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Factors Influencing the Readiness of Small Retail Stores in Guntur City to Adopt AI-Powered Inventory Management Systems: A Study Using Primary Survey Evidence and Secondary Literature

Raja Pavan ^a, N Devi Sreeja ^b

^a Assistant Professor, KL Business School, Koneru Lakshmaiah Education Foundation

^b Research Scholar, 3rd BBA – Business Analytics, Koneru Lakshmaiah Education Foundation

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ABSTRACT

This study examines factors associated with the readiness of small retail businesses in Guntur City to adopt AI-powered inventory management systems. The analysis combines a small primary survey dataset (20 usable responses) with a focused review of recent scholarly literature on AI adoption in small and medium-sized enterprises (SMEs), technology adoption, and AI-supported inventory management. The survey instrument covered AI awareness, digital skills, technological infrastructure, perceived ease of use, expected inventory benefits, affordability, financial readiness, organizational support, employee willingness, trust, adoption intention, and overall readiness. Descriptive results indicate moderate overall readiness: the mean score for overall readiness was 3.20 on a five-point scale, while willingness to adopt within two years averaged 2.75. Among the measured items, trust in AI-generated inventory recommendations had the highest mean (3.20), whereas infrastructure averaged 2.65. In the correlation analysis, cost affordability showed the strongest association with overall readiness ($r = 0.49$), followed by employee willingness ($r = 0.47$) and adoption intention ($r = 0.39$). Because the sample is small and non-probability based, these results are exploratory and are not presented as population estimates or causal findings. The study identifies affordability, employee capability, digital infrastructure, training, and trust as useful areas for a larger follow-up investigation.

Keywords: artificial intelligence; inventory management; small retail stores; technology adoption; organizational readiness; Guntur City; SMEs

1. Introduction

Artificial intelligence is increasingly being incorporated into business processes that depend on data, prediction, automation, and decision support. Inventory management is a particularly relevant application area because retailers must balance product availability against excess stock, wastage, and tied-up working capital. AI-enabled forecasting and decision-support tools can potentially assist with demand prediction, replenishment, and stock-level decisions. Recent research on AI-based inventory control reports potential benefits for forecasting, stockout reduction, and excess-inventory management, while also identifying data, integration, and implementation challenges ("Application of Reinforcement Learning to Improve Finished Goods Inventory Management," 2025).

For small retailers, however, the decision to adopt AI is unlikely to depend on technological capability alone. Small firms may have fewer financial resources, less specialized technical expertise, limited digital infrastructure, and greater sensitivity to implementation risk. A recent systematic review of AI in SMEs identified lack of knowledge, cost, and inadequate infrastructure among the most common implementation barriers (Oldemeyer et al., 2025). A 2026 systematic review likewise emphasizes organizational readiness, trust, perceived usefulness, ease of use, and resource constraints as recurring conditions in SME AI adoption (Landini & Machado, 2026).

This study therefore focuses on the local context of small retail businesses in Guntur City. Its purpose is to identify preliminary patterns in a small sample and to develop evidence-based variables for larger-scale research; the results are not intended as a definitive city-wide estimate.

1.1. Research problem

Although AI-enabled inventory tools may offer operational benefits, small retailers may hesitate to adopt them because of cost, limited knowledge, insufficient digital skills, weak infrastructure, employee readiness, uncertainty about trust, or lack of external support. There is limited local evidence on how these factors relate to readiness among small retailers in Guntur City.

1.2. Objectives

1. To assess the preliminary level of readiness of small retail stores in Guntur City to adopt AI-powered inventory management systems.
2. To examine descriptive patterns in AI awareness, digital skills, infrastructure, perceived usefulness, affordability, organizational support, employee willingness, trust, and adoption intention.
3. To identify preliminary factors that show stronger relationships with overall readiness in the dataset.
4. To use secondary literature to contextualize the local findings and refine a larger-scale research framework.

1.3. Research questions

RQ1. What is the preliminary level of readiness among the surveyed small retailers to adopt AI-powered inventory management?

RQ2. Which measured factors show stronger preliminary associations with overall readiness in the sample?

RQ3. What barriers and forms of support are most frequently reported by the surveyed respondents?

2. Review of Literature

The Technology–Organization–Environment (TOE) perspective (Tornatzky & Fleischer, 1990) provides a suitable structure for this study because it considers technological characteristics, organizational conditions, and environmental influences in technology adoption. Recent research applying TOE to AI adoption in SMEs shows that adoption is shaped by more than the availability of technology. Resource constraints, technical competence, managerial support, trust, and external support can affect whether firms move from awareness to implementation.

