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Digital Disruption in Retail Industry: Adoption of Digital Technology Amongst Small Retail Store Owners

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Abstract

Small neighbourhood stores form a critical pillar of developing economies, with technology firms increasingly engaging to enhance service delivery and operational efficiency in these settings. The rise in mobile phone and internet penetration has the potential to significantly accelerate technology-based innovations in small retail stores, improving their productivity and sustainability. Prior research indicates that factors including owner age, firm age, education, and internet access influence the likelihood of adopting digital technology in small businesses. This study surveyed 547 kirana (small retail) stores in India to examine the relationship between the store owner's age and the adoption of digital tools and digital payment systems for business operations. The findings reveal that digital tool adoption is highest among store owners aged 31-40 years and lowest among those aged 50 years and above. These insights underscore the need for technology providers to incorporate age as a critical consideration in their strategies to promote technology adoption within small retail environments.

Keywords: Age, Digital Disruption, Digital Payment, Retail Industry, Small Retail Store, Technology Adoption.

Introduction

The phenomenon of family-owned neighbourhood stores forms the backbone of the country's daily grocery supply and local economies (1). These small retail stores are typically family-run, operate within less than 500 square feet, stock 1,000–8,000 SKUs, and employ 1–4 workers, often generating annual revenues below INR 50 lakh, aligning with micro and small enterprise classifications in India (2-4). With an estimated 12–13 million small retail stores across India, around 3 million are located in Tier 1 metro cities, while the remainder are spread across Tier 2, Tier 3, and rural areas (5). Urban small retail stores tend to exhibit faster technology adoption due to better infrastructure and consumer demand, whereas rural stores, despite their significance, face infrastructural and digital literacy challenges (6). Despite their critical role, small retail stores face challenges in adopting digital technologies, including limited vendor support, financial constraints, low digital literacy, and infrastructure barriers like unreliable electricity and internet connectivity (7, 8). However, post-pandemic shifts in consumer preferences towards cashless and contactless transactions have encouraged many store owners to adopt digital payment systems and communication tools like WhatsApp to remain relevant and competitive (9, 10). WhatsApp, as a Mobile Instant Messaging App, enables small retail store owners to communicate directly with customers for taking orders, sharing offers, and maintaining personalised connections, facilitating efficient service and customer loyalty (11, 12). It is increasingly vital for small retail businesses, with 97% of India's MSMEs reportedly using WhatsApp Business for daily operations by 2024 and 77% of consumers in Tier 2 and 3 cities using WhatsApp during their purchase journeys, highlighting its integration into consumer behaviour (13, 14). Digital payments, defined as transactions completed using an electronic device connected to a mobile network (15), have become an essential part of small retail store operations. They require low technical skill, are easy to set up, and significantly speed up transactions, benefiting both customers and store owners by reducing the dependency on cash, improving record-keeping, and enabling targeted communication through customer data collection (16-18). In 2024, UPI accounted for 83% of all digital payments in India

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with 208.5 billion transactions, processing nearly 600 million transactions daily by May 2025, underscoring the scale and acceptance of digital payments within India's retail landscape (19, 20). Together, WhatsApp and digital payment systems are becoming interconnected in small retail store operations, as store owners often use WhatsApp to send payment links, confirm transactions, and manage customer orders while maintaining engagement and operational efficiency. Despite these opportunities, the pace of adoption varies based on store owners' age and digital readiness, with younger owners adopting these tools more readily due to higher digital comfort, while older owners often require structured support and demonstrations to overcome perceived complexity and resistance (21-27). The conceptual framework of this study integrates the Technology Acceptance Model (TAM), the Diffusion of Innovation (DOI) theory, and the Unified Theory of Acceptance and Use of Technology (UTAUT). TAM highlights perceived usefulness (PU) and perceived ease of use (PEOU) as critical factors influencing how kirana store owners start using WhatsApp and digital payments, supported by studies indicating these perceptions are central in small retail technology uptake (28). DOI adds dimensions like relative advantage and compatibility, relevant for understanding how these tools align with kirana store workflows and customer needs (29-31). UTAUT incorporates social influence and facilitating conditions, which shape adoption in environments where peer learning and customer demand are strong drivers (32, 33).

A key element within this framework is the role of demographics, especially age, in shaping the adoption and use of WhatsApp and digital payments. Age influences perceptions of usefulness, ease of use, and the confidence to adopt and consistently use these tools for business operations. Younger owners, due to higher digital familiarity, are more inclined to integrate WhatsApp for customer communication and digital payments for transactions, while older owners may find these tools complex and hesitate without additional support (34-40).

