



E-Commerce Adoption and Business Growth among Apparel Retailers in Pune: Evidence from a Pilot Study

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Abstract- E-commerce has transformed the apparel retail industry by changing consumer purchasing behaviour, market access, competitive dynamics, and service expectations. However, the extent to which e-commerce adoption contributes to business growth among traditional apparel retailers remains an important empirical question, particularly for small and medium-sized businesses operating in competitive urban markets. This pilot study examines e-commerce adoption, customer engagement, logistics efficiency, digital marketing, and the challenges associated with transitioning to online retail among apparel retailers in Pune. The study uses a quantitative, exploratory research design based on questionnaire responses from 50 customers and 15 available retailer respondents. Customer responses were selected from the first 50 records in the supplied dataset, while all available retailer responses were analysed. Reliability was assessed using Cronbach's alpha, followed by descriptive statistics and exploratory hypothesis testing. The customer questionnaire had high internal consistency for two sets of rating items, with alpha coefficients of 0.880 and 0.928. The retailer rating items produced an alpha of 0.561, indicating limited internal consistency for that item group. Exploratory tests found no statistically significant association between online selling adoption and reported sales increases among retailers ($p=.604$). Customer review importance was positively associated with overall online shopping satisfaction ($\rho=.345$, $p=.014$), but its relationship with reported hesitation to reorder was not statistically significant ($p=.639$). No significant relationship was identified between retailers' delivery-speed ratings and reported sales changes ($p=.705$), or between advertising-importance ratings and online-selling adoption ($p=.184$). The results point to the importance of digital retail capabilities, but also to the limitations of drawing definitive conclusions from a small, non-random pilot sample. The study provides a preliminary basis for refining the questionnaire, improving construct measurement and conducting a larger investigation on e-commerce adoption and apparel retail growth in Pune.

Keywords- : E-commerce adoption, apparel retail, business growth, digital marketing, client engagement, logistics efficiency, customer retention, Pune, pilot study.

I. INTRODUCTION

1. Background of the study

E-commerce has become an important part of contemporary retailing, allowing firms to reach customers beyond their immediate geographic markets, and allowing consumers to compare products, prices, brands and delivery options conveniently. Online retail in the apparel industry provides access to a wide selection of products, digital promotions, customer reviews and personalized recommendations. These changes have transformed the manner in which apparel companies attract customers, manage inventory, distribute products and compete for market share.

Apparel retailers historically relied on brick and mortar stores, personal selling, customer relationships, and local reputation. These strengths still play a role in the purchase decision. However, digital platforms have increased the competitive pressure by providing a wide choice of products, price comparisons, online payment systems and home delivery. Hence, retailers need to assess whether and how digital channels can support existing operations.

The adoption of e-commerce is not as simple for apparel retailers as building an online account or posting products on a marketplace. To be a successful seller you may need to have digital marketing skills, product photography, inventory integration, customer-service capabilities, efficient delivery arrangements, secure payment systems and effective return management. Such requirements can be difficult for businesses with limited financial resources, technological expertise and bargaining power.

The city of Pune provides an appropriate context for examining these issues as the retail landscape here encompasses traditional neighborhood stores, independent clothing shops, hybrid retail outlets and online vendors serving a heterogeneous customer base. By understanding how these firms respond to digital competition, retailers can invest wisely and the work provides a basis for future research on technology adoption and growth in retail.

2 Definition of the problem

E-commerce does create opportunities for market expansion, but it does not automatically lead to increased sales, improved profitability, or better customer retention. Online sales channels can expand your market reach, but they can



also mean platform fees, price competition, shipping costs, return losses, and technology costs.

Likewise, consumer engagement through digital reviews, social media, and online communication may improve the consumer experience, but its effect on repeat purchases and loyalty depends on variables such as product quality, trust, service reliability, and satisfaction.

The central problem addressed by this study is the limited pilot-level evidence available within the supplied dataset on the relationships between e-commerce adoption and the business outcomes of apparel retailers in Pune. The study therefore examines these relationships and identifies the measurement and methodological issues that should be addressed before undertaking a larger investigation.

3 Research objectives

The study has the following objectives:

- To examine e-commerce adoption and its relationship with the reported sales performance of apparel retailers in Pune.
- To explore the relationship between online customer-related factors, shopping satisfaction and customer retention indicators.
- To explore the relationship between delivery-related ratings and the reported sales performance of retailers.
- To examine the relationship between advertising priorities and retailers' adoption of online selling.
- To determine challenges for traditional apparel retailers during their transition to e-commerce.
- To assess the preliminary reliability of the questionnaire and identify improvements required for a larger study.

