



Advancing E-commerce Strategies in Small Retail Enterprises: Unveiling the Impact of Digital Literacy and Consumer Engagement Through PLS-SEM in India

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Abstract. Over the past decade, technological breakthroughs and the expansion of internet connectivity have significantly changed India's digital landscape. This digital revolution has rippled through many industries, particularly e-commerce within the retail sector. The retail sector's use of e-commerce solutions is more than simply a popular trend; it reflects a fundamental change in how businesses run and engage with their customer base. Internet usage rates in India are expected to rise significantly by 2026 from \$38.5 billion at present to \$200 billion [1]. This accelerating growth highlights the importance of using digital technologies by retailers to reach larger audiences through personalization of marketing activities as well as providing a better customer experience. The aim of the study is to investigate factors impacting behavioural intentions towards adopting electronic commerce innovation among small scale retail businesses in Indian cities. Results demonstrate a clear influence of digital literacy and consumer engagement on them while shaping adoption of future technologies.

Keywords: Digital Literacy, Behaviour Intention, Consumer Engagement, Innovative e-commerce adoption, social media utilisation, small retailers.

1 Introduction

The influx and integration of advancing technologies in the e-commerce platforms have transformed the face of retail sector. This shift has promoted democratisation of markets access especially for small retailers who can now access national and international markets with relatively lower capital investment by harnessing digital platforms [2]. Additionally, researchers are extensively utilising technology models in various contexts to understand the user behaviour regarding technology acceptance and adoption, e-commerce being one such context [3],[4]. However, the transition to e-commerce is fraught with challenges, particularly for small retailers who may lack the digital literacy and resources to effectively compete online. Furthermore, the landscape is

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quite fierce and nimble, with consumer involvement as the central objective to make it in e-commerce. Presence on digital platforms helps increase customer engagement by tapping into the growing social media communities [5]. Personalization, influencer collaboration, social commerce and AI-based tools are some examples of cutting-edge techniques used in e-commerce today. Being impactful entails engaging customers in digital spaces using not only technical skills but also keeping track of online consumer preferences that keep evolving [6],[7]. Hence, small retail enterprises embracing emerging digital marketing strategies for their businesses has become a critical research area. It is against this backdrop that this research attempts to identify variables that affect the adoption of advancing e-commerce strategies by small retail enterprise in metropolitan cities of India through adapted UTAUT model with emphasis on role of digital literacy and consumer engagement. This study therefore examines these factors so as provide a better understanding on how small traders might manoeuvre the intricacies of the internet shopping place and benefit from ecommerce's potential as a driver for growth and sustainability. It encapsulates the challenges and opportunities posed by digital economy emphasizing on businesses transformation for continued competitiveness.

1.1 Problem Statement

The navigation towards e-commerce by small retail businesses in India depicts mixed sentiments. As much as the digital market space presents a whole range of opportunities for growth and expansion, there are also various obstacles that tend to impede the successful implementation of e-commerce strategies by these enterprises, digital literacy being one of them. A lot of small-scale retailers do not have necessary competencies and knowledge required to navigate through web complexities which include setting up online stores plus making use of digital marketing instruments [8]. This gap in becoming digitally literate impedes their efforts at creating strong online presence thus impacting their competitiveness in digital space.

Consumer engagement is another major hurdle that needs to be addressed in this scenario. In the current competitive environment for e-commerce, solely maintaining an online presence is not sufficient to enhance the customer base. It calls for understanding consumer behaviour patterns, preferences as well as expectations within the digital domain. The development of captivating online content, effective utilization of social media networks and customization of shopping experience in line with needs of tech-savvy customers pose difficulties to smaller vendors [9]. These challenges highlight why a strategic approach towards adopting new age e-commerce tools is the need of the hour so as to diffuse the obstacles encompassing digital literacy and consumer engagement.

1.2 Research Objectives

The study primarily attempts to examine the influence of digital literacy and consumer engagement on the decisions of small retail enterprises to embrace e-commerce strategies in India. Specifically, its objectives are to:

1. Investigate the influence of different variables that effect the behaviour intention of small retailers while embracing e commerce strategies.
2. Examine the digital presence modes among small retail business owners and identify gaps that effect their intention to implement e-commerce strategies.
3. Explore how consumer engagement strategies and digital literacy mediate the impact of various variables on the adoption of e-commerce initiatives in small retail enterprises.

1.3 Significance of the Study

To effectively capitalize on the opportunities of the digital economy, small businesses need to understand how to enhance the adoption of e-commerce methods. The current study holds significant importance for several reasons. Firstly, by identifying the barriers related to digital literacy and consumer engagement, it can assist in the development of targeted interventions and support programs by the government and professional organisations aimed at empowering small retailers with the necessary skills and knowledge for successful e-commerce adoption [10]. Secondly, the insights gained from this research can help small retailers optimize their e-commerce strategies to achieve increased market reach, improve competitiveness, and enhance customer satisfaction. With this, it supports the more generic aim of establishing a more eclectic digital economy in which smaller companies can flourish alongside larger enterprises. The study's ultimate goal is to offer valuable knowledge for e-commerce platforms, business owners, and regulators so they may formulate plans that would assist small retail businesses in India's digital marketplace prosper sustainably.