Empirical studies in India and South Asia indicate that perceived usefulness and social influence are significant drivers of WhatsApp and digital payment use, while age moderates the way store owners navigate the challenges and benefits of these technologies (41, 42). Importantly, the use of WhatsApp for business communication often complements and reinforces the use of digital payments in kirana stores, as store owners use WhatsApp to share payment links, confirm transactions, and handle customer orders, demonstrating how these tools function together in daily operations to enhance efficiency and customer trust.

Despite extensive theoretical frameworks, there is limited empirical research specifically examining how age impacts the adoption and consistent use of WhatsApp and digital payments in kirana stores, and how these two tools correlate within daily retail operations. Understanding these linkages is crucial in the Indian context, where kirana stores face mounting pressure to adopt digital practices to remain competitive while serving a digitally evolving customer base. This study addresses these gaps by testing specific relationships to uncover how age, WhatsApp usage, and digital payment adoption are connected, which can inform targeted interventions for enhancing digital transformation in small retail. Based on the conceptual framework and identified gaps, the following hypotheses are proposed to guide the study:

H01: Retailers' age has no significant association with the adoption of WhatsApp for business purposes.

H02: Retailers' age has no significant association with the adoption of digital payment systems for business purposes.

H03: There is no significant association between the use of WhatsApp and digital payment systems by kirana store owners.

Testing these hypotheses is important as it will reveal whether age influences adoption patterns and whether the usage of WhatsApp reinforces or complements digital payment adoption, helping policymakers, digital service providers, and kirana owners themselves understand practical pathways to foster sustainable digital integration in India's small retail sector.

Methodology

The study adopted a descriptive and cross-sectional research design to examine the adoption of digital tools among kirana store owners. A stratified random sampling technique was used, drawing from kirana stores listed in public domain

databases across Mumbai to ensure proportional representation from the eastern, western, northern, and southern zones of the city. The primary sampling units were individual kirana stores operating within Mumbai. A total sample of 547 kirana stores was collected for the study, which was statistically sufficient, as for chi-square analysis with a medium effect size (w = 0.3), a significance level of 0.05, and a power of 0.80, the required sample size is approximately 88, ensuring the robustness of the findings and reliability for hypothesis testing. The key variables considered in the study included the age of store owners as the independent variable and the adoption of digital payment systems and WhatsApp for business purposes as the dependent variables, while education level, store size, and locality were considered as control variables. Data was collected using structured, close-ended telephone interviews, leveraging the high mobile phone penetration among store owners while ensuring safety in the post-COVID context. The questionnaire was designed to be clear and concise to encourage participation while capturing relevant data. For analysis, descriptive statistics were used to profile the respondents, and inferential statistics, specifically chi-square tests, were applied to test the associations between age and the adoption of WhatsApp and digital payment systems, aligning with the objectives of the research.

Results

Sample Characteristics

Analysis of 547 kirana store owners showed that 91.2% were aged 30 years and above, indicating limited interest among the younger population in kirana businesses despite their prevalence in Table 1. The largest group was 31-40 years (43.7%), followed by 41-50 years (33.5%), above 50 years (14.1%), and 20-30 years (8.8%).

Table 1: Descriptive Statistics

Age	Frequency	Percent	Cumulative Percent
20-30 years	48	8.8	8.8
31-40 years	239	43.7	52.5
41-50 years	183	33.5	85.9
Above 50 years	77	14.1	100.0
Total	547	100.0	

This table shows the age distribution of respondents, confirming that middle-aged groups dominate the kirana sector while younger participation remains low.

Further analysis of the data suggests that, out of 417 WhatsApp users, 48.7% were aged 31-40, 33.3% were 41-50, 10.8% were 20-30, and 7.2% were above 50 in Table 2. This indicates that WhatsApp adoption is strongest among middle-aged store owners, with lower adoption among older owners, highlighting generational differences in digital tool acceptance.