4. Research questions

- Does online-selling adoption correspond with higher reported sales performance among apparel retailers?
- Are customer reviews and other online shopping factors associated with customer satisfaction and retention indicators?
- Is delivery-speed performance associated with reported sales changes?
- Are advertising priorities associated with online-selling adoption?
- What operational, technological, and competitive challenges do apparel retailers report?

5. Scope of the study

The study focuses on apparel retailers and customers in Pune. It looks at e-commerce adoption, sales changes, customer buying habits, digital marketing priorities, delivery issues and challenges in online retail.

The analysis uses 50 customer responses and all 15 retailer responses available in the uploaded files. As this is a pilot

study, the results are exploratory and should not be generalised to all apparel retailers or customers in Pune.

II. LITERATURE REVIEW

1. Use of technology and electronic commerce

Frameworks that consider perceived usefulness, ease of use, organizational readiness and environmental pressures are commonly used to explain the adoption of technology. Davis (1989) proposed the Technology Acceptance Model that explains technology acceptance by perceived usefulness and perceived ease of use. These ideas are relevant to clothing retailers considering whether selling online will improve customer access, sales opportunities and operational efficiency.

Tornatzky and Fleischer (1990) developed the Technology–Organisation–Environment framework that considers technological characteristics, organizational resources and environmental conditions in technology adoption. Applied to the apparel retail industry, this framework states that the adoption of e-commerce is contingent upon the availability of technological infrastructure, financial capacity, managerial expertise, competitive pressure, and access to outside support.

In smaller retailers, the decision to implement e-commerce may be a trade-off between expected benefits in the market and costs of implementation and risks to the operation. Therefore, the extent to which digital channels improve business performance should be considered separately from adoption.

2. Sales performance and e-commerce

Online retailing can also extend geographical reach, and provide further sales channels. Digital platforms also enable retailers to share product information, promote collections and reach consumers who may not visit physical stores.

But sales performance is related to many things. Pricing, product differentiation, customer trust, delivery reliability, inventory availability, and platform visibility. So the existence of an online channel alone is not the proof of better sales. Verhoef, Kannan, and Inman (2015) explored the transition from multichannel retailing to omnichannel retailing and stressed the importance of understanding customers' interactions across channels. For apparel retailers, the combination of online and offline operations may provide the best of both worlds: the ease of digital access combined with the tactile evaluation and personal service of physical stores

3. Customer involvement, satisfaction and loyalty on the internet

Customer involvement is important for e-commerce as digital interactions can facilitate communication, feedback,



recommendations and personalized marketing. Social media content and reviews can affect the quality, reliability and credibility of a product.

Oliver (1999) conceptualized customer loyalty as a commitment that can be maintained despite situational influences and competing marketing efforts. This view means that loyalty is not just a single purchase or a positive satisfaction rating.

Customer involvement online in apparel retailing builds loyalty when customers experience consistent product quality, accurate product descriptions, reliable fulfillment, convenient returns and responsive customer service. Satisfaction, engagement, retention and loyalty are different constructs and should be separately measured in empirical research.

4. Logistics and supply chain effectiveness

Logistics and supply chain management affect order fulfillment, inventory availability, delivery times, handling of returns, and the customer experience. Christopher (2016) highlighted the strategic significance of supply chain management in synchronizing the flow of goods and information between organizations.

Online apparel retailers have their own logistics issues such as siloed inventory systems, delivery delays, reverse logistics costs, returns due to sizing and limited leverage in negotiating with delivery providers. Even if digital marketing is successful in generating demand, these challenges may still affect customer satisfaction and profitability.

Efficient logistics may facilitate business growth; however a pilot study is required to determine whether these relationships exist using direct measures of delivery performance, operational efficiency and growth.

Marketing digital y expansión de mercado Digital marketing helps retailers to market products via social media, search, online ads and other digital channels. Digital marketing is an integrated process which involves online communication, customer acquisition, measurement and optimization (Chaffey and Ellis-Chadwick, 2019).

For clothing retailers, advertising can help to make their products more visible and drive traffic to their online stores. But the expansion of a market is not just a matter of advertising spend or perceived importance of promotion. It may also depend on conversion rates, repeat purchases, geographic reach, customer acquisition costs and the ability to fulfill orders profitably.

Consequently, advertising priorities and actual market expansion should be measured as separate variables in future research.