2 Literature Review

Digital and big data technology has transformed the retail industry, especially for small businesses who are looking to find their space in today's burgeoning e-commerce environment. Moreover, the 2016 digital India campaign significantly promoted the progress of the e commerce sector and the second impetus in this direction was accelerated by way of Pandemic. The studies in the review of literature are an effort to cover the complexity of digital literacy and consumer engagement as principal features supporting e-commerce strategies for small retail businesses.

2.1 Digital Literacy in E-commerce Adoption

Digital literacy functions as a promising facilitator that assists small retail enterprises to manoeuvre their way around e-commerce adoption. Research has defined digital literacy not only as a proficiency with digital tools, but also included the skills important for navigating within this domain: e-communication, creation of content via electronic media and decision-making processes needed to ensure safety which problem solving

in online environment [11]. Within the framework of e-commerce, digital literacy enables the understanding of how online marketplaces works and how advances in digital marketing and analytics can be encashed for increasing online sales revenues [12]. This research reiterated the need for digital literacy as a key to overcome both operational and strategic barriers related to adoption of e-commerce, indicating that SME retail business owners require dedicated programs aimed at educating them about relevant aspects in an ever-changing online environment [13], [14].

2.2 Consumer Engagement in E-commerce

The determinant of a successful online store is the involvement of consumers. For example, in today's digital market place which is highly competitive, and has customer loyalty that keeps changing hands, the brand loyalty as well as repeated purchases can be greatly enhanced by customers' effective engagement. According to study on the strategies for consumer engagement on e-commerce sites, creating an interactive experience that is personalized with artificial intelligence powered recommendations, augmented reality technologies and responsive customer service leads to high customer satisfaction and higher retention rates [15]. The role played by social media platforms in boosting customer interactions among others through user generated content and social sharing mechanisms have been discussed extensively in research studies especially carried out among SMEs [16],[17].

2.3 E-commerce Strategies for Small Retail Enterprises

Small retail businesses need to strategically approach the mechanism of e-commerce adoption. Research in this field offers various tactics suited to small companies' specific requirements and limitations [18]and suggests that small retailers can succeed in e-commerce by using marketplace platforms to cut initial expenses embracing mobile commerce to reach smartphone users and utilizing social media to increase brand recognition and connect with customers. Research highlights how crucial it is to incorporate analytics into online sales operations [19] This helps businesses understand customer preferences, fine-tune product selections, and create personalized marketing campaigns. Additionally, researcher scholars have stressed that small retailers need to embrace emerging technologies to understand what customers want and stay ahead in the digital world and found that improving digital skills helps companies become more innovative.[20],[21]

2.4 Theoretical Framework

The Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh et al. [22] and the Technology Acceptance Model (TAM) developed by Davis [23] have been popularly applied in scholarly work to analyse technology acceptance behaviours. As factors of behavioural intention and on ground application of technology, these models emphasize the relevance of perceived utility, ease with which it can be used (TAM), social influence along with facilitating conditions (UTAUT).

2.5 Hypothesis Development

This study builds on existing research to explore how small retail businesses adopt e-commerce. It focuses on digital literacy and consumer engagement as key factors. The study provides a more in-depth examination of the variables affecting electronic-commerce acceptance by utilizing the UTAUT model in conjunction with the constructs of technology preparedness, market orientation, and social media utilization. The influence of their framework on the acceptance and use of electronic-commerce platforms is investigated, with the assumption that they have an influence on small retail firms' behaviour intention to embrace and use these platforms efficiently. Additionally, since the pandemic has compelled businesses of all sizes to alter their approaches to the new normal in the digital world, the terms "e commerce strategies" and "innovative e commerce strategies" are used interchangeably throughout the study. The study retains the elements of 'facilitating conditions' and 'behaviour intention' from the original model. It also looks at how digital literacy and consumer engagement affect plans to adopt e-commerce. By integrating these aspects, the research attempts to give fresh perspectives into the nuances of small businesses aiming to adopt e-commerce while adding to the study initiated by Venkatesh et al. in 2003[22], as mentioned earlier. The following constructs are proposed in the model:

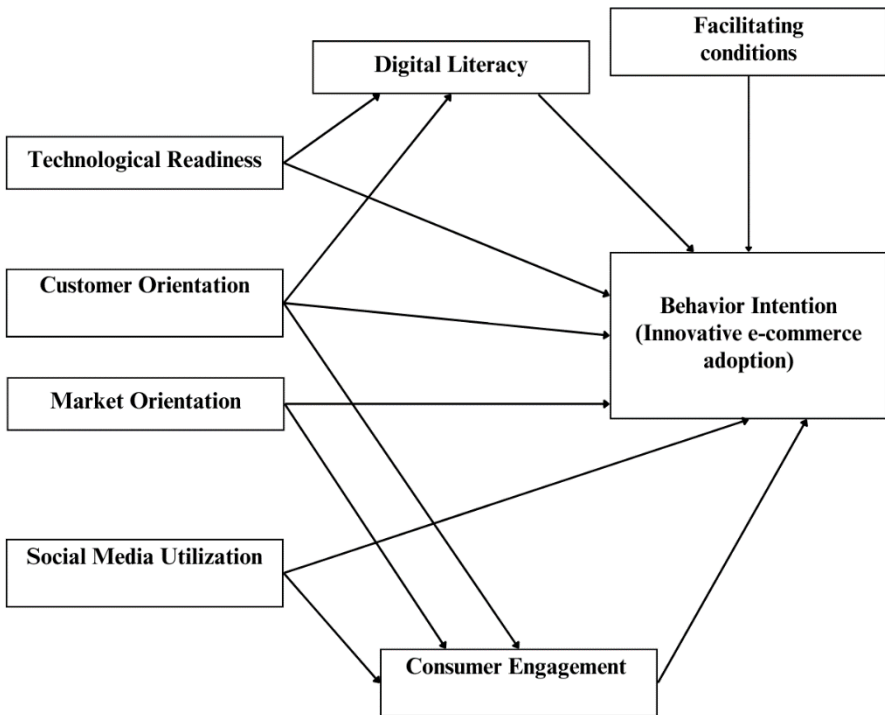
- **Technological Readiness:** Technological readiness is an organization's preparedness and ability to embrace and utilize innovative technology tools and infrastructure effectively. Research studies provide insights into the impact of digital literacy on technological readiness and the adoption of e commerce platforms [24],[25],[26]. They highlight the importance of enhancing digital skills and literacy to facilitate broader and more effective adoption of digital tools in various domains.
- **Digital Literacy:** Digital literacy is marked by understanding and competency in using digital technologies. Organizations with higher digital capabilities are better equipped in leveraging e commerce adoption technology for business competitiveness [27] [28].
- **Customer Orientation:** Customer Orientation targets on devising tools and strategies to cater to customer needs and preferences. Organizations that prioritize customer satisfaction tend to have better engagement and loyalty. Yang & Peterson [29] elucidate how customer orientation affects customer satisfaction and loyalty, which are crucial constructs in electronic-commerce adoption and retention. Additionally, orientation of customers with web-based technologies enhances users experience and in turn its adoption [30].
- **Market Orientation:** Understanding market trends, customer behaviour, and competitive dynamics defines market-orientation many research studies examine the influence of market orientation on the development of e-commerce adoption [31],[32].

- **Consumer Engagement:** Customer engagement is strategies that emphasise interactions and experiences between the organization and its customers. Effective consumer engagement leads to loyalty and positive outcomes. It is indicated that customer engagement practices in the digital landscape impacts the rate of its adoption and builds loyalty of its customers [33].
- **Facilitating Conditions:** Facilitating Conditions are the resources, assistance, and technological framework that users think they can access to make usage of technology easier as previously discussed [22]. Perceptions of how much outside influences help or impede the usage of technology are captured by this construct. It is a factor that assumes importance for a new technology user [34],[35]. This is adapted from the UTAT model. It is proposed that facilitating Conditions exert an influence on behaviour intention of adopting e-commerce by the respondents.
- **Social Media Utilisation** Social media utilisation refers to the extent or manner in which individuals or organizations use social media platforms. Social media has been found to be useful in different outcomes like customer engagement in contexts of e-commerce and other business outcomes in a digital environment [36],[37].
- **Behaviour intention:** It is the extent to which the user is willing to adopt technology, in this context the behaviour intention to adopt e-commerce innovation is examined. This is adapted from the UTAT model as mentioned earlier [22]. Its role has been examined in various studies [38],[39]. Behaviour intention is an important construct of the initial model as well. The following Hypothesis is suggested for the study:
 - H1: Technological readiness positively influences behaviour intention of adopting innovative e-commerce tools.
 - H2: Market orientation positively influence behaviour intention of adopting innovative e-commerce tools.
 - H3: Consumer orientation positively influence behaviour intention of adopting innovative e-commerce tools.
 - H4: Social media utilisation positively impacts behaviour intention of adopting innovative e-commerce tools.
 - H5: Facilitating conditions positively influences the behaviour intention of small business owners to adopt innovative e-commerce strategies.
 - H6: Digital literacy mediates the relationship between:
 - Technological readiness and behaviour intention of adopting innovative e-commerce tools
 - Customer orientation and behaviour intention of adopting innovative e-commerce tools

- H7: Consumer Engagement mediates the relationship between:
 - Customer orientation and behaviour intention of adopting innovative e-commerce tools
 - Market orientation and behaviour intention of adopting innovative e-commerce tools
 - Social media utilisation and behaviour intention of adopting innovative e-commerce tools

The conceptual framework of the model was made based on previous studies as shown in the Fig 1.

Fig. 1. Theoretical Framework Model of E-Commerce Adoption



Source: Based on literature review

3 Research Methodology

The methodology of this current research work is meticulously designed to examine the variables affecting the behaviour intention of small retailers while adopting innovative

e-commerce tools. Additionally, this study investigates how digital literacy and consumer engagement influence the way small retail businesses in India use e-commerce strategies. This section outlines the methods used for data collecting, analysis, sampling strategy, and research design in the study.

3.1 Research Design

In the current research study, the Partial Least Squares Structural Equation Modelling (PLS-SEM) method was adopted for analysing the gathered data set. The PLS-SEM approach is very effective in analysing the complex relationships between variables in exploratory research. PLS-SEM is rated better than other software's as it can work with both small and medium sample sized data sets equally well and has the ability to model reflective and/or formative latent constructs with ease. PLS-SEM finds extensive scope in context of business research and is supported in its application by detailed guidelines provided by the authors [40][41].