Table 2: Age-wise Usage of WhatsApp for Business Purposes

WhatsApp Usage –Age Group Cross Tabulation			Age Group				
			20-30 yrs.	31-40 yrs.	41-50 yrs.	Above 50 yrs.	Total
Use WhatsApp	No	Count	3	36	44	47	130
		% within use WhatsApp	2.30%	27.70%	33.80%	36.20%	100.00%
	Yes	Count	45	203	139	30	417
		% within use WhatsApp	10.80%	48.70%	33.30%	7.20%	100.00%
Total		Count	48	239	183	77	547
		% within use WhatsApp	8.80%	43.70%	33.50%	14.1	100%

On usage of digital payment, among 255 digital payment users, 52.5% were aged 31-40, 34.5% were 41-50, 9.8% were 20-30, and 3.1% were above 50, showing a similar pattern to WhatsApp adoption, with middle-aged owners leading in digital payment adoption while older owners lag significantly shown in Table 3.

Table 3: Age-wise Usage of Digital Payment for Business Purposes

Digital Payment Usage –Age Group Cross Tabulation			Age Group 20-30 yrs	31-40 yrs	41-50 yrs	Above 50 yrs	Total
Use digital payment	No	Count	23	105	95	69	292
		% within use digital payment	7.90%	36.00%	32.50%	23.60%	100.00%
	Yes	Count	25	134	88	8	255
		% within use digital payment	9.80%	52.50%	34.50%	3.10%	100.00%
Total		Count	48	239	183	77	547
		% within use digital payment	8.80%	43.70%	33.50%	14.1	100%

When the sample data were further analysed to check the usage of both tools together, it was evident that in the 20-30 years age group, there were 45 users of WhatsApp, and among them, 25 (55.6%) also used digital payment, Table 4. In the 31-40 years age group, 203 used WhatsApp, with 130 (64%) using digital payments as well. In the 41-50 years group, 139 used WhatsApp, and 87 (62.6%) used digital payments. For those above 50 years, 30 used WhatsApp, but only 7 (23.3%) used digital payment. These observations indicate a strong tendency to use digital payment tools along with WhatsApp for age groups up to 50 years, while those above 50 years show lower adoption rates, with 23.3% using both tools together for business purposes. This suggests that WhatsApp familiarity encourages digital payment adoption, but targeted interventions are needed to improve this adoption among older store owners.

Table 4: Usage of Digital Payment and WhatsApp for Business Purposes

Age Groups				Use Digital Payment No	Use Digital Payment Yes	Total
20-30 years	use WhatsApp	No	Count	3	0	3
			% within use WhatsApp	100.0%	0.0%	100.0%
		Yes	Count	20	25	45
			% within use WhatsApp	44.4%	55.6%	100.0%
	Total		Count	23	25	48
			% within use WhatsApp	47.9%	52.1%	100.0%
31-40 years	use WhatsApp	No	Count	32	4	36
			% within use WhatsApp	88.9%	11.1%	100.0%
		Yes	Count	73	130	203
			% within use WhatsApp	36.0%	64.0%	100.0%
	Total		Count	105	134	239
			% within use WhatsApp	43.9%	56.1%	100.0%
41-50 years	use WhatsApp	No	Count	43	1	44
			% within use WhatsApp	97.7%	2.3%	100.0%
		Yes	Count	52	87	139

				% within use WhatsApp	37.4%	62.6%	100.0%
		Total		Count	95	88	183
				% within use WhatsApp	51.9%	48.1%	100.0%
		use WhatsApp	No	Count	46	1	47
				% within use WhatsApp	97.9%	2.1%	100.0%
Above 50 years			Yes	Count	23	7	30
				% within use WhatsApp	76.7%	23.3%	100.0%
		Total		Count	69	8	77
				% within use WhatsApp	89.6%	10.4%	100.0%

Hypothesis Testing and Interpretation

H01: Retailers' Age has no Significant Association with the adoption of WhatsApp for Business Purposes

The hypothesis was tested using chi-square analysis, showing a significant association ($p<0.05$) between age and WhatsApp usage. Out of 417 kirana store owners using WhatsApp for business, 10.8% were in the 20-30 years age group, 48.7% were in the 31-40 years group, 33.3% were in the 41-50 years group, and 7.2% were in the above 50 years group. The highest proportion of users was observed in the 31-40 years category, followed by the 41-50 years category, indicating varied adoption levels across age groups in Table 5.