6. Research gap

The literature establishes that e-commerce adoption, customer engagement, logistics, and digital marketing can influence retail operations. However, the relationships between these factors are context-dependent, and the adoption of digital channels should not be treated as equivalent to business growth.

This pilot study fills an initial empirical gap by examining the available customer and retailer responses from Pune. The contribution is exploratory in that it evaluates selected associations, assesses the reliability of the questionnaire and identifies where more direct measures are needed to test the proposed relationships more rigorously.

III. RESEARCH METHODOLOGY

1 Research design

The study adopts a quantitative, exploratory, cross-sectional pilot design. A structured questionnaire was used to obtain information from apparel retailers and customers.

The retailer questionnaire covers business characteristics, online-selling adoption, reported sales changes, delivery-related considerations, advertising, online competition, and operational challenges. The customer questionnaire covers demographics, online purchasing behaviour, product-selection factors, shopping satisfaction, service ratings, and indicators of repeat-purchase intentions.

2. Sample and data sources

The supplied workbooks contained 137 customer records and 15 retailer records. The analysis uses the first 50 customer records and all 15 retailer records.

Respondent group Records available Records analysed
Selection approach Customers 137 50 First 50 records in the supplied workbook
Retailers 15 15 All available records
Total 152 65 Two separate respondent groups
The selection of the first 50 customer records was based on record order, not random sampling. The resulting sample should therefore be treated as a convenience-based pilot subset. The retailer sample is smaller than the intended target of 50 and does not provide sufficient evidence for broad population-level conclusions. Customer and retailer responses are analysed separately because they represent different units of analysis. Customer ratings are not combined with retailer responses to create a single respondent-level dataset.

3. Data preparation

The uploaded spreadsheets were examined to identify relevant variables, response categories, numeric ratings, and missing values. The customer analysis uses the eight 1–5 factor ratings and six 1–5 service-experience ratings. The retailer analysis uses the five 1–5 importance ratings covering price competitiveness, delivery speed, product quality, advertising, and technology support.



For hypothesis testing, the available variables were mapped to the closest relevant indicators. Because some questionnaire items do not directly operationalise the hypotheses, these tests are treated as exploratory proxy-based analyses.

4. Reliability analysis

Cronbach's alpha was used to assess the internal consistency of the selected rating-item groups. The coefficient is calculated as:

The Cronbach's Alpha (α) formula can be written as follows:

$$\alpha = \frac{k}{k-1} \left(1 - \frac{\sum_{i=1}^k \sigma_i^2}{\sigma_T^2} \right)$$

Where:

- α = Cronbach's Alpha (internal consistency reliability coefficient)
- k = Total number of items in the scale
- σ_i^2 = Variance of the i -th item
- σ_T^2 = Variance of the total score across all items

This formula is used to assess the internal consistency reliability of a questionnaire or measurement scale. Alpha values must be interpreted in relation to the theoretical coherence of the items. A high coefficient does not establish unidimensionality, construct validity, or causal relationships. In particular, the retailer importance ratings represent potentially distinct business priorities and may not constitute a single reflective scale.

5. Descriptive and inferential analysis

Frequencies and percentages were used to describe respondent characteristics and categorical responses. Means and standard deviations were calculated for the 1–5 rating items.

The exploratory hypothesis tests used:

- Fisher's exact test for the relationship between online-selling adoption and reported sales increases.
- Spearman's rank correlation for ordinal relationships involving customer ratings and retailer delivery-speed ratings.
- Mann–Whitney U testing to compare advertising-importance ratings between online adopters and non-adopters.

A significance level of 0.05 was used. The small retailer sample, proxy measures, and exploratory design mean that statistical significance should not be interpreted as evidence of causality.

IV. DATA ANALYSIS AND RESULTS

1. Customer demographic analysis

Table 1. Demographic profile of the 50 customers

Demographic variable	Category	Frequency	Percentage
Gender	Female	32	64.00%
	Male	18	36.00%
Age	Below 18	2	4.00%
	18–25 years	11	22.00%
	26–35 years	16	32.00%
	36–45 years	13	26.00%
	46–60 years	7	14.00%
	Above 60 years	1	2.00%
Occupation	Employed	30	60.00%
	Student	12	24.00%
	Homemaker	4	8.00%
	Business	3	6.00%
	Teacher	1	2.00%
Monthly household income	Below ₹25,000	22	44.00%
	₹25,000–₹50,000	13	26.00%
	₹50,000–₹1,00,000	9	18.00%
	Above ₹1,00,000	6	12.00%
Total		50	100.00%

Source: Analysis of the first 50 customer records in the supplied dataset.