3.2 Sample

To ensure that homogeneity of the data, a standard classification of major cities was considered. Hence, sample was collected from the Tier 1 category of metropolitan cities of India cities. 150 small retail businesses from India's metropolitan cities—New Delhi, Mumbai, Bengaluru, Kolkata, and Chennai—made up the sample. These businesses were engaged across different industries, including food, electronics, clothing, and home goods. To guarantee a representative cross-section of small retail businesses, stratified sampling was applied, taking into account variables including business size, industry, and location. This sampling strategy aided in capturing the diverse experiences and practices related to e-commerce adoption across different types of small retail enterprises.

3.3 Data Collection Methods

A structured online questionnaire was distributed to the owners and managers of the selected small retail businesses for gathering data. The survey instrument was developed based on existing literature and was pre-tested with a small subset of the sample to ensure clarity and relevance. A well structure questionnaire was eventually used to elicit responses from the target sample. Out of 172 questionnaires, 150 were in the usable form which was included in the study. The questionnaire comprised two sections, first one gathered the respondents demographic profile and the second portion included a 5 point Likert scale over range of questions designed to measure digital literacy (e.g., familiarity with digital tools and platforms, understanding of online marketing strategies), consumer engagement (e.g., strategies to engage customers online, use of social media in context of business), and levels of electronic-commerce adoption (e.g., use of online sales channels, integration of e-commerce into business operations). Responses on technological readiness, market orientation, social media utilisation and customer orientation were captured in a similar manner.

4 Data Analysis

The PLS-SEM analysis was applied with the use of the Smart PLS software, a leading tool for PLS-SEM analysis in business research. The analysis proceeded in the following manner:

- Measurement Model Assessment:** In this initial step the reliability, along with the validity of the constructs within the survey were calculated. Techniques such as Coefficient alpha for consistency, AVE measure for convergent validity, and the Heterotrait-Monotrait ratio criterion for discriminant validity were employed to assess the measurement model's adequacy.
- Structural Model Assessment:** In this phase, the hypothesized relationships between various factors impacting digital literacy, consumer engagement, and e-commerce adoption were examined. Path coefficients were calculated to determine the strength and significance of these relationships, and the model's inferences and explanatory power was evaluated through the statistical measure of R^2 for the dependent variables.

Table 1 lists out the research methodology adopted for the current study.

Table 1. Research Methodology

Aspect	Description
Research Design	Table 1: Quantitative approach using Smart PLS software to explore the relationships between digital literacy, consumer engagement, and e-commerce adoption.
Sample	<p>Size: 150 small retail businesses</p> <p>Location: Major cities across India (New Delhi, Mumbai, Bengaluru, Kolkata, Chennai)</p> <p>Sectors: Apparel, Electronics, Home Goods, Food Items</p> <p>Sampling Method: Stratified sampling to ensure diverse representation</p>
Data Collection	<p>Method: Online survey</p> <p>Respondents: Owners and managers of small retail businesses.</p> <p>Content: Questions measuring digital literacy, consumer engagement, and e-commerce adoption intentions.</p>

Analytical Techniques	Tool Used: PLS-SEM software package Measurement Model Assessment: Cronbach's alpha, Composite Reliability (CR), Average Variance Extracted (AVE), Discriminant validity Structural Model Assessment: Path coefficients, Significance testing (bootstrapping), Coefficient of determination (R^2), (Q^2)
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Source: Author's compilation

Table 2. Profile of the Respondents

Characteristic	5 to 10 years	Percentage (%)	Count (n=150)
Type of Ownership Sector Distribution	Over 10 years	60%	90
	Apparel	25%	37.5
	Electronics	15%	22.5
Years of Operation Digital Presence	Home Goods	30%	45
	Food Items	30%	45
	Have an e-commerce website	40%	60
Sector Distribution Geographic Location	Use online market-places	25%	37.5
	Active on social media for business	20%	30
	Cost of maintenance effects additional e-commerce usage	30%	45
	New Delhi	25%	37.5

Digital Presence	Mumbai	50%	75
	Bengaluru	70%	105
	Kolkata	80%	120
	Chennai	50%	75
Geographic Location	New Delhi	20%	30
	Mumbai	20%	30
	Bengaluru	20%	30
	Kolkata	20%	30
	Chennai	20%	30

Source: Author’s calculation

5 Results

Table 2 provides a synthetic overview of the demographic and operational characteristics of the 150 small retail enterprises surveyed for this study. The table is organized into five main categories: Type of Ownership, Years of Operation, Sector Distribution, Digital Presence, and Geographic Location, each detailing the composition of the sample in percentages and actual counts. From the table, it is evident that the majority (60%) of the businesses are family-owned, indicating a significant prevalence of family-operated enterprises within the small retail sector in India. This is followed by partnerships (25%) and sole proprietorships (15%), showcasing a variety of ownership structures among the respondents. In terms of operational longevity, the businesses are evenly split between those operating for less than 5 years and those between 5 to 10 years, each constituting 30% of the sample. Notably, 40% of the enterprises have been in operation for over 10 years, highlighting a segment of well-established businesses engaging with e-commerce strategies.

