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Bridging the AI Adoption Gap: What Drives U.S. SME Owners' Willingness-to-Pay for Supply-Chain Risk Software?

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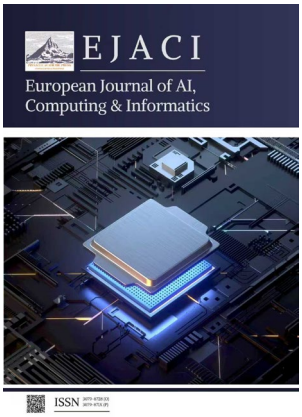

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Abstract: The application of artificial intelligence (AI) in supply chain risk management offers small and medium-sized enterprises (SMEs) opportunities to enhance early warning capabilities, improve compliance, and strengthen operational resilience. However, SMEs often face resource constraints and cognitive differences during technology adoption, and their willingness-to-pay (WTP) remains unclear. This study employs an online discrete choice experiment (N = 512) conducted in August–September 2024 to examine SME owners' decision-making regarding AI-enabled risk management software. The experiment incorporates attributes such as monthly fee, early-warning lead time, compliance module, and data localization option. A mixed logit model and latent class analysis are applied, followed by Bayesian post-estimation to derive optimal price ranges. Results indicate that risk sensitivity, technology adoption willingness, compliance awareness, and understanding of supply chain complexity are significant drivers of WTP. Distinct customer segments are identified: price-sensitive firms focus on subscription cost, whereas function-oriented firms value early-warning and compliance features. Analysis further shows that lower-revenue SMEs exhibit lower maximum acceptable prices compared to larger firms, yet their subscription appeal can be increased through tailored feature bundles. Based on these findings, the study proposes a tiered pricing strategy: an entry-level plan emphasizing core early-warning, a mid-tier plan adding compliance functions, and a premium plan including data localization. The study contributes by highlighting the role of behavioral and cognitive factors in SME pricing decisions and provides empirical guidance for the design and pricing of AI-based supply chain risk management software.

Keywords: willingness-to-pay (WTP); small and medium-sized enterprises (SMEs); supply chain risk management; artificial intelligence (AI) adoption; discrete choice experiment

1. Introduction

Artificial intelligence (AI) has emerged as a practical and transformative tool in supply chain risk management, offering firms concrete ways to improve operational resilience and decision-making. Modern supply chains face a variety of disruptions, including delays in raw material deliveries, sudden shifts in customer demand, and supplier failures. AI-enabled software systems help firms address these challenges by analyzing large volumes of operational data—such as inventory levels, production schedules, and supplier performance metrics—to identify patterns that indicate potential risks [1]. For instance, an SME using an AI platform might receive early alerts when a key supplier shows signs of delayed shipments, enabling the firm to adjust inventory levels or seek alternative sources before production is affected. Such proactive insights reduce downtime, avoid stockouts, and enhance overall efficiency. Beyond early-warning functions, AI tools can

support inventory optimization by predicting demand fluctuations and suggesting adjustments to stock levels across different locations. For example, a regional distributor could use AI to balance inventory between multiple warehouses, ensuring that high-demand areas are adequately supplied while minimizing excess stock in lower-demand regions. Similarly, AI can assist in workflow optimization by identifying bottlenecks in procurement or production processes, allowing managers to allocate resources more effectively and streamline operational procedures. These capabilities are particularly valuable for SMEs, which often operate with smaller teams and limited operational buffers, where even minor disruptions can have outsized impacts on revenue and customer satisfaction.

Despite these practical benefits, SMEs face substantial adoption challenges. Limited financial resources mean that investment in AI-enabled software represents a significant decision, with ongoing subscription fees, integration costs, and potential staff training requirements all contributing to the perceived burden [2]. Moreover, SMEs may lack in-house technical expertise to deploy and maintain AI systems effectively, increasing uncertainty about the real-world returns on investment. Managerial perceptions and cognitive differences further influence adoption decisions. SME owners vary in how they evaluate risk: some may underestimate the probability or impact of supply chain disruptions, while others may overemphasize compliance or operational efficiency relative to cost. Similarly, their understanding of AI capabilities ranges from highly informed to cautious skepticism, affecting how they perceive the value of predictive alerts, compliance modules, or data management features. These differences create significant heterogeneity in willingness-to-pay (WTP), with some firms willing to invest in comprehensive software packages and others only considering basic or low-cost solutions.

