

# Evaluating the Influence of Organizational Learning on E-Commerce Acceptance among Small and Medium Enterprise Practitioners: A Pilot Test

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## Abstract

This study investigates the factors influencing the adoption of e-commerce technologies among Small and Medium-sized Enterprises (SMEs) in Xi'an, China, emphasizing the role of organizational learning, information culture, and advancements in digital technologies such as blockchain and artificial intelligence (AI). Through a comprehensive literature review and quantitative analysis, the research highlights the critical impact of technological readiness, organizational culture, and strategic digital integration on e-commerce adoption. The COVID-19 pandemic's challenges and opportunities for digital marketing and e-commerce are also examined, revealing their essential role in sustaining SME performance during such unprecedented times. Employing Structural Equation Modeling (SEM) for data analysis, the study conducts a detailed psychometric assessment to ensure the reliability and validity of the constructs involved. This multi-phase methodology includes pilot testing to refine measurement instruments, followed by an in-depth examination of internal consistency, discriminant validity, and model fit. The findings reveal high construct reliability, satisfactory Average Variance Extracted (AVE) levels, and good discriminant validity, affirming the theoretical distinctions between constructs. Despite minor deviations from ideal benchmarks, the model demonstrates an acceptable fit, suggesting its adequacy in representing the complexities of e-commerce adoption among SMEs.

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By providing a holistic view of the e-commerce adoption landscape, this study offers valuable insights for SMEs to assess their readiness, understand the cultural and technological dynamics, and leverage advanced technologies for strategic planning and implementation. This research contributes significantly to the literature on e-commerce adoption in SMEs and presents practical implications for enhancing their competitive edge in the global marketplace.

**Keywords:** E-commerce adoption; SMEs in China; Organizational learning; Digital technology advancements; Structural Equation Modeling (SEM).

## **1. Introduction**

Adoption of e-commerce technologies in small and medium enterprises (SMEs) has been heavily influenced by several factors, including information culture and advanced technologies like blockchain and artificial intelligence (AI). These factors determine the pace of adoption, effectiveness, and sustainability of e-commerce solutions in SMEs. Each study offers valuable insights into the many aspects of e-commerce adoption among SMEs, emphasizing the importance of technological readiness, organizational culture, and strategic integration of digital solutions. By applying the research findings and addressing the identified gaps, SMEs can better navigate the complexities of e-commerce adoption and leverage digital technologies to enhance their competitive edge in the global marketplace. The COVID-19 pandemic presented unique challenges and opportunities for MSMEs in terms of digital marketing and e-commerce adoption. The author [1] assessed the impact of these factors on the financial and sustainability performance of MSMEs during the pandemic. The study showed that e-commerce and digital marketing have been crucial in maintaining and enhancing MSME performance during these challenging times.

The author [2] conducted a study to explore the impact of information culture on e-commerce adoption. The study suggested that higher e-commerce adoption levels positively correlate with strong information culture in SMEs. The study also provided a diagnostic tool for SMEs to assess their readiness and capability for e-commerce adoption using Structural Equation Modeling (SEM). It emphasized the need for SMEs to understand the cultural factors that strongly predict e-commerce adoption.

The author [3] conducted further research to investigate the combined effect of digital literacy and e-commerce adoption on SME performance. The study highlighted the importance of the Online to Offline (O2O) model and revealed a strong association between digital literacy, e-commerce adoption, and improved SME performance. The study emphasized the need for integrated strategies that combine digital literacy with e-commerce to enhance performance.

The author [4] delved into how e-commerce adoption and entrepreneurship orientation impact the efficiency and marketing capabilities of micro, small, and medium enterprises (MSMEs) in Indonesia. The study concluded that e-commerce adoption significantly boosts marketing capabilities and overall efficiency, providing a framework for enhancing marketing strategies through e-commerce among Indonesian MSMEs.

The author [5] examined the role of organizational culture in the adoption of B2B e-commerce, with a focus on

manufacturing SMEs. The study conducted a pilot test to determine the reliability and acceptance of B2B e-commerce adoption models. The study indicated that organizational readiness and external pressures are key factors influencing the adoption of B2B e-commerce.