Table 5: Usage of WhatsApp and Age Group Cross-tabulation

			Age Group 20-30 years	31-40 years	41-50 years	Above 50 years	Total
use WhatsApp	No	Count	3	36	44	47	130
		% within use WhatsApp	2.3%	27.7%	33.8%	36.2%	100.0%
	Yes	Count	45	203	139	30	417
		% within use WhatsApp	10.8%	48.7%	33.3%	7.2%	100.0%
Total		Count	48	239	183	77	547
		% within use WhatsApp	8.8%	43.7%	33.5%	14.1	100%

The chi-squared test reported zero cells with an expected count of less than five, with the minimum expected count being 11.41, confirming the validity of the test, in Table 6. The p-value obtained from Pearson Chi-Square, Likelihood Ratio, Linear-by-Linear Association, Phi, Cramer's V, and Contingency Coefficient was 0.0, which is below the threshold of 0.05, Table 7. This result confirms that there is a statistically significant association between the age of kirana store owners and their use of WhatsApp for business purposes, with age distribution influencing the adoption rates recorded.

Table 6: Chi-Square Test Results for WhatsApp Usage

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	77.172	3	0
Likelihood Ratio	70.056	3	0
Linear-by-Linear Association	62.72	1	0
N of Valid Cases	547		

Table 7: Symmetric Measures for WhatsApp Usage

Symmetric Measures		Value	Approx. Sig.
Nominal by Nominal	Phi	0.376	0
	Cramer's V	0.376	0
	Contingency Coefficient	0.352	0
N of Valid Cases		547	

Table 8: Usage of Digital Payment and Age Group Cross-tabulation

			Age Group				
			20-30 years	31-40 years	41-50 years	Above 50 years	Total
Use digital payment	No	Count	23	105	95	69	292
		% within Use digital payment	7.90%	36.00%	32.50%	23.60%	100.00%
	Yes	Count	25	134	88	8	255
		% within use digital payment	9.80%	52.50%	34.50%	3.10%	100.00%
Total		Count	48	239	183	77	547
		% within Use digital payment	8.80%	43.70%	33.50%	14.1	100%

H02: Retailers' Age has no Significant Association with the Adoption of Digital Payment for Business Purposes

To test this hypothesis, a chi-squared test was conducted.

Out of the 255 kirana store owners using digital payment systems for business, 9.8% were in the 20-30 years age group, 52.5% were in the 31-40 years group, 34.5% were in the 41-50 years group, and 3.1% were in the above 50 years group. The data shows that the majority of digital payment users are concentrated in the 31-40 years group, followed by the 41-50 years group, with significantly lower usage in the oldest age category shown in Table 8.

There were zero cells with an expected count of less than five, and the minimum expected count was 11.41, shown in Table 9 and Table 10. The p-value obtained from Pearson Chi-Square, Likelihood Ratio, Linear-by-Linear Association, Phi, Cramer's V, and Contingency Coefficient was 0.0, which is less than 0.05. This result indicates that the null hypothesis was rejected, confirming that the association between age and the adoption of digital payments for business purposes is statistically significant.

Table 9: Chi-Square Test Results for Digital Payment Usage

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	49.920[a]	3	0
Likelihood Ratio	56.75	3	0
Linear-by-Linear Association	32.243	1	0
N of Valid Cases	547		

Note: a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 11.41

Table 10: Symmetric Measures for Digital Payment Usage

Symmetric Measures		Value	Approx. Sig.
Nominal by Nominal	Phi	0.302	0
	Cramer's V	0.302	0
	Contingency Coefficient	0.289	0
N of Valid Cases		547	

H03: The association between WhatsApp usage and digital payment adoption is not statistically significant

A chi-square test was used to test this hypothesis. The result of the chi-square test for the association of attributes for categorical data showed that the null hypothesis was rejected (p-value < 0.05). The cross-tabulation showed that the sum of the on-diagonal elements (124 + 249 = 373) outweighed the sum of the off-diagonal elements (168 + 6 = 174), indicating a positive association. This shows that kirana store owners who adopt WhatsApp are also more likely to adopt digital payments for business purposes shown in Table 11, Table 12 and Table 13.