Interpretation: 64% of the sample of customers were female respondents. The largest age group was 26-35 years old, with 32% followed by respondents aged 36-45 years old (26%). Employed respondents represented 60% of the sample, while 44% reported monthly household income below ₹25,000.

These characteristics describe the selected pilot sample only. The distribution should not be interpreted as



representative of all apparel consumers in Pune because the records were not randomly selected.

2. Customer online-shopping behaviour

Table 2. Online apparel purchasing patterns

Variable	Category	Frequency	Percentage
Purchase frequency	Never	9	18.00%
	1–2 times per year	27	54.00%
	3–5 times per year	10	20.00%
	6 or more times per year	4	8.00%
Monthly online apparel spending	Below ₹500	18	36.00%
	₹500–₹1,000	13	26.00%
	₹1,001–₹2,000	11	22.00%
	Above ₹2,000	8	16.00%
Share of apparel purchases online	0–25%	31	62.00%
	26–50%	17	34.00%
	51–75%	2	4.00%
Overall online-shopping satisfaction	Neutral	17	34.00%
	Satisfied	26	52.00%
	Very satisfied	7	14.00%
Willingness to buy from physical stores with an online platform	Yes	40	80.00%
	No	10	20.00%

Source: Analysis of the first 50 customer records.

Interpretation: A total of 41 respondents (82%) reported purchasing apparel online at least occasionally, while nine (18%) reported never doing so. Nevertheless, 62% indicated

that online purchases accounted for no more than one-quarter of their apparel purchases.

Overall 66% were satisfied/very satisfied with their online shopping experience. Notably, 80% expressed willingness to buy from physical retailers if those retailers also offered an online platform. This finding provides preliminary

descriptive support for investigating hybrid retailing as a potential strategy, but it does not establish that a hybrid model increases sales or loyalty.

**3. Retailer profile**

Table 3. Characteristics of the 15 available apparel retailer respondents

Variable	Category	Frequency	Percentage
Business type	Sole proprietorship	13	86.70%
	Clothing store	1	6.70%
	Partnership	1	6.70%
Years in operation	1–5 years	6	40.00%
	6–10 years	2	13.30%
	More than 10 years	7	46.70%
Store type	Physical store	7	46.70%
	Hybrid store	7	46.70%
	Online store	1	6.70%
Current online selling	Yes	9	60.00%
	No	6	40.00%
Monthly revenue	Below ₹1 lakh	3	20.00%
	₹1–5 lakh	2	13.30%
	₹5–10 lakh	6	40.00%
	Above ₹10 lakh	4	26.70%
Strategies adopted to compete online	Yes	14	93.30%
	No	1	6.70%
Views hybrid retailing as the future	Yes	14	93.30%
	No	1	6.70%

Source: Analysis of all 15 available retailer records. Percentages may not total exactly 100 because of rounding. Interpretation: Most respondents operated sole proprietorships, and almost half had been in business for more than ten years. Nine (60%) retailers said they were currently selling online and six (40%) said they were not.

Fourteen respondents reported adopting strategies to compete with online platforms, and 14 considered hybrid retailing an important future direction. These results indicate that digital competition and channel integration are salient concerns within this small retailer sample. They do not establish the prevalence of these attitudes across Pune's entire apparel retail sector

4. Reliability analysis: Cronbach's alpha

Table 4. Internal consistency of selected rating-item groups

Respondent group	Item group	Number of items	Sample size	Cronbach's alpha	Preliminary interpretation
Customers	Online apparel purchasing-factor ratings	8	50	0.88	High internal consistency
Customers	Online service-experience ratings	6	50	0.928	Very high internal consistency
Retailers	Online-selling importance ratings	5	15	0.561	Limited internal consistency

Note: Alpha coefficients were calculated using the supplied numeric ratings. The coefficients do not establish construct validity or one-dimensionality.

consistency in the selected sample. The six service-experience items produced an alpha of 0.928, indicating very high internal consistency.

Interpretation

The eight customer purchasing-factor items produced a Cronbach's alpha of 0.880, indicating high internal

The retailer item group produced an alpha of 0.561. This value is relatively low for a scale intended to measure a single coherent construct. However, the five items of price



competitiveness, speed of delivery, quality of product, advertising and technical support may represent different business priorities rather than interchangeable indicators of one underlying construct. Hence the low coefficient may be echoing the breadth of the item group and limitations of measurement.