Oldemeyer et al.'s (2025) systematic review of AI in SMEs identified 27 implementation challenges and highlighted lack of knowledge, cost, and inadequate infrastructure as particularly recurring barriers. This directly supports the inclusion of digital skills, infrastructure, affordability, and training-related variables in the present survey instrument.

Landini and Machado's (2026) systematic review of 68 peer-reviewed studies further indicates that AI adoption in SMEs is associated with organizational readiness, trust, perceived usefulness, ease of use, and strategic alignment, while limited resources and technological complexity can constrain adoption. These findings support the present study's inclusion of trust, ease of use, expected inventory accuracy, and organizational readiness measures.

Research on small independent retailers also indicates that technology adoption can be affected by concerns about cost, integration, transparency, and practical fit with existing business processes (Chang et al., 2024). In inventory management specifically, recent work on AI and reinforcement learning indicates potential improvements in demand forecasting and inventory control, while data availability and integration remain practical barriers ("Application of Reinforcement Learning to Improve Finished Goods Inventory Management," 2025).

3. Conceptual Framework

The framework groups the questionnaire variables into three broad dimensions. The technological dimension covers digital skills, infrastructure, ease of use, expected inventory accuracy, and expected stock-control benefits. The organizational dimension covers affordability, financial readiness, management/support conditions, employee willingness, and trust. The outcome variable is overall readiness to adopt AI-powered inventory management, supported by adoption intention.

Table 1. Conceptual framework of the study

Dimension	Variables	Expected relationship with readiness
Technological	Digital skills; infrastructure; ease of use; inventory accuracy; stock control	Greater capability and perceived usefulness are expected to support readiness.
Organizational	Cost affordability; financial readiness; support; employee willingness; trust	Greater organizational capacity and confidence are expected to support readiness.
Adoption outcome	Adoption intention; overall readiness	Represents willingness and perceived preparedness to adopt.

4. Methodology

The study uses an exploratory design. Primary data were obtained through a structured questionnaire administered to small retail-business respondents. The dataset contains 20 completed usable responses. The sample is not a representative probability sample of all retailers in Guntur City, and the analysis is therefore treated as exploratory.

The questionnaire included respondent and business characteristics, current inventory practices, inventory problems, AI awareness, AI knowledge, and Likert-scale statements measuring technology, organizational, trust, adoption-intention, and overall-readiness constructs. Likert items were coded from 1 to 5, with higher values representing greater agreement/readiness on the relevant statement.

Analysis consisted of frequencies and percentages for categorical variables, means for Likert-scale items, and Pearson correlations between individual measured factors and overall readiness. Two exploratory internal-consistency coefficients were also calculated for groups of five related items. Because the sample is only 20, these reliability and correlation results are diagnostic rather than confirmatory.

4.1. Secondary-data component

Secondary evidence was drawn from recent peer-reviewed literature on AI adoption in SMEs, technology adoption frameworks, small-retailer technology adoption, and AI-supported inventory management. The secondary literature is used to establish the theoretical background and compare broad themes with the local evidence. It is not merged numerically with the 20 survey observations and no external statistics are represented as Guntur-specific survey results.

4.2. Ethical and data-integrity statement

The paper does not fabricate respondents, answers, or secondary observations. The source data file contains personal identifiers such as respondent names and email addresses; these identifiers are not reproduced in this paper. For journal submission, the researcher should retain the original consent documentation and follow the requirements of the institution and target journal concerning human-participant research, privacy, and ethics review (University Grants Commission [UGC], 2019).

5. Results

The dataset contains 20 usable responses. The sample includes 12 female and 8 male respondents.

Table 2. Respondent profile (n = 20)

Indicator	Category	n	%
Gender	Female	12	60.0
Gender	Male	8	40.0
AI awareness	Yes	15	75.0
AI awareness	No	5	25.0

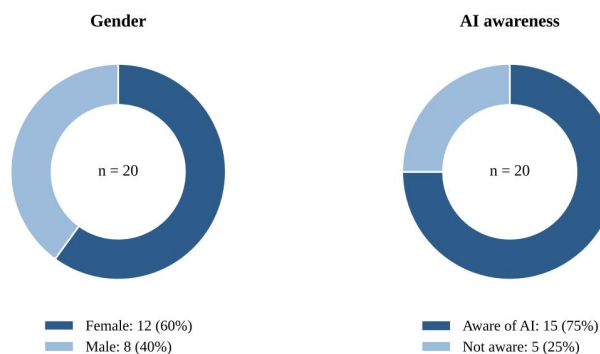


Figure 1. Profile of respondents by gender and AI awareness (n = 20).