Given these realities, this study addresses the following research question: Which behavioral and cognitive factors significantly influence SME owners' maximum acceptable price for AI-enabled supply chain risk management software? [3]. Understanding these factors is critical for both theoretical and practical reasons. From a theoretical perspective, the research extends existing models of SME technology adoption by incorporating behavioral dimensions, such as risk sensitivity and technology openness, and cognitive factors, such as awareness of supply chain complexity and compliance requirements, into pricing decision frameworks. From a practical perspective, insights from this study enable software providers to design tiered subscription plans and feature packages that reflect SME heterogeneity. For example, providers can offer entry-level plans with essential early-warning functionality for highly cost-sensitive SMEs, while premium plans with advanced analytics, compliance modules, and data management options cater to firms with higher WTP and more complex operational needs. By aligning product offerings with actual SME priorities and financial constraints, providers can enhance adoption rates, improve customer satisfaction, and support SMEs in achieving more resilient and efficient supply chains.

2. Research Design and Data

To understand SME owners' willingness-to-pay (WTP) for AI-enabled supply chain risk management software, this study employed a discrete choice experiment (DCE) conducted online between August and September 2024. A total of 512 SME owners participated, with careful regional quota sampling to ensure that the sample reflected the geographical distribution and industry composition of SMEs across the country. This approach helped capture realistic variations in decision-making that may arise from different operational environments, such as logistics infrastructure, regional supplier networks, and market demands.

The DCE method is particularly suitable for this study because it allows respondents to make choices between hypothetical software packages that vary systematically in attributes, simulating the trade-offs SME owners face when considering subscription-based

AI solutions. By presenting multiple scenarios, the experiment captures the implicit valuation of each feature while accounting for the influence of subscription cost. This approach goes beyond simply asking for a preferred price, as it reflects realistic decision-making under constrained budgets and limited operational resources.

The software attributes included in the experiment were selected based on prior literature, industry consultation, and SME operational needs. They are as follows:

Monthly subscription fee – representing direct affordability and cost sensitivity, a key concern for SMEs with limited operating budgets. Lower-cost tiers were designed to be accessible to smaller firms, while higher-priced tiers incorporated advanced functionalities.

Early-warning lead time – measuring the predictive capability of the software. Longer lead times provide more opportunity to respond to potential disruptions, such as delayed shipments or supply shortages, which is especially critical for SMEs that may have limited inventory buffers.

Compliance module – supporting regulatory monitoring and risk mitigation. Many SMEs face industry-specific reporting requirements, and automated compliance features reduce the manual workload, minimize errors, and help maintain uninterrupted operations.

Data localization option – allowing firms to choose where sensitive data is stored. This feature is particularly relevant for SMEs that handle proprietary information, supplier contracts, or customer data, giving managers flexibility to control data security while complying with local regulations.

Participants were presented with multiple choice sets, each containing two or three hypothetical software packages differing in attribute levels. For example, one scenario might compare an entry-level plan with a shorter early-warning lead time and no compliance module at a lower cost, against a mid-tier plan with longer predictive lead time, a basic compliance module, and moderate subscription fees. Respondents were asked to select the package they would most likely adopt, forcing them to weigh the benefits of additional functionality against higher costs. By analyzing these choice patterns, the study quantified the marginal WTP for each attribute and the relative importance of price versus features.

For statistical analysis, a mixed Logit model was used to capture individual-level heterogeneity in preferences, recognizing that SME owners differ in risk perception, technology adoption experience, and budget constraints. The mixed Logit approach allows for random variation in coefficients across respondents, providing a more nuanced understanding of how different factors influence WTP.

In addition, a Latent Class model was applied to identify distinct customer segments. This method classified SMEs into groups with similar preference patterns, revealing clusters such as price-sensitive firms, function-focused adopters, and comprehensive users who value all software features. By distinguishing these segments, the analysis provided actionable insights for tiered pricing strategies and feature bundle design.