The customer alpha values should also be interpreted cautiously. Product factors such as price, brand, delivery, and

influencer content are not necessarily indicators of one underlying construct. Before treating these groups as validated scales, a larger study should assess dimensionality, construct validity, and the theoretical rationale for combining the items.

5. Customer descriptive statistics

Table 5. Descriptive statistics for customer purchasing factors

Item	N	Mean	Standard deviation
Price and discounts	50	4.02	0.98
Brand	50	3.82	1.04
Customer reviews	50	4.04	1.03
Delivery speed	50	3.74	1.1
Return policy	50	3.9	1.07
Variety	50	4.24	0.98
App interface	50	3.94	1.1
Influencer content	50	3.58	1.4

Scale: 1 = Poor; 5 = Excellent. Source: Customer pilot dataset.

Interpretation: Product variety was rated highest (4.24) followed by customer reviews (4.04) and price and discounts (4.02). The influencer content had the lowest mean rating at 3.58 and the highest standard deviation at 1.40, indicating more variability in the ratings of the respondents.

The findings indicate that product choice, reviews, and price-related considerations were rated relatively highly in this sample. However, the ratings measure the perceived importance of these factors, not their independently estimated effects on purchase behaviour.

Table 6. Descriptive statistics for customer online service experience

Item	N	Mean	Standard deviation
Product quality	50	3.74	0.94
Product fit	50	3.6	0.99
Delivery	50	3.84	0.98
Return/refund experience	50	3.76	1.19
Customer service	50	3.72	1.05
Value for money	50	3.86	1.01

Scale: 1 = Poor; 5 = Excellent. Source: Customer pilot dataset.

Value for money had the highest average rating (3.86), followed by delivery (3.84). The lowest rated was product fit (3.60). These results suggest potential areas for improving online apparel shopping, particularly fit information, sizing accuracy, and product descriptions. They are descriptive

findings and do not establish the causes of customer satisfaction or dissatisfaction.

6. Retailer descriptive statistics

Table 7. Importance ratings for online-selling requirements

Item	N	Mean	Standard deviation
Price competitiveness	15	4.53	0.64
Delivery speed	15	3.8	0.56
Product quality	15	3.4	0.74
Advertising	15	4.47	0.64
Technology support	15	4.47	0.52

Scale: 1 = Poor; 5 = Excellent, as specified in the questionnaire.

Interpretation: Price competitiveness had the highest mean rating (4.53), while advertising and technology support both had means of 4.47. The average of delivery speed was 3.80 and the average of product quality was 3.40.

The pattern suggests that respondents placed substantial importance on competitive pricing, advertising, and technology support. Nevertheless, these ratings should not be interpreted as objective assessments of operational efficiency or evidence that any specific factor causes growth.

7. Exploratory hypothesis testing

The five hypotheses are examined below using the closest available measures in the supplied questionnaires. Because several hypotheses are not directly operationalised by the existing items, the results should be interpreted as



preliminary evidence rather than definitive tests of the **complete theoretical relationships**.

Hypothesis 1: E-commerce adoption and sales performance

• H_{01} : E-commerce adoption does not significantly impact the sales performance of apparel retailers in Pune.

• H_{11} : E-commerce adoption significantly impacts the sales performance of apparel retailers in Pune.

Table 8. Online-selling adoption and reported sales increases

Online-selling status	Sales increased	Sales did not increase	Total
Currently selling online	3	6	9
Not currently selling online	1	5	6
Total	4	11	15

Test statistic	Result
Test	Fisher's exact test
Odds ratio	2.5
Two-sided p-value	0.604
Significance level	0.05
Statistical decision	Fail to reject H_{01}

Statistical decision Fail to reject H_{01}

Interpretation: Three of the nine online-selling retailers reported increased sales, compared with one of the six retailers not currently selling online. The observed odds ratio was 2.50, but Fisher's exact test did not indicate a statistically significant association ($p=.604$).

Thus, the pilot data do not provide sufficient evidence to reject the null hypothesis. This does not mean that e-commerce does not impact sales. The sample is too small to

For this exploratory test, current online-selling adoption was compared with whether retailers reported increased sales. Reports of unchanged or decreased sales were grouped together. Fisher's exact test was used because of the small sample and cell frequencies.

support a reliable conclusion, and the cross-sectional data do not establish whether online adoption preceded sales changes.