The sector distribution reveals a balanced representation across apparel (25%), electronics (20%), home goods (30%), and food items (25%), reflecting the diverse nature

of small retail enterprises transitioning to e-commerce platforms. Digital presence was notably high among the respondents, with 50% owning an e-commerce website, 70% utilizing online marketplaces, and 80% active on social media for business purposes. This shows that digital literacy was prevalent amongst the small retailers. This underscores the strategic emphasis on digital platforms for business operations and customer engagement. Additionally, financial aspects of cost which is related with upkeep and incorporating advancing technologies frequently had emerged as hinderances to embrace innovative e commerce tools in 50% of respondents. Lastly the geographic location of the businesses is evenly distributed among five major cities in India, ensuring a broad representation of the small retail sector across different urban centres.

Table 3 shows the reliability and validity assessments of the constructs used in the present research, which are pivotal in understanding the acceptance and usage of electronic-commerce strategies among small retail firms in India. The table is divided into five columns representing each construct's coefficient alpha measure, measure of its Composite Reliability along with values of Average Variance Extracted and the status of Discriminant Validity.

- Cronbach's Alpha values: The values of this measure are above the acceptable value of 0.7, for all variables which indicate sound internal consistency within the constructs. These values suggest that the survey items grouped under each construct reliably measure the same underlying concept. The acceptable threshold at 0.70 is widely accepted across many fields [42].
- Composite Reliability (CR) values exceed the suggested minimum of 0.7, with each construct demonstrating excellent internal consistency from a composite perspective. This further validates the constructs' reliability beyond what is indicated by coefficient alpha measure alone [43].
- Average Variance Extracted: The amount of variance that the construct extracts from its indicators is reflected by the AVE measure relative to the amount due to measurement error. The AVE values for all constructs surpass the 0.5 benchmark, indicating good convergent validity. This suggests that a significant proportion of the indicators' variance is accounted for by their respective constructs [44].
- Discriminant Validity is confirmed for all constructs, indicating that each construct is distinct and captures phenomena which other constructs fail to represent in the model. This was assessed through Heterotrait-Monotrait ratio, and the values were less than value 0.90 for all the variables as acceptable [45] and is shown in Table 4.

Table 3. Measurement Model Assessment for Variables

Variable	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)	Discriminant Validity
Technological Readiness	0.77	0.80	0.50	Confirmed
Market Orientation	0.79	0.84	0.56	
Customer Orientation	0.83	0.88	0.55	
Social Media Utilisation	0.86	0.89	0.57	
Digital Literacy	0.82	0.85	0.52	
Consumer Engagement	0.88	0.90	0.55	
Facilitating Conditions	0.76	0.79	0.51	
Behaviour Intention (Innovative Ecommerce Adoption)	0.75	0.78	0.58	

Source: Author's calculation

Table 4. Heterotrait-Monotrait ratio (HTMT) values

Digital Literacy	Facilitating Conditions	Social Media Utilisation	Customer Orientation	Market Orientation	Technological Readiness	Variable
3.66(0.821)	3.69(0.849)	3.92(0.939)	3.62(0.821)	2.96(1.560)	2.33(1.313)	Mean (SD)
0.535	0.539	0.117	0.231	0.504	0.000	Technological Readiness
0.414	0.558	0.052	0.138	0.000	0.000	Market Orientation
0.536	0.429	0.225	0.000	0.000	0.000	Customer Orientation
0.271	0.249	0.000	0.000	0.000	0.000	Social Media Utilisation
0.686	0.000	0.000	0.000	0.000	0.000	Facilitating Conditions
0.000	0.000	0.000	0.000	0.000	0.000	Digital Literacy
0.000	0.000	0.000	0.000	0.000	0.000	Consumer Engagement
0.000	0.000	0.000	0.000	0.000	0.000	Behaviour Intention of E-commerce Adoption

Source: Author's calculation

Consumer Engagement	2.60(0.506)	0.592	0.396	0.418	0.181	0.703	0.617	0.000	0.000
Behaviour Intention of E commerce	2.96(1.055)	0.658	0.561	0.312	0.211	0.877	0.627	0.665	0.000

The assessment detailed in Table 3 & Table 4 demonstrates that the measurement model employed in this study is robust, with constructs exhibiting high reliability and validity. This rigorous evaluation forms a solid foundation for the structural model analysis, ensuring the integrity and credibility of the findings derived from the subsequent analysis.

Table 5. Inner VIF

Predictor Construct	VIF
Technological Readiness	1.752
Market Orientation	2.056
Customer Orientation	1.329
Social Media Utilisation	1.156
Facilitating Conditions	1.071
Digital Literacy (mediator)	1.481
Consumer Engagement (mediator)	1.381

Source: Author’s calculation

Prior to finding the path coefficients, the model collinearity concerns were checked through the inner VIF, which were values found to be within the range recommended

i.e. less than 3 (Table 5), thus showing absence of any collinearity concerns [46]. Alongside, the SRMR value was at 0.070 which was less than threshold value of 0.08 as suggested by Hair as mentioned earlier [45] showing the model fits the data adequately. The values of R^2 and Q^2 for mediating and dependent constructs were calculated. The R^2 values showed a moderate impact on digital literacy ($R^2 = 0.561$), consumer engagement ($R^2 = 0.626$) and behaviour intention ($R^2=0.642$). In the blindfolding method using Stone-Geisser Q^2 to find out the predictive relevance of the said framed model for each endogenous construct, the values of the variables were found to be greater than 0, thus it fulfilled the cross-validation criterion of the predicting power of the mediating and dependent variables. For digital literacy ($Q^2=0.267$) and consumer engagement ($Q^2=0.296$) it showed medium predictive relevance and for behaviour intention ($Q^2=0.38$) was found to indicate high predictive relevance based on the values calculated. Fig 2 shows the path diagram for predicting the direct and indirect effects on behaviour intention of small business owners in ae commerce adoption.