Finally, Bayesian post-estimation techniques were employed to determine the optimal price ranges for each identified segment. This approach uses posterior distributions to estimate the maximum acceptable subscription fees that balance affordability and feature value, taking into account uncertainty in individual preferences. The combination of mixed Logit, Latent Class, and Bayesian analysis ensures that the findings are both statistically robust and practically relevant, allowing software providers to tailor pricing strategies to the needs of different SME types while supporting broader adoption [4].

In sum, this research design integrates realistic decision scenarios, carefully chosen software attributes, and advanced statistical models to produce reliable estimates of SME owners' WTP. By grounding the experiment in operationally relevant choices—such as early-warning timing, compliance needs, and data control—the study captures the complexity of SME decision-making and provides a strong empirical foundation for designing subscription plans that align with actual market behavior.

3. Results Analysis

The analysis demonstrates that multiple behavioral and cognitive factors significantly influence SME owners' willingness-to-pay (WTP) for AI-enabled supply chain risk management software. Risk sensitivity—the extent to which an SME owner perceives potential disruptions in supply chains—was positively correlated with WTP, indicating that firms experiencing or anticipating frequent operational challenges are willing to invest more in preventive tools and are more likely to view such investments as essential rather than optional. Likewise, technology adoption willingness, reflecting managerial openness to digital innovations, increased the perceived value of software features, particularly predictive analytics and workflow optimization functions, since these tools can directly reduce manual errors and accelerate decision-making. Compliance awareness, defined as recognition of operational obligations and their potential costs, also had a meaningful effect, with SMEs that prioritize regulatory adherence showing higher WTP due to the perceived benefits of reducing penalties and improving reporting accuracy. Finally, understanding of supply chain complexity, including multiple suppliers, inventory nodes, and delivery schedules, shaped the valuation of early-warning lead times and data localization features, emphasizing the practical relevance of software functionality for sustaining operational continuity and building long-term resilience.

Latent class analysis identified three distinct SME segments with differing preference structures. Price-sensitive enterprises primarily evaluated subscription cost, demonstrating minimal interest in advanced features and often viewing software adoption as an unavoidable expense rather than a strategic investment. Function-focused firms valued early-warning and compliance capabilities most highly, appreciating their ability to reduce uncertainty and improve planning reliability. Comprehensive adopters considered all features—including data localization—to be critical and exhibited the highest WTP, reflecting a strategic mindset that views AI-enabled tools as integral to competitive advantage, customer trust, and future scalability.

Revenue size analysis further indicated that SMEs with annual revenue below $5 million generally reported lower maximum acceptable prices. However, adoption potential can be increased by designing feature bundles that combine early-warning functions with basic compliance modules, delivering perceived value without substantially increasing cost. Table 1 summarizes the WTP patterns across the identified segments and revenue categories.

Table 1. SME Payment Preferences by Segment.

SME Segment	Key Features Valued	Average WTP ($/month)	Typical Revenue Range ($M)
Price-sensitive	Minimal, cost-focused	120	<5
Function-focused	Early-warning, compliance	250	5–20
Comprehensive adopters	All features including data localization	400	>20

4. Pricing Strategy Recommendations

Based on the mixed Logit and Latent Class model estimates, supplemented by Bayesian post-estimation, a tiered pricing strategy is recommended to account for the heterogeneity of SME preferences and financial capabilities. The analysis suggests that a structured approach, offering entry-level, mid-tier, and premium plans, allows software providers to maximize adoption while matching price to perceived value.

The entry-level plan is specifically designed for highly price-sensitive SMEs, particularly those with annual revenue below $5 million. This plan focuses on core early-warning functionality, such as alerts for potential supplier delays or inventory shortages, while minimizing system complexity. By providing a low-cost option that addresses immediate

operational risks, this tier reduces financial barriers and encourages initial adoption. Small firms can gain practical benefits, such as preventing production delays or stockouts, without committing to advanced modules that may exceed their budgets.

The mid-tier plan extends the entry-level features by incorporating compliance modules, which automate regulatory reporting and risk mitigation processes. This plan targets SMEs that, while still cost-conscious, require additional operational assurance and legal compliance support. The mid-tier pricing balances affordability with enhanced functionality, making it suitable for firms that seek moderate investment in risk management while avoiding overpaying for features they may not immediately use.