Hypothesis 2: Online customer engagement and customer retention

• H_{02} : Online customer engagement strategies have no significant effect on customer retention and brand loyalty in apparel retail.

• H_{12} : Online customer engagement strategies have a significant effect on customer retention and brand loyalty in apparel retail.

The customer questionnaire does not contain a direct multi-item measure of retailers' online engagement strategies or a validated brand-loyalty scale. As an exploratory proxy, the importance rating assigned to customer reviews was compared with customers' reported hesitation to reorder because of online-shopping problems. Spearman's rank correlation was used.

Table 9. Customer reviews and hesitation to reorder

Variable relationship	Spearman's rho	p-value	N	Statistical decision
Importance of customer reviews and hesitation to reorder	-0.068	0.639	50	Not statistically significant

Note: Higher hesitation scores indicate greater reported hesitation. Customer-review importance is a proxy for a customer-related online factor, not a direct measure of engagement strategy.

Interpretation: The association between customer-review importance and hesitation to reorder was weak and negative ($\rho=-.068$) and was not statistically significant ($p=.639$). The analysis therefore fails to reject H_{02} using this proxy.

A separate exploratory analysis found a positive association between customer-review importance and overall online-shopping satisfaction ($\rho=.345$, $p=.014$, $N=50$). Therefore, the ones that valued the reviews more also reported a higher satisfaction. But this correlation in itself is not proof of engagement strategies translating into higher customer retention or brand loyalty.



Direct measures of engagement activities, repeat purchase intentions, actual retention and brand loyalty would be required for a definitive test of H 2 .

Hypothesis 3: Logistics efficiency and operational growth

- H₀₃: Logistics and supply chain efficiency do not significantly contribute to the operational growth of e-commerce apparel retailers.

- H₁₃: Logistics and supply chain efficiency significantly contribute to the operational growth of e-commerce apparel retailers.

The retailer questionnaire includes a delivery-speed importance rating and a categorical item on reported sales changes. Because it does not directly measure logistics efficiency or operational growth, the delivery-speed rating was used as an exploratory proxy and compared with the ordinal sales-change category using Spearman's rank correlation.

Table 10. Delivery-speed rating and reported sales changes

Variable relationship	Spearman's rho	p-value	N	Statistical decision
Delivery-speed rating and reported sales changes	-0.107	0.705	15	Not statistically significant

Interpretation: The observed association was weak and negative ($\rho = -0.107$), with no statistically significant relationship at the 5% level ($p = 0.705$). The pilot data therefore fail to reject H₀₃ using the available proxy.

This result should not be interpreted as evidence that logistics efficiency is unimportant. The item records the perceived importance of delivery speed, not actual delivery performance, order-fulfilment efficiency, or logistics costs. A larger study should measure delivery times, fulfilment accuracy, return rates, inventory availability, and operational growth directly.

Hypothesis 4: Digital marketing and market expansion

- H₀₄: The digital marketing tools do not significantly affect the market expansion of apparel retailers in the e-commerce space.

H 4 : Digital marketing tools are vital in the market expansion of apparel retailers in the environment of e-commerce.

The retailer questionnaire includes an advertising-importance rating but does not directly measure market expansion through customer acquisition, geographic reach, conversion rates, or new-market sales. The exploratory test compared advertising-importance ratings between online-selling adopters and non-adopters using the Mann–Whitney U test.

Table 11. Advertising-importance ratings by online-selling adoption

Group	N	Mean advertising-importance rating
Currently selling online	9	4.67
Not currently selling online	6	4.17

Test statistic	Result
Test	Mann–Whitney U
U statistic	37.5
Two-sided p-value	0.184
Significance level	0.05
Statistical decision	Fail to reject H ₀₄ using the proxy

Statistical decision Fail to reject H₀₄ using the proxy



Interpretation: Retailers currently selling online reported a higher mean advertising-importance rating (4.67) than those not selling online (4.17). The difference, however, was not statistically significant ($p=.184$).

The analysis does not determine whether digital marketing influences market expansion, because the measured output is online-selling adoption, not market expansion. Thus, the results do not provide enough evidence to reject H_{04} and the direct relationship is not tested.

Hypothesis 5. E-commerce conversion challenges • H_{05} : Traditional apparel retailers do not face major challenges in shifting to e-commerce platforms.

• H_{15} : Traditional apparel retailers encounter major difficulties in shifting to electronic commerce.