The author [6] explored the adoption of blockchain technology within the e-commerce sector. The study focused on customer adoption of Blockchain-Enabled E-commerce Platforms (BEEP) among second-hand small and medium apparel retailers. The study applied the Unified Theory of Acceptance and Use of Technology (UTAUT) model and found that customers' adoption of BEEP was significantly predicted by performance expectancy, effort expectancy, social influence, and facilitating conditions.

The author [7] outlined the IT factors affecting e-commerce adoption in SMEs in Sri Lanka. The study proposed a research agenda to develop a comprehensive understanding of these factors and aimed to bridge the gap in understanding e-commerce adoption barriers. The study employed the Technology Acceptance Model (TAM) as part of its methodology.

The author [8] assessed the acceptance of AI in e-commerce and identified key factors that influence consumer acceptance of AI technologies in the e-commerce sector. The study confirmed that perceived usefulness and perceived ease of use are significant predictors of AI technology acceptance in e-commerce.

The rapid advancement of e-commerce presents significant opportunities and challenges for SMEs in China. This study investigates the factors that influence SME practitioners' acceptance of e-commerce technologies in Xi'an, with a particular emphasis on the role of organizational learning. The research aims to provide insights into how organizational learning capabilities influence the adoption of e-commerce, potentially guiding SMEs in their strategic planning and implementation of e-commerce technologies.

In conclusion, the pilot study is critically important as it offers a holistic view of the e-commerce adoption landscape in SMEs, addressing technological, organizational, and environmental factors. By providing SMEs with the knowledge and tools to assess their readiness, understand the cultural and technological factors at play, and leverage advanced technologies, this research empowers SMEs to strategically plan and implement e-commerce solutions, ultimately enhancing their competitive edge in the global marketplace.

## **2. Methodology**

This study aimed at scrutinizing the reliability and validity of various constructs through detailed psychometric assessments alongside the utilization of Structural Equation Modeling (SEM). This multifaceted approach is meticulously organized into several distinct phases, commencing with pilot testing for the preliminary evaluation of constructs. This initial step is pivotal for refining the measurement instruments to ensure they precisely capture the intended constructs, thereby laying a solid foundation for the subsequent phases of the study.

Pilot testing serves as a critical juncture in the research methodology, facilitating the preliminary assessments necessary to establish the initial reliability and validity of the constructs under investigation. The significance of

this phase cannot be overstated, as it is essential for refining the measurement instruments to accurately reflect the constructs of interest. The author [9] exemplify this process through their discussion on employing SEM to assess the quality of observational data within marital interactions. They extend the traditional multitrait-multimethod approach to concurrently evaluate both reliability and validity within the same analytic framework, underscoring the integral role of pilot testing in the research methodology [9].

Following the completion of pilot testing, the methodology progresses to the data analysis and model assessment phase. This stage involves a deep dive into the data through SEM to explore the intricate relationships between the constructs and to evaluate the overall fit of the model. This comprehensive analysis encompasses the evaluation of causal hypotheses, the assessment of measurement error, and the examination of differential reliability and validity across various population groups. The author [10] shed light on the statistical theory underpinning SEM and its applicability to the assessment of reliability and validity, offering insightful examples from medical research to illustrate its practical applications [10]. Moreover, [11] introduce an alternative methodology for estimating reliability using SEM, which is preferred for its flexibility in accommodating nonlinearity between factors and item scores, further emphasizing the versatility and depth of SEM in research analysis.

The cumulative impact of employing such a structured approach to research methodology is the assurance of the findings' robustness and accuracy, which in turn, significantly contributes to the study's credibility and reliability. The rigorous evaluation of reliability and validity, paired with the comprehensive analysis facilitated by SEM, plays a pivotal role in bolstering the integrity and credibility of the research. Consequently, the adoption of a structured methodology that encompasses both psychometric assessments and SEM analysis is instrumental in ensuring the accuracy and robustness of the research findings, thereby enhancing the overall credibility and reliability of the study.

Figure 1 shows the flow chart of this study.