The premium plan provides the full suite of features, including data localization, advanced predictive analytics, and comprehensive reporting tools. This option caters to SMEs with higher WTP, often those managing complex supplier networks or critical operational processes. Premium adopters benefit from enhanced operational control, faster response times to disruptions, and robust compliance oversight.

The tiered strategy not only addresses different willingness and ability-to-pay levels but also supports progressive adoption, allowing firms to start with a basic package and upgrade as operational complexity grows or risk awareness increases.

As shown in Table 2, the tiered structure aligns software functionality with SME operational needs and budget constraints. Providers can capture value from firms with advanced requirements while ensuring that smaller, resource-constrained SMEs can access essential risk management capabilities. By integrating pricing and functionality in this way, adoption barriers are minimized, and long-term customer relationships are supported through flexible, scalable subscription options.

Table 2. Tiered Pricing Strategy for SMEs.

Plan	Key Features	Target Revenue ($M)	Suggested Monthly Fee ($)
Entry-level	Core early-warning alerts	<5	120
Mid-tier	Early-warning + Compliance module	5–20	250
Premium	Full suite including data localization and advanced analytics	>20	400

5. Discussion

The findings hold both theoretical and practical implications. Theoretically, the study demonstrates that WTP among SMEs is influenced not only by financial considerations but also by behavioral and cognitive factors. Risk perception, technology adoption willingness, compliance awareness, and understanding of supply chain complexity independently affect pricing decisions, highlighting the importance of integrating non-financial dimensions into models of SME technology adoption.

From a practical perspective, the results guide software providers in designing subscription tiers and feature bundles. Entry-level tiers can reduce adoption barriers for budget-constrained SMEs, while mid-tier and premium offerings cater to more function-oriented or higher-WTP firms. Such differentiation enhances market coverage, strengthens long-term customer relationships, and allows providers to capture additional revenue streams.

Effective communication strategies are essential. Providers must clearly convey the value of software features, such as how early-warning capabilities reduce operational disruptions or how compliance modules save time and mitigate risk. Tailored messaging can reinforce perceived value, encouraging SMEs to adopt higher-tier plans [5].

Limitations include reliance on stated preferences rather than observed purchase behavior and potential differences between experimental scenarios and real-world adoption. Future research could combine DCE data with actual adoption patterns, explore industry-

specific variations, or examine longitudinal changes in WTP as SMEs gain familiarity with AI tools.

6. Conclusion

This study underscores the critical influence of behavioral and cognitive factors on SME owners' willingness-to-pay (WTP) for AI-enabled supply chain risk management software. Beyond financial constraints, factors such as risk sensitivity, which reflects how acutely managers perceive potential operational disruptions, technology adoption willingness, indicating openness to new digital tools, compliance awareness, and understanding of supply chain complexity significantly shape pricing decisions. These findings demonstrate that SME adoption behavior cannot be fully understood by cost considerations alone; managerial perceptions and cognitive evaluations of operational risk play equally important roles. Furthermore, revenue size remains a relevant determinant, with smaller SMEs generally exhibiting lower WTP, highlighting the need for pricing strategies that are sensitive to organizational scale.

Building on these insights, the study proposes a tiered pricing strategy—comprising entry-level, mid-tier, and premium plans—that aligns software functionality with SME preferences and financial capabilities. Entry-level plans provide essential early-warning functions for cost-sensitive firms, mid-tier plans incorporate compliance modules for firms requiring regulatory assurance, and premium plans deliver comprehensive features including data localization and advanced analytics for firms with higher WTP. This framework not only facilitates adoption among resource-constrained SMEs but also enables software providers to capture additional value from firms that prioritize advanced functionalities.

In practical terms, these findings guide software developers in designing feature bundles, subscription models, and communication strategies that reflect the diverse needs of SMEs. For example, emphasizing operational benefits such as early disruption detection or automated compliance reporting can increase perceived value and encourage adoption. Theoretically, the research contributes to SME technology adoption literature by integrating behavioral and cognitive dimensions into WTP analysis, offering a more nuanced understanding of how managerial perception interacts with financial considerations. Overall, this study provides both actionable guidance for practitioners and empirical evidence for scholars, supporting informed decision-making in the design, pricing, and dissemination of AI-enabled risk management solutions for SMEs.

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