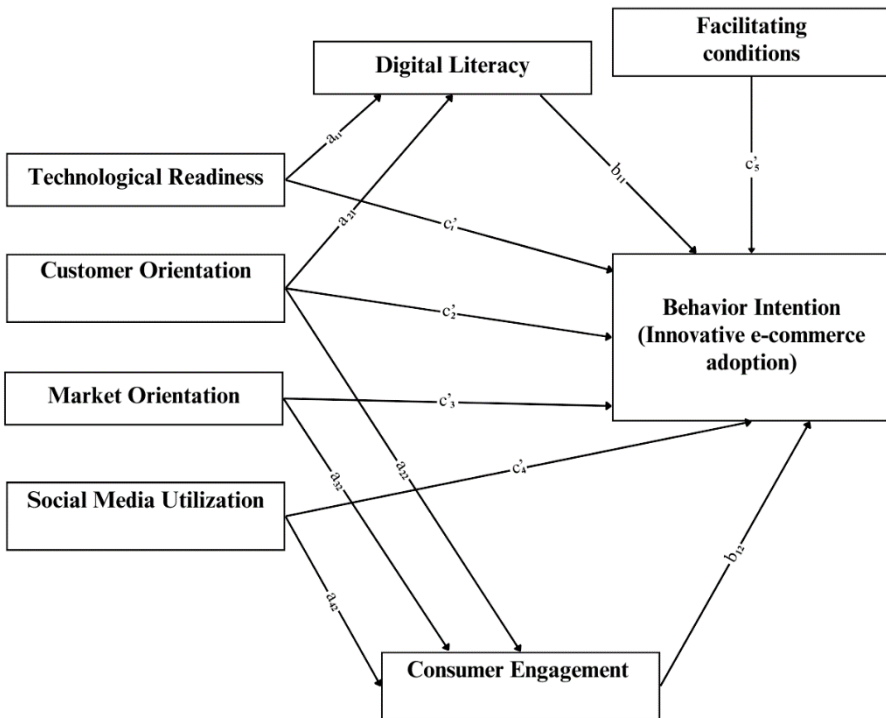


Fig. 2. Structural Equation Modelling (SEM) Path Diagram for Predicting the Direct and Indirect Effect of Ecommerce Adoption

Source: Author’s Calculations

Table 6. SEM Analysis Results on E-commerce Adoption Factors

Path	Path Coefficient (β)		
	Indirect Effect	Direct Effect	Total Effect
Technological Readiness → Digital Literacy Digital Literacy → BI E-commerce Technological readiness → BI E-commerce	0.182* 0.204** -	0.154**	0.191**
Customer Orientation → Digital Literacy Digital Literacy → BI E-commerce Customer Orientation → Consumer Engagement Consumer Engagement → BI E-commerce Customer Orientation → BI E-commerce Innovation Adoption	0.212** 0.204** 0.243** 0.167** -	0.111**	0.583**
Market Orientation → Consumer Engagement Consumer Engagement → BI E-commerce Market Orientation → BI E-commerce Innovation Adoption	0.125* 0.16** -	0.082*	0.102*
Social Media Utilization → Consumer Engagement Consumer Engagement → BI E-commerce Social Media Utilization → BI E-commerce Innovation Adoption	0.478*** 0.167** -	0.255***	1.034***
Facilitating Conditions → BI E-commerce Innovation Adoption	-	0.156***	0.156***

Source: Calculations by author, Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7. Testing of Hypothesis

Hypothesis	Relationship	Original Sample(β)	Std Error	T value	P value	Supported
H1	Technological readiness->Behaviour Intention of innovative e commerce adoption (DO)	0.154	0.036	4.277	.000**	Yes
H2	Market orientation-> Behaviour Intention of innovative e commerce adoption (DO)	0.082	0.033	2.484	.001**	Yes
H3	Customer orientation-> Behaviour Intention of innovative e commerce adoption (DO)	0.111	0.013	8.538	.000**	Yes
H4	SMU-> Behaviour Intention of innovative e commerce adoption (DO)	0.255	0.030	8.500	.000***	Yes
H5	Facilitating Conditions-> Behaviour Intention of innovative e commerce adoption (DO)	0.156	0.012	13.000	.000***	Yes
H6a	Technological Readiness>Digital Literacy-> Behaviour Intention of innovative e commerce adoption (IO)	.0371	0.030	12.36	.000**	Yes
H6b	Customer Orientation->Digital Literacy-> Behaviour Intention of innovative e commerce adoption (IO)	.0432	0.017	2.541	.000**	Yes

H7a	Customer Orientation->Consumer Engagement-> Behaviour Intention of innovative e commerce adoption (IO)	0.0405	0.011	3.681	.003***	Yes
H7b	Market Orientation->Consumer Engagement-> Behaviour Intention of innovative e commerce adoption (IO)	0.0208	0.017	1.223	.021**	Yes
H7c	Social media Utilisation->Consumer Engagement-> Behaviour Intention of innovative e commerce adoption (IO)	0.0779	0.012	6.491	.000***	Yes