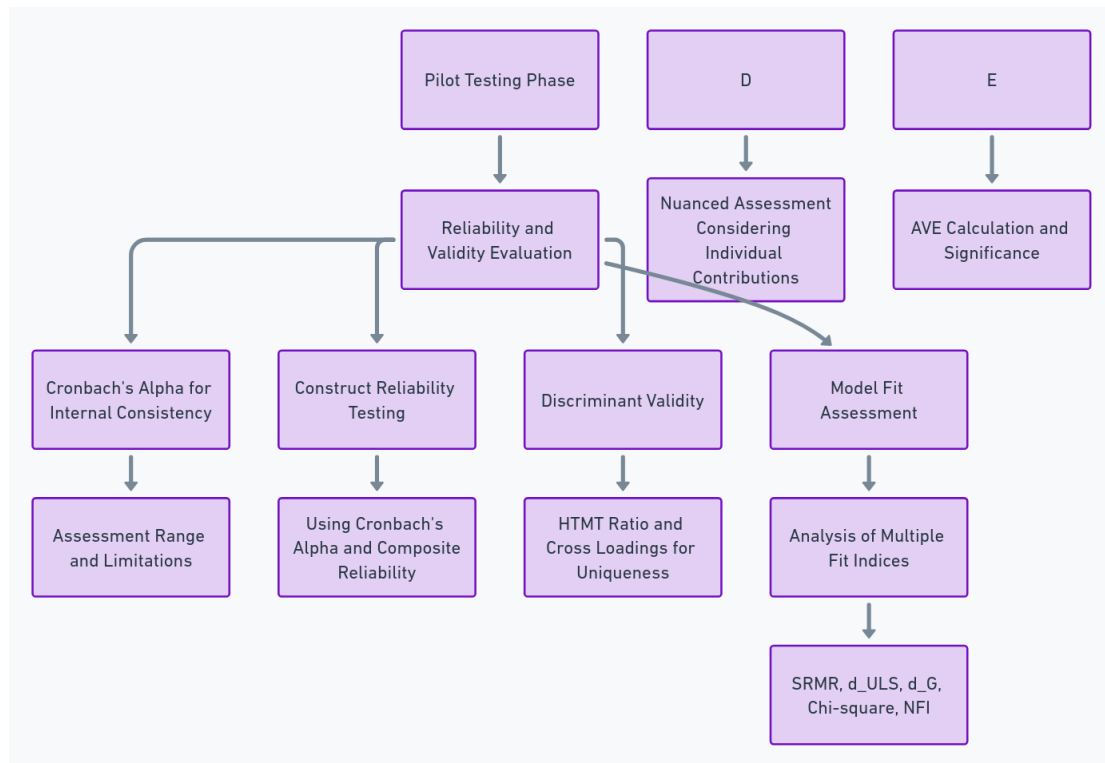


Figure 1

### 2.1 Pilot Testing

In the phase of pilot testing, the study meticulously evaluated the reliability and validity of its constructs by applying established psychometric methods. To measure the internal consistency, which indicates how closely related a set of items are as a group, Cronbach's Alpha was utilized. This statistical tool is essential in determining the degree of correlation among items within a construct, thereby assessing the construct's reliability. The evaluation was further enhanced by examining Composite Reliability ( $\rho_a$  and  $\rho_c$ ), which offers a more detailed look at internal consistency by accounting for individual item contributions to the overall construct. Additionally, the Average Variance Extracted (AVE) was used to determine the extent to which a construct captures variance from its indicators relative to the variance caused by measurement error, serving as a measure of convergent validity.

### 2.2 Data Analysis

This study evaluates the extent to which Small and Medium-sized Enterprises (SMEs) in Xi'an, China have adopted e-commerce technology using a quantitative survey as the primary data collection tool. The approach is recognized for its efficiency and effectiveness, making it ideal for quantifying variables and validating hypotheses.

The survey is designed to collect data on critical factors such as the culture of organizational learning, openness to organizational change, propensity for risk-taking, and the acceptance of e-commerce technology among SMEs. The survey employs a structured format, using Likert scales, multiple-choice questions, or ratings to

obtain measurable responses. This format enables straightforward quantification and statistical analysis of the data.

To ensure that the collected data is representative and applicable to the SMEs in Xi'an, China, the study employs random sampling. The sample size is determined with precision, considering statistical parameters like confidence levels and error margins to ensure reliable and valid results.