The retailer questionnaire records challenges such as price competition, platform commissions, delivery delays, return fraud, technology problems, and payment delays. These responses are categorical and often allow multiple challenges to be reported by the same respondent.

Table 12. Reported challenges associated with online selling

Indicator	Result
Retailer responses available	15
Responses listing one or more challenges	13
Responses with no recorded challenge entry	2
Percentage of all retailer records with recorded challenges	86.70%
Percentage among records with a non-missing challenge entry	100.00%

Interpretation: Thirteen of the 15 retailer records contained one or more reported challenges associated with online selling. They included price competition, platform commissions, delivery delays, return risks and technology issues.

The descriptive findings show that transition-related challenges were common across the retailer responses received. However, the questionnaire did not include a validated multi-item measure of challenge severity and two records did not have a recorded response to this question. Therefore, the study does not make a formal statistical rejection decision for H_{05} . A statistically defensible test would need a clearly defined challenge construct, a suitable reference threshold, and a sufficient number of observations. The results provide descriptive support for further investigation of H_5 , rather than conclusive statistical confirmation..

5. DISCUSSION

1. E-commerce adoption and sales performance

The retailer data show that nine of the 15 respondents were selling online, but the available evidence did not establish a statistically significant association between adoption and reported sales increases. This finding reinforces the distinction between digital-channel adoption and business performance.

Online selling may increase access to potential customers, but the benefits can depend on pricing, inventory availability, platform visibility, advertising effectiveness, fulfillment reliability, and the costs of operating the channel. A retailer may also experience a change in sales because of seasonal demand, broader market conditions, product assortment, or competition unrelated to e-commerce adoption.

The observed odds ratio should therefore be treated as a preliminary estimate rather than a reliable indication of the size of the adoption effect. The small number of retailers and sales-increase responses limits statistical power.

2. Customer engagement and retention

The customer sample assigned relatively high ratings to variety, reviews, and price-related factors. Customer-review importance was positively associated with overall shopping satisfaction, but its relationship with hesitation to reorder was not significant.

This distinction is important because the relevance of reviews to satisfaction does not establish that reviews or other engagement activities cause repeat purchasing. Satisfaction can also be influenced by product fit, quality, value for money, delivery and return experiences. Customer loyalty also has to consider repeat-purchase behavior, trust and switching intentions.



Future research should distinguish customer engagement as an organisational activity from customer engagement as an individual response. It should also measure retention and loyalty directly rather than relying exclusively on satisfaction or reorder hesitation.

3. Logistics and supply chain efficiency

Delivery speed received a mean importance rating of 3.80 among retailers, but the selected analysis did not establish a significant relationship between this rating and reported sales changes.

The finding may reflect the difference between perceived importance and actual operational performance. Retailers may believe delivery speed is important, but lack the systems, inventory visibility, or delivery partnerships to reliably provide it.

In future research, objective or clearly defined operational indicators such as average delivery time, order accuracy, fulfillment cost, inventory turnover, cancellation and returns should be measured. These measures would provide a stronger basis for evaluating the relationship between logistics performance and business growth.

4 Digital marketing and market expansion

Retailers currently selling online assigned a higher mean importance rating to advertising than non-adopters, but the observed difference was not statistically significant. More importantly, advertising importance is not equivalent to digital marketing effectiveness or market expansion.

A retailer may invest in advertising without generating profitable sales if the audience is poorly targeted, product information is inadequate, or conversion rates are low. Similarly, a retailer can grow its customer base organically through social media activity, marketplace discovery or referrals without much paid media.

A more rigorous study should look at specific marketing channels and measure reach, engagement, customer acquisition cost, conversion rates, repeat purchases and geographic expansion.

5. Challenges faced by traditional apparel retailers

The retailer responses identified price competition, commissions, delivery delays, return-related risks, and technology problems as relevant concerns. These results are consistent with the operational complexity in online apparel retailing.

Traditional retailers may have customer relationships and product knowledge, but limited resources for digital infrastructure, fulfillment, online merchandising and data-driven marketing. The transition to e-commerce may

therefore require not only technology adoption but also changes in organisational routines and capabilities.

The high proportion of available records containing challenge entries indicates that these issues warrant further investigation. However, the current dataset does not establish the relative severity of individual challenges or their independent effects on business performance.

6. The potential role of hybrid retailing

Fourteen of the 15 retailer respondents viewed hybrid retailing as the future, while 40 of the 50 customers indicated that they would buy from physical retailers offering online platforms. These descriptive findings suggest that integrating physical and digital channels is a promising topic for further research. A hybrid model may allow retailers to combine physical product evaluation and personal service with online discovery, ordering, and communication.