5.1. Current inventory-management practices

Table 3. Current inventory-management practices

Method	n	%
Manual records	11	55.0
Excel	6	30.0
Inventory management software	2	10.0
Billing software	1	5.0

Manual records were the most common reported method (11 of 20 respondents), followed by Excel (6). Only three respondents reported using inventory management software or billing software. This suggests that the surveyed group largely operates with relatively basic inventory-management arrangements, although the result cannot be generalized to all Guntur retailers.

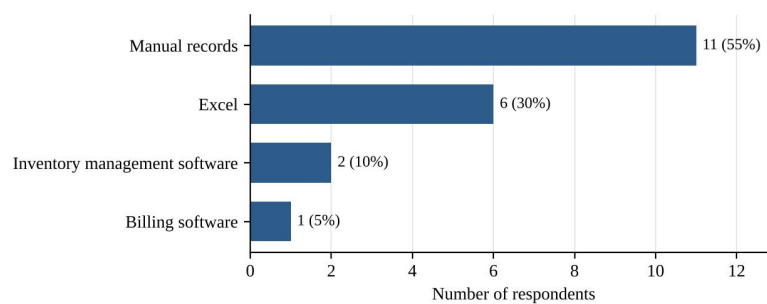


Figure 2. Current inventory-management practices among respondents (n = 20).

5.2. AI awareness and readiness indicators

Table 4. Mean scores of awareness and readiness indicators (scale 1–5)

Measure	Mean / 5
AI knowledge	3.00
Digital skills	2.75
Infrastructure	2.65
Ease of use	2.80
Accuracy	3.00
Stock control	3.05
Cost affordability	2.85
Financial readiness	2.85
Support	2.95
Employee willingness	2.95
Trust	3.20
Adoption intention	2.75
Overall readiness	3.20

The mean for overall readiness was 3.20. Trust in AI-generated inventory recommendations recorded the highest mean among the listed measures (3.20), while infrastructure was lower (2.65). Adoption intention averaged 2.75. These values indicate a mixed readiness profile rather than uniformly high or low readiness.

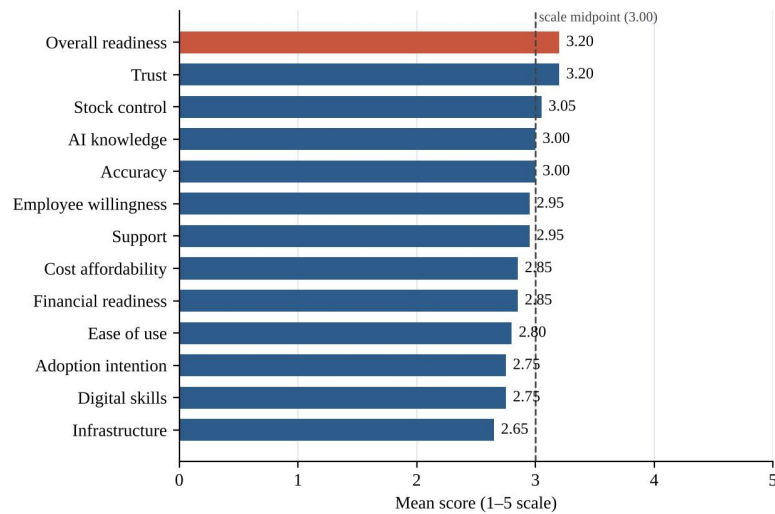


Figure 3. Mean scores on the five-point scale (n = 20). The dashed line marks the scale midpoint.

5.3. Preliminary association with overall readiness

Table 5. Pearson correlation of each factor with overall readiness

Factor	Pearson r with overall readiness
Cost affordability	0.49
Employee willingness	0.47
Adoption intention	0.39
Ease of use	0.33
Infrastructure	0.31
Accuracy	0.30
Stock control	0.29
Trust	0.28
Digital skills	0.27
AI knowledge	0.17
Financial readiness	0.17
Support	0.08

In this dataset, cost affordability had the strongest observed correlation with overall readiness ($r = 0.49$), followed by employee willingness ($r = 0.47$) and adoption intention ($r = 0.39$). These are sample associations only. They should not be interpreted as proof that changing a factor will cause readiness to change, especially given the very small sample size.