Various methods were considered for the delivery of the survey, including online platforms, telephone interviews, and direct meetings. Given the study's emphasis on digital technology and the prevalent shift towards online transactions, conducting the survey online is the optimal approach. Online surveys are advantageous due to their broad reach, cost savings, and ease of use for the research team and participants, allowing for efficient data collection from a wide range of SMEs in the specified region.

To achieve a strong response rate, which is vital for the study's credibility and the validity of its outcomes, strategies such as issuing follow-up reminders, providing participation incentives, and streamlining the survey process are implemented. A high level of participation is critical to minimizing biases and improving the quality of the collected data.

The collected data were analyzed using Structural Equation Modeling (SEM) to assess the relationships between constructs and to evaluate the model fit. Discriminant validity was assessed using the Heterotrait-Monotrait (HTMT) ratio, and model fit was evaluated using indices such as the Standardized Root Mean Square Residual (SRMR), Chi-square, and the Normed Fit Index (NFI).

### **3. Results**

#### ***3.1 Construct Reliability and Validity***

The assessment of construct reliability and validity is a critical step in psychometric testing and research investigations, with Cronbach's Alpha serving as a foundational measure of internal consistency. This metric evaluates the interconnectedness among a collection of items within a construct, calculating the average correlation among items and the collective number of items. While values exceeding 0.9 suggest excellent reliability, they may also imply redundancy. Values between 0.7 and 0.9 indicate strong reliability suitable for basic research, and those in the range of 0.6 to 0.7 are acceptable for exploratory studies. Scores below 0.6, however, signal poor reliability, necessitating adjustments.

Addressing Cronbach's Alpha's limitations, Composite Reliability, including rho\_a and rho\_c, provides a refined assessment of internal consistency by factoring in the varying contributions of individual items to a construct. Rho\_a calculates the mean of squared item loadings and error variances, ideal for uniform item loadings, whereas rho\_c sums up factor loadings and error variances, catering to diverse item loadings. Values above 0.7 for either indicate commendable reliability, presenting a more precise evaluation for constructs with varied item reliabilities. Table 1 shows the Cronbach's Alpha, Composite Reliability (rho\_a and rho\_c), and Average Variance Extracted (AVE).

**Table 1:** Cronbach's Alpha, Composite Reliability (rho\_a and rho\_c), and Average Variance Extracted (AVE)

<b>Construct</b>	<b>Cronbach's Alpha</b>	<b>Composite Reliability (rho_a)</b>	<b>Composite Reliability (rho_c)</b>	<b>Average Variance Extracted (AVE)</b>
AM	0.910	0.913	0.908	0.665
EA	0.945	0.946	0.945	0.773
OC	0.920	0.929	0.920	0.699
OLC	0.943	0.946	0.942	0.767
ORC	0.958	0.961	0.958	0.698
PDL	0.887	0.895	0.887	0.613
WTR	0.823	0.848	0.830	0.500

The results presented in Table 1 offer a comprehensive assessment of the internal consistency and reliability of various constructs measured in the study, utilizing Cronbach's Alpha, Composite Reliability (rho\_a and rho\_c), and Average Variance Extracted (AVE).

**Cronbach's Alpha:** All constructs show high Cronbach's Alpha values (>0.7), indicating strong internal consistency. The scores range from 0.823 for Willingness to Take Risks (WTR) to 0.958 for Organizational Risk Culture (ORC), suggesting that the items within each construct are highly correlated and reliable.

**Composite Reliability (rho\_a and rho\_c):** Both rho\_a and rho\_c values are above 0.7 across all constructs, affirming commendable reliability. This demonstrates that both uniform and diverse item loadings within constructs are effectively contributing to their internal consistency. The rho\_a and rho\_c values are closely aligned for each construct, further supporting the reliability of the constructs' measurement.

**Average Variance Extracted (AVE):** The AVE values, which indicate the proportion of variance captured by the construct relative to the variance due to measurement error, are above 0.5 for all constructs, with the highest being 0.773 for E-commerce Adoption (EA) and the lowest being 0.500 for Willingness to Take Risks (WTR). Values above 0.5 suggest that, on average, the constructs explain a majority of the variance in their indicators, signifying satisfactory convergent validity.