Table 11: Usage of Digital Payment and WhatsApp Cross-tabulation

Usage of Digital payment and WhatsApp Cross tabulation				
		Use_ Digital Payment		Total
		No	Yes	
Use WhatsApp	No	124	6	130
	Yes	168	249	417
Total		292	255	547

Table 12: Chi-Square Test Results for WhatsApp and Digital Payment Usage

Chi-Square Tests	**Value**	**df**	**Asymp. Sig. (2-sided)**	**Exact Sig. (2-sided)**	**Exact Sig. (1-sided)**
Pearson Chi-Square	120.892[a]	1	0		
Continuity Correction[b]	118.688	1	0		
Likelihood Ratio	144.92	1	0		
Fisher's Exact Test				0	0
Linear-by-Linear Association	120.671	1	0		
N of Valid Cases	547				

Note: a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 60.54
b. Computed only for a 2×2 table

Table 13: Symmetric Measures for WhatsApp and Digital Payment Usage

Symmetric Measures		**Value**	**Approx. Sig.**
Nominal by Nominal	Phi	0.47	0
	Cramer's V	0.47	0
	Contingency Coefficient	0.425	0
N of Valid Cases		547	

An in-depth analysis across age groups showed that the association between WhatsApp usage and digital payment adoption is not significant in the 20-30 years age group but is significant in all other age groups. In the 31-40 years, 41-50 years, and above 50 years age groups, the association remains positive, as the sum of diagonal elements in the cross-tabulation outweighs the sum of off-diagonal elements. This indicates that within these age groups, kirana store owners who use WhatsApp are more likely to also adopt digital payment systems for business purposes shown in Table 14.

Table 14: Age-wise Cross-tabulation of WhatsApp and Digital Payment Usage

Age-Group	**Pearson Chi-Square**	**Phi coefficient**	**Cramer's V**	**Contingency Coefficient**	**Significance Value**
20-30 years	3.478	0.269	0.269	0.260	0.062
31-40 years	34.776	0.381	0.381	0.356	**0.000***
41-50 years	48.707	0.516	0.516	0.458	**0.000***
Above 50 years	8.845	0.339	0.339	0.321	**0.003***

Discussion

The results of this study demonstrate that the adoption of WhatsApp and digital payment tools is significantly higher among small retail store owners aged 31-50 years, aligning with previous findings indicating that middle-aged retailers are more open to digital tool adoption due to perceived usefulness and ease of use (43, 44). The lower adoption rates among those above 50 years reflect challenges such as digital literacy barriers, perceived risk, and resistance to change, consistent with studies highlighting age-related constraints in technology adoption (45, 46). The observed increase in digital tool usage post-COVID-19 aligns with reports that highlighted a global shift towards digital transactions due to health and safety concerns during the pandemic (47). This behavioural change has pushed even traditional retail sectors towards digital engagement (48), suggesting that external shocks can accelerate technology adoption in unorganised retail segments (49). Further, similar patterns have been reported in studies from other South Asian markets, indicating that pandemic-driven digital adoption trends are regionally consistent. The data also reflects the growing trend of cashless transactions in India as noted by the Reserve Bank of India, although the adoption rate remains lower compared to developed economies, highlighting opportunities for policy interventions to increase adoption (50). The aggressive expansion of organised retail further pressures small retail stores to adopt digital tools to remain competitive (51, 52). Studies also confirm that digital payment systems and mobile communication tools like WhatsApp enhance operational efficiency and customer retention in small retail settings, supporting the present study's findings (53, 54).

This study acknowledges limitations such as its city-focused sample and limited geographic diversity, which may affect generalizability. Additionally, while age was examined as a primary factor, other factors such as education, income, and infrastructure may also influence adoption patterns and should be explored in future studies to build a comprehensive understanding of digital tool adoption in small retail in India.

Conclusion

This study concludes that small retail store owners aged 31-50 exhibit the highest adoption rates for WhatsApp and digital payment tools, confirming age as a key factor influencing digital technology uptake within small retail environments. Middle-aged owners view these tools as beneficial for operational efficiency, customer engagement, and competitive positioning, while lower adoption rates among those above 50 reflect challenges such as digital literacy gaps, perceived complexity, and risk aversion.

The findings highlight that the adoption of WhatsApp for business communication often complements and leads to the adoption of digital payment systems, showing their interconnection in supporting seamless operations and customer service within small retail settings. The COVID-19 pandemic accelerated the shift towards digital tools, yet India still lags behind developed economies in cashless transaction adoption, indicating the need for supportive policies, targeted capacity-building initiatives, and practical digital literacy interventions for small retail owners.

Future research should extend to multi-city and rural-urban comparative studies to capture diverse adoption patterns, while examining the role of education, training, and peer influence in encouraging digital adoption among older owners. This will support the development of evidence-based policies and targeted interventions to drive inclusive, sustainable digital transformation within India's small retail sector.

Abbreviation

None.

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Author Contributions

All authors contribute equally.

Conflict of Interest

The authors declare that they have no competing interests.

Ethics Approval

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