Nevertheless, willingness to use a hybrid channel is not equivalent to actual adoption, purchase behaviour, or improved profitability. Further research should examine whether integrated inventory, online ordering, in-store collection, digital customer service and coordinated promotions deliver real business benefits.

VI. MANAGERIAL IMPLICATIONS

Build digital capabilities incrementally Apparel retailers must take stock of their position before investing significant resources into e-commerce. Clear product listings, accurate sizing information, updated photos, digital payment options and basic customer communication are first steps.

- Combine physical and digital channels Retailers can look at online catalogs, social commerce, digital customer support, and coordinated in-store and online promotions. These initiatives should be evaluated based on customer uptake and operating costs, not assumed successful simply because they are put in place.
- Improve product and return information management Customer ratings indicate that there is scope to improve the information on product-fit and the overall shopping experience. Providing detailed size charts, real-life photos, fabric descriptions, and clear return policies can help customers make more informed purchasing decisions.
- Strengthening logistics set up Retailers should check delivery partners, tracking of orders, packaging, inventory availability and reverse logistics arrangements. Small businesses can benefit from shared fulfillment arrangements or technology solutions appropriate to their scale.
- Evaluate the impact of digital marketing Retailers should monitor meaningful results such as qualified website



visits, customer inquiries, conversion rates, repeat purchases and acquisition costs. The importance of advertising should not substitute for evidence of efficacy.

- Seek specific institutional support The retailers' responses indicate a possible demand for reasonably priced digital training, technology assistance and improved ways of handling problems related to platforms. Industry associations and other relevant support organizations could consider training and advisory programs for small apparel businesses.

VII. LIMITATIONS AND FUTURE WORK

The study has limitations.

- First, the retailer data set only had 15 responses, falling short of the desired 50. Consequently, retailer-level inferential results are preliminary and have limited statistical power.
- Second, the customer analysis uses the first 50 records from a larger dataset rather than a random sample. The findings may therefore reflect record-order and selection effects.
- Third, the study is cross-sectional and based on self-reported questionnaire responses. It cannot establish causal relationships between e-commerce adoption and business growth.
- Fourth, several hypotheses are not directly operationalised by the questionnaire. Advertising importance is not a direct measure of market expansion; delivery-speed importance is not an objective measure of logistics efficiency; and customer-review importance is not a complete measure of engagement strategy or brand loyalty.
- Fifth, the retailer alpha coefficient of 0.561 suggests that the five business-priority ratings should not automatically be treated as a single scale. The high customer alpha coefficients also require further assessment of dimensionality and construct validity.
- Sixth, the current analyses do not control for retailer size, business age, product category, revenue, platform type, digital maturity, or competitive intensity. These factors could influence both adoption and business outcomes.

Future research should obtain the intended 50 retailer responses and 50 customer responses, preferably using a documented sampling strategy. A larger study could then use validated multi-item scales, direct measures of sales growth and customer retention, and multivariable analyses appropriate to the sample size and data structure.

Where possible, longitudinal or repeated-measure data would help establish whether e-commerce adoption precedes changes in sales, profitability, and customer retention.

VIII. CONCLUSION

This pilot study examined e-commerce adoption and selected business and customer outcomes in apparel retailing in Pune. The available data suggest that online selling, digital marketing priorities, customer reviews, and hybrid retailing are relevant to the respondents' retail experiences. Product variety, customer reviews, and price-related factors received relatively high ratings among customers, while retailers assigned high importance to price competitiveness, advertising, and technology support.

The exploratory hypothesis tests did not identify statistically significant associations between online-selling adoption and reported sales increases, delivery-speed ratings and sales changes, or advertising-importance ratings and online-selling adoption. Customer-review importance was positively associated with overall shopping satisfaction, but its association with hesitation to reorder was not significant. These findings do not establish that e-commerce, logistics, customer engagement, or digital marketing lack business value; they indicate that the available sample and measures are insufficient to demonstrate the specified relationships conclusively.

The retailer responses also highlighted practical concerns involving online competition and the transition to digital channels. The positive descriptive responses to hybrid retailing suggest a domain that deserves further empirical study.

Overall, the study provides preliminary evidence and points to important measurement requirements for a larger investigation. The main contribution of this paper is to lay down the questions, variables and analytical procedure needed to evaluate the contribution of e-commerce adoption toward growth of apparel retailers in Pune.

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