Source: Calculations by author, Note: *p < 0.05, **p < 0.01, ***p < 0.001, DO: Direct Only, IO: Indirect Only

Table 5 provides an overview of the updated and extended results from the SEM analysis exploring the factors affecting e-commerce adoption among small retail enterprises. This expanded analysis incorporates additional constructs and examines both direct and indirect relationships, as well as interaction effects, to provide a more comprehensive understanding of the dynamics influencing e-commerce adoption. Method of bootstrapping was used to test the path coefficients significance with 5000 sub samples at confidence level of ninety- five percent. According to research [47], bootstrapping is a resampling method that offers robust estimates of standard errors and confidence intervals, aiding in the evaluation of the reliability of the PLS-SEM results. The statistical significance of the model's path coefficients, indirect effects, and total effects can all be assessed using this method. Table 7 statistics support the framed hypothesis very well.

5.1 Technological Readiness and Digital Literacy Interaction

The interaction between technological readiness and digital literacy significantly impacts innovation adoption, with a total effect (path coefficient) of 0.191, p<0.01. Technological readiness influences behaviour intention directly with $\beta=0.154$, significant at p<0.01, t value at 4.27 and indirect effect with mediation of digital literacy is 0.371, p<0.01, t value 12.36. The high t value shows the effect is statistically significant. H1 and H6a are supported.

- **Influence of Customer Orientation:** Customer orientation significantly influences both digital literacy and consumer engagement, with path coefficients of 0.21 and 0.24, respectively. Significant at less than 0.01 significance level these results highlight the foundational role of customer-centric values in enhancing digital competencies and engagement strategies, underlining the strategic value of aligning business practices with customer needs and preferences. Additionally, with the mediating influence of digital literacy and consumer engagement, the customer orientation shows a total effect of $\beta = 0.583$ at .01 sign showing the influence of improved customer orientation strategies exerting a positive influence on the behaviour intention of adopting advancing e commerce tools by small business owners. Hence H3 and H6b and H7a are supported.
- **Social Media Utilization:** The strongest effect on consumer engagement comes from social media utilization ($\beta = 0.47$), signifying the critical role of social media platforms in engaging customers. Moreover, social media utilization directly and with mediation of consumer engagement influences e-commerce adoption, with coefficients of 0.25 and 1.034, at $p < 0.001$ sign respectively. This indicates that social media is an important factor that facilitates the behaviour intention of adopting innovative e-commerce tools by small retailers, with the support enhanced levels of consumer engagement. The indirect effect signifies that social media utilization influences e-commerce adoption through its impact on consumer engagement. Hence H4 and H7c are supported.
- **Market Orientation:** It influences consumer engagement with a β of 0.12 and a p-value of 0.05. Additionally, it exerts a small direct effect at $\beta = 0.08$ and total effect $\beta = 0.102$, significant at $p < 0.05$. Hence H2 and H7b are supported.
- **Facilitating Conditions:** It has a significant, effect with a $\beta = 0.15$, $p < 0.001$. This signifies that role and support of government policies and infrastructure assistance can go a long way in promoting this trend. Hence H5 is supported.

Additionally, the direct paths from Digital Literacy (DL) to behaviour intention of adopting e commerce Adoption is $\beta = 0.20$, $p < 0.01$ and from Consumer Engagement to E-commerce Adoption $\beta = 0.16$, $p < 0.01$ which suggest an influence under their mediated impact in the model.

6 Interpretation and Discussion of Results

The SEM analysis sheds light on the intricate adoption characteristics of electronic commerce avenues by small retail businesses in India, revealing key insights into the roles of digital literacy, consumer engagement, technological readiness, and social media utilization.

- **Digital Literacy and Technological Readiness:** The positive interaction between digital literacy and technological readiness ($\beta = 0.182$, $p = 0.05$) suggests that businesses

with higher levels of technological infrastructure and readiness can leverage digital literacy more effectively to foster innovation and e-commerce adoption. This finding aligns with Patel & Chatterjee [13] as previously mentioned, who highlight the essential role of digital literacy in enriching the e-commerce capabilities of small businesses, especially when supported by adequate technological infrastructure. The synergistic effect observed underscores the importance of not just individual digital skills but also the broader technological ecosystem in which these businesses operate.

- **Customer Orientation:** The direct effects of customer orientation on digital literacy ($\beta=0.21$, $p=0.01$) and consumer engagement ($\beta=0.24$, $p<0.001$) emphasize the strategic value of adopting a customer-centric approach. This is consistent with the work of Nuseir [18] as mentioned earlier, who contended that improving engagement in the digital sphere and building digital competencies require customer-oriented approach. This study extends this argument by quantifying the influence of customer orientation on key factors that drive e-commerce success, highlighting its pivotal role in the digital transformation of small retail enterprises.
- **Market Orientation:** It has a smaller, yet significant, effect with a β of 0.12 and a p-value of 0.05 on consumer engagement. Direct effect at $\beta=0.08$ and total effect on behaviour intention of business owners is $\beta=0.09$, $p<0.05$. This indicates the benefit associated with harnessing the impact of market orientation indicators like market intelligence, competitor awareness etc. to alleviate the e-commerce adoption intention of business owners ultimately leading to its successful integration within the business strategy.
- **Facilitating Conditions:** This represents the direct effect of facilitating conditions of government support, infrastructure, training etc. on the behaviour intention of small business owners and managers in adopting innovative e-commerce practices. It has a smaller, yet significant, effect with a β of 0.15 and a p-value of 0.001. This signifies that role and support of government policies and infrastructure assistance can go a long way in promoting this trend.
- **Social Media Utilization:** The strong social media utilization's direct impact on the engagement of consumers (beta coefficient=0.47 and p value <0.001) and its significant influence on e-commerce adoption both directly and indirectly through consumer engagement, support the expanding research literature on the centrality of social media in contemporary business strategies. Additionally, as mentioned earlier [33], research underscore the transformative role of social media on engagement of the consumers and electronic-commerce adoption. The current study's findings affirm and extend this perspective by quantifying the direct and mediated impacts of social media utilization on e-commerce adoption, underscoring the importance of integrating social media into the e-commerce strategies of small retail enterprises.

