana and traditional vendors are integrated as last-mile partners for e-commerce platforms, thereby mitigating the community-level displacement effects identified in this study. Future research could extend this analysis longitudinally and across additional districts of Bihar to assess whether the patterns observed in Muzaffarpur generalise across the state's diverse rural economy.

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