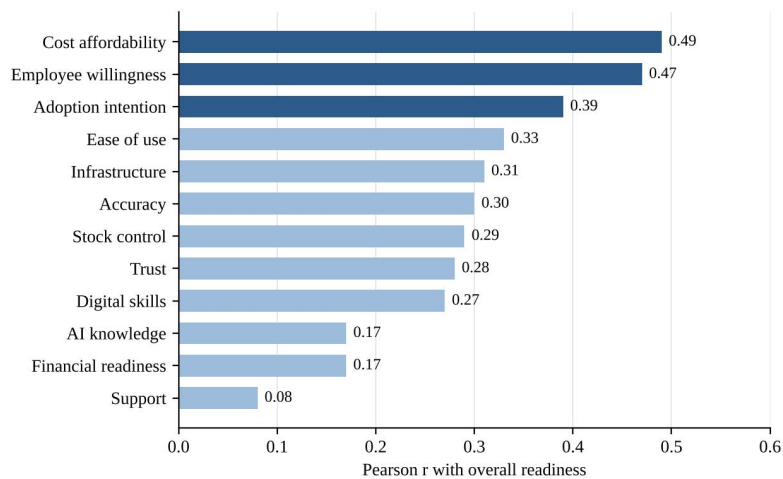


Figure 4. Pearson correlation of each factor with overall readiness (n = 20). These are sample associations only and do not indicate causation.

5.4. Reported barriers

Table 6. Challenges reported by respondents

Reported challenge	n	%
Lack of skilled employees	5	25.0
Data security concerns	4	20.0
Lack of knowledge	3	15.0
High cost	3	15.0
Other	3	15.0
No need for AI	1	5.0
Lack of internet	1	5.0

The most frequently selected challenge was lack of skilled employees (5 respondents), followed by data-security concerns (4), lack of knowledge (3), and high cost (3). The distribution reinforces the importance of human capability, trust/security, and affordability in a larger study.

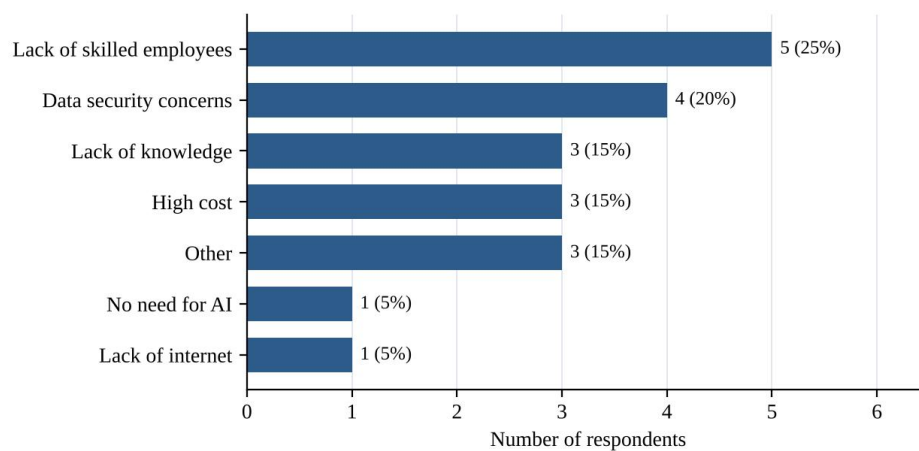


Figure 5. Challenges reported by respondents (n = 20).

5.5. Support requested by respondents

Table 7. Support themes requested by respondents

Support theme	Respondents mentioning theme	%
Training	10	50.0
Affordable software	9	45.0
Financial/government support	8	40.0
Ease-of-use	6	30.0
Technical support	5	25.0

Training was the most common support theme, mentioned by 10 of the 20 respondents (50%). Affordable software, financial/government support, ease-of-use features, and technical support were also mentioned. Because respondents could provide multiple forms of support in one answer, these theme counts overlap and should not be summed as mutually exclusive categories.