- Digital literacy and Consumer engagement mediate well between the various variables affecting the behaviour intention of willingness to accept and use innovative e-commerce tools, while also having a direct path leading in the direction of Behaviour intention of small business owners for electronic-commerce adoption. This highlights the strong presence of this component in the electronic-commerce context.

In summary, the study depicts a complex interplay of factors that contribute to the adoption of e-commerce, highlighting the importance of technological readiness, customer orientation, market orientation, and particularly the utilization of social media and the environmental impact generated by the facilitating conditions. It elucidates the significant mediating aspect of digital literacy and customer engagement in influencing the contribution of these factors. In the current study's context, digital literacy is not about just having knowledge about digital tools, but the ability to harness it well for commercial purpose. Integrating SEO's, drop shipping, fraud prevention, personalised engines, and augment reality into the everyday business of small business owners, substantially enhancing the experience of the consumers and generating sales.

7 Implications

The study has significant implications for theory and as well as for practice which can be executed by policy makers.

7.1 Theoretical implications

The direct effects of customer orientation on digital literacy and consumer engagement extend the theoretical understanding of how a customer-centric approach influences digital competencies and engagement. This supports and expands upon theories posited as mentioned earlier [15], providing empirical evidence that customer orientation is crucial for developing digital capabilities and fostering engagement in the e-commerce context. It also validates the role of social media influence on behaviour intention of small business owners in their e-commerce adoption both directly and indirectly through consumer engagement, which validates and extends existing theories regarding the role of social media in modern business strategies. This application of this understanding can lead to increased customer satisfaction and loyalty, as businesses become more responsive to consumer needs and preferences in the e-commerce landscape.

7.2 Technological Implications

The positive influence of technological readiness on digital literacy highlights the need of business to focus on both aspects to reap benefits, which can be achieved by keeping the employees upskilled with the evolving new age tools. The study underscores the significant influence of contemporary social media on behaviour intention of e-commerce adoption. Small Businesses can harness this interaction and potential of social

media platforms by adopting latest technology tools like AI powered chatbots, personalisation engines, augmented reality to enhance consumer engagement and drive innovative e-commerce strategies.

7.3 Policy Implications

Policymakers should readily support, promote, and organise digital literacy initiatives focussed at small retail enterprises. Working on promoting digital skills enhancement alongside technological readiness, can give impetus to innovation and adoption of electronic-commerce strategies, as indicated by the interaction effect. Additionally, financial support for setting up technological infrastructure, particularly for small businesses, is pertinent. Furthermore, providing subsidised training programmes and technical support services to assist the small business houses in readily adopting the current trends. Policies that focus on building such support networks and infrastructure can boost the rewards of digital literacy while establishing a culture that is favourable for the successful acceptance and use of electronic commerce in a digital world that is perpetually evolving.

8 Conclusion

With the digital influx in the retail sector, small retail businesses are confronted with new opportunities and as well as challenges which has intensified competition in the market. According to the study's findings, digital literacy and consumer engagement play critical mediating roles in the adoption of e-commerce approaches by small retailers, who are largely influenced by their technology readiness, market and customer orientation, and social media usage. The research results align with earlier studies on the subject that highlight the ability of social media platforms to increase customer engagement as extensively cited in this study and state that technological preparedness and customer orientation drive the level of digital literacy which in turn determines the intention of small retail businesses to implement innovations related to e-commerce. Higher levels of digital literacy and active customer involvement enable retailers to better take advantage of these facets, thereby encouraging the adoption of e-commerce. The study offers fresh perspectives on the combined impact of customer orientation and technological preparedness on digital literacy, as well as the complex influences of social media on behaviour intentions to adopt the advantages of advanced e-commerce. Lastly, facilitating conditions like infrastructure and training are enabling factors that directly influence the adoption process by helping merchants get over impediments as well as enhance the entire adoption process.

9 Future Research

Many different dimensions on innovative e-commerce adoption by small business houses can be delved into. New age business models in the e-commerce context like

omni channels, subscription models and collaborative commerce, in the small business e-commerce scenario can be studied. How business owners in smaller cities of India are responding to the fast-paced advancements in the e-commerce space and the impact on their digital learning and future expansion is another area to be explored. Additionally, future researchers can consider exploring the model of the current study through a longitudinal study. Furthermore, investigating the moderating influence of digital literacy in the model can be assessed. Lastly, future research can be conducted by applying the model in other business contexts which will enhance its external validity.

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