In summary, the internal consistency and reliability of the constructs are strong, as indicated by high values of Cronbach's Alpha, Composite Reliability (rho\_a and rho\_c), and satisfactory levels of AVE. This underscores the constructs' reliability and validity in measuring the respective phenomena within the study, providing a solid foundation for drawing conclusions from the data.

### **3.2 Discriminant Validity**

Discriminant validity, essential for ensuring a construct's uniqueness within a study, involves methods such as

Cross Loadings and the Heterotrait-Monotrait (HTMT) Ratio within Structural Equation Modeling (SEM) to ascertain each construct's distinctiveness. An item should load more significantly on its intended construct than on others, with HTMT values below 0.90 considered acceptable for affirming discriminant validity. The HTMT ratio matrix helps confirm that constructs are distinct and not excessively correlated, which is crucial for maintaining the model's theoretical integrity.

Table 2 presents the Heterotrait-Monotrait (HTMT) ratios within a Structural Equation Modeling (SEM) framework, assessing discriminant validity among various constructs and their interactions. Discriminant validity is crucial for ensuring that constructs are sufficiently distinct from one another in a model.

**Table 2: Heterotrait-Monotrait (HTMT) Matrix**

<b>Construct</b>	<b>A EA N</b>	<b>OC</b>	<b>OLC</b>	<b>ORC</b>	<b>PDL</b>	<b>WTR</b>	<b>OLC x AM</b>	<b>OLC x WTR</b>	<b>OLC x ORC</b>	<b>OLC x PDL</b>
<b>AM</b>	0.751	0.738	0.839	0.847	0.87	0.845	0.465	0.391	0.351	0.364
<b>EA</b>		0.718	0.845	0.860	0.905	0.751	0.447	0.457	0.491	0.440
<b>OC</b>			0.657	0.757	0.770	0.826	0.411	0.468	0.475	0.425
<b>OLC</b>				0.912	0.871	0.824	0.605	0.647	0.625	0.584
<b>ORC</b>					0.89	0.855	0.509	0.526	0.530	0.495
<b>PDL</b>						0.890	0.472	0.436	0.444	0.401
<b>WTR</b>							0.494	0.455	0.456	0.418
<b>OLC x AM</b>								0.893	0.884	0.874
<b>OLC x WTR</b>									0.858	0.849
<b>OLC x ORC</b>										0.879

The HTMT ratios are below the threshold of 0.90 across all constructs, indicating good discriminant validity. This suggests that each construct is sufficiently distinct from the others, supporting the theoretical distinctions between them. For instance, the HTMT ratios between constructs such as AM (Adoption Motivation) and EA (E-commerce Adoption), OC (Organizational Change), OLC (Organizational Learning Culture), ORC (Organizational Risk Culture), PDL (Perceived Difficulty Level), and WTR (Willingness to Take Risks) range from 0.718 to 0.890, all below the 0.90 threshold, affirming their distinctiveness.

Moreover, the interactions between OLC (Organizational Learning Culture) and other constructs (e.g., OLC x



AM, OLC x WTR, OLC x ORC, OLC x PDL) show HTMT values below 0.90, further indicating good discriminant validity. These interactions between OLC and other constructs like AM, WTR, ORC, and PDL have HTMT ratios ranging from 0.351 to 0.647, which are well below the threshold, reinforcing the constructs' distinctiveness within the model.

The HTMT ratios for the interactions within the constructs (OLC x AM, OLC x WTR, OLC x ORC) also remain below 0.90, signifying that these combined constructs maintain distinct conceptual identities, which is essential for the integrity of the structural model.

In summary, the HTMT ratios reported in Table 2 affirm the discriminant validity of the constructs and their interactions within the SEM framework, ensuring that they are distinct and theoretically justified. This supports the model's conceptual structure and its ability to accurately represent the relationships between constructs.