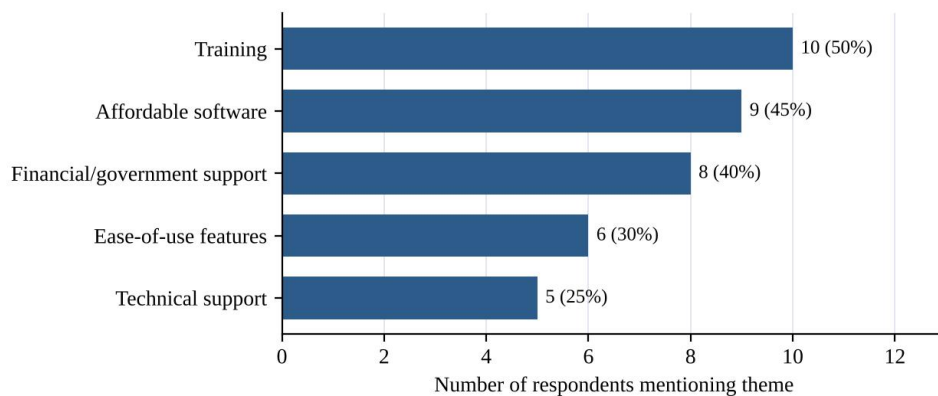


Figure 6. Support themes mentioned by respondents. Respondents could mention more than one theme, so percentages do not sum to 100.

5.6. Reliability diagnostics

Table 8. Exploratory reliability diagnostics

Item group	Items	Cronbach's alpha	Interpretation
Technological readiness	5	0.94	Exploratory diagnostic only
Organizational readiness	5	0.93	Exploratory diagnostic only

The reliability coefficients are included only as exploratory diagnostics. With $n = 20$, they should not be used to establish scale validity. A larger sample should be used for item analysis, construct validity, reliability confirmation, and—if justified—regression or structural-equation analysis.

6. Discussion

The evidence is broadly consistent with the secondary literature in showing that AI adoption by smaller businesses is multidimensional. The local responses suggest that retailers may recognize potential value in AI while still facing practical constraints related to cost, employee skills, infrastructure, and knowledge. This pattern aligns with the broader SME literature, where resource limitations, lack of knowledge, and technological readiness are repeatedly identified as barriers.

The strongest simple association was observed for cost affordability ($r = 0.49$). This should be interpreted cautiously, but it indicates that affordability deserves prominent treatment in the next stage of the research. Employee willingness also showed a comparatively strong association ($r = 0.47$), supporting the argument that adoption is not only a software-purchasing decision but also an organizational change process.

The relatively high mean for trust (3.20) compared with infrastructure (2.65) is noteworthy. It may indicate that some respondents are not fundamentally opposed to AI recommendations but may lack the technological conditions or practical capability required to implement them. This distinction is important because awareness or positive attitudes do not automatically translate into organizational readiness.

The current inventory-practice results also suggest a potential digital-transition pathway. Since many respondents reported manual records or Excel, future research could distinguish between basic digitization and AI adoption rather than treating them as the same stage. A retailer may first need digital sales/inventory records, reliable data, and employee training before advanced predictive tools become useful.

7. Implications

7.1. Implications for small retailers

Retailers considering AI inventory tools may benefit from beginning with narrowly defined problems such as stockout alerts, reorder suggestions, demand forecasting, or slow-moving inventory identification. The findings suggest that affordability, staff readiness, and practical training should be considered alongside the software itself.

7.2. Implications for technology providers

AI vendors serving small retailers may need low-cost packages, simple interfaces, onboarding support, transparent recommendations, and integration with existing billing or inventory records. Such features can reduce the gap between technological availability and practical adoption.

7.3. Implications for future support programmes

The responses indicate demand for training and financial or technical support. Future studies can examine whether retailer training, subsidized digital tools, local technology-support networks, or demonstrations change adoption intention and readiness over time.

8. Limitations

First, the dataset contains only 20 usable responses, which is too small for strong population-level inference. Second, the sampling approach is not documented as a probability sample, so sampling error and selection bias may be present. Third, all measures are self-reported. Fourth, the study measures perceived readiness rather than actual implementation outcomes. Fifth, the secondary literature is not specific to Guntur City and therefore provides contextual rather than local prevalence evidence. Finally, the current study does not establish causal relationships.

9. Conclusion

This study provides an initial evidence base on AI-inventory adoption readiness among a small group of retailers in Guntur City. The surveyed respondents reported moderate overall readiness (mean = 3.20/5), while the most prominent practical issues concerned employee skills, affordability, knowledge, data-security concerns, and access to training or other support. Cost affordability and employee willingness showed comparatively stronger associations with overall readiness in the data. These results are consistent with recent SME AI-adoption literature emphasizing organizational capability, resources, infrastructure, trust, and usability.

The next stage should expand the sample substantially across different retail categories and locations in Guntur City, use a transparent sampling procedure, validate the questionnaire, and conduct appropriately powered inferential analysis. The present paper is therefore best understood as an exploratory first step that establishes the direction of a larger research project.

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