### **3.3 Model Fit**

In structural equation modeling, evaluating a model's fit involves examining various indices, each providing insights into different aspects of fit. The analysis reveals an SRMR value of 0.085, slightly above the preferred threshold of 0.08, indicating a minor deviation from the ideal fit but still within an acceptable range. The d\_ULS and d\_G indices, at 5.945 and 8.614 respectively, suggest a close approximation to an ideal fit, although without established cutoffs, their values imply an acceptable model fit. The Chi-square statistic is 2052.807, necessitating nuanced interpretation due to its sensitivity to sample size, which could otherwise suggest an inaccurate fit. Notably, the NFI stands at 0.900, indicating a substantially better fit compared to a null model and suggesting the model's overall adequacy despite the marginally high SRMR and Chi-square values.

This analysis underscores the importance of considering multiple fit indices to gain a comprehensive understanding of a model's performance. Although some values, like SRMR and Chi-square, slightly deviate from ideal benchmarks, the strong NFI and close-to-ideal d\_ULS and d\_G indices affirm the model's general suitability. It emphasizes the need for theoretical congruence alongside statistical measures, suggesting that a model can still be viable if it aligns with theoretical expectations and empirical evidence, even if minor statistical deviations exist. Further adjustments, grounded in theory and empirical findings, might enhance the model's fit and its ability to accurately represent the studied phenomena. Table 3 shows the model fit assessment.

**Table 3: Model Fit Analysis**

<b>Fit Index</b>	<b>Saturated Model</b>	<b>Estimated Model</b>
SRMR	0.085	0.085
d_ULS	5.963	5.945
d_G	8.568	8.614
Chi-square	2056.684	2052.807

#### **4. Discussion**

The pilot testing phase provided valuable insights into the reliability and validity of the constructs measuring factors influencing SME practitioners' acceptance of e-commerce in Xi'an. The strong performance of the Organizational Learning Capability construct highlights its potential importance in facilitating e-commerce adoption. The study underscores the need for SMEs to foster an environment conducive to learning and adaptability, facilitating the successful implementation of e-commerce technologies.

This extensive study delves into the adoption of e-commerce technologies by Small and Medium-sized Enterprises (SMEs) in Xi'an, China, through various lenses, including organizational learning, information culture, and technological advancements like blockchain and AI. The introduction highlights the pivotal role of technological readiness, organizational culture, and strategic digital integration in navigating the complexities of e-commerce adoption, especially under the challenging conditions posed by the COVID-19 pandemic. The study underscores the importance of e-commerce and digital marketing in sustaining SME performance during these times.

Subsequent research segments explore the impact of information culture on e-commerce adoption, the benefits of digital literacy, the significance of the Online to Offline (O2O) model, the influence of e-commerce adoption on marketing capabilities and efficiency, and the importance of organizational culture in the adoption of B2B e-commerce. Additionally, it assesses the customer adoption of Blockchain-Enabled E-commerce Platforms (BEEP) and identifies IT factors affecting e-commerce adoption in Sri Lankan SMEs. The acceptance of AI in e-commerce and its role in consumer acceptance in the e-commerce sector is also examined.

The methodology section outlines a structured approach to assess the reliability and validity of constructs using Structural Equation Modeling (SEM), starting with pilot testing to refine measurement instruments. This is crucial for establishing initial reliability and validity, further examined through detailed psychometric assessments and SEM analysis.

Results show strong construct reliability and validity, indicated by high Cronbach's Alpha values and Composite Reliability ( $\rho_a$  and  $\rho_c$ ), alongside satisfactory Average Variance Extracted (AVE) levels. Discriminant validity assessment through the Heterotrait-Monotrait (HTMT) ratios confirms the distinctiveness of constructs, ensuring their theoretical integrity. The model fit analysis, while showing slight deviations from ideal benchmarks, presents an overall acceptable fit, as evidenced by various fit indices.

In conclusion, the study offers a holistic view of e-commerce adoption in SMEs, addressing technological, organizational, and environmental factors. It equips SMEs with insights and tools for strategic e-commerce implementation, ultimately enhancing their competitive stance in the global marketplace.

#### **5. Conclusion**

This study's pilot testing phase confirmed the reliability and validity of constructs measuring the factors affecting e-commerce acceptance among SME practitioners in Xi'an, China. The findings emphasize the

significance of organizational learning in navigating the complexities of e-commerce adoption. Future research will extend these findings, offering deeper insights into how SMEs can leverage organizational learning to enhance e-commerce acceptance and integration into their business practices.

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