

Use Of Ai Tools in Small Retail Businesses in Selected Areas of Jharkhand: A Primary Study of Operational Efficiency and Customer Engagement

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Abstract—There is a shift in the functioning of every sector due to the emergence of artificial intelligence and its tools. The swift transition of businesses from traditional methods to digitally advanced tools has become a necessity. Initially, these tools were used for the pure purpose of competition in the market, but with time, it is used for the proper and timely functioning of the business. There are areas like Jharkhand where big businesses have adopted the new technology over time, but there are small businesses that struggle with the same. Many socio-economic factors contribute to the situation and limit their potential. This primary study focuses on those businesses and considers areas like inventory management, asset upgradation- finding ways to make the process smooth and efficient. This also studies the effect of AI tools on customers and how it affects them. Customer retention and identifying potential customers can be a major part. This paper studies the impact and utilisation of AI tools ranging from automated programmed systems managing inventory and demand forecasting to AI-driven Customer Relationship Management (CRM) systems. The objective of this study is to evaluate all the data procured through following several existing works in this field, and structured questionnaire interviews to conclude findings for two dimensions: operational efficiency and customer engagement. The findings suggest that while traditional methods can be difficult to let go of, several digital tools help small retailers too. For instance, WhatsApp messaging-based marketing bots are used to keep track of several things at a time, reducing human errors and speeding the process of supply chain logistics. This explores how personalised AI tools function better for their businesses. During the study, many challenges are also identified, such as initial costs, skill gaps among shopkeepers, adoption challenges, etc. The findings aim to provide a roadmap to actually help tackle micro businesses or enterprises with all the above-mentioned challenges and bridge the gap involving majorly technology through AI tools.

Index Terms—Artificial Intelligence, Small Retailers, Jharkhand, Operational Efficiency, Customer Engagement, Digital Transformation

I. INTRODUCTION TO ARTIFICIAL INTELLIGENCE

Just as the brain is for humans, artificial intelligence (AI) is for computers. Initially, the term ‘Artificial Intelligence (AI)’ was more of an idea among scientists and not some sort of invention that developed in a single day. It was in the 1950s when a new question came into the minds of a group of scientists: “Can machines think like humans?” or develop smart ways in which they can learn something on their own without being instructed step by step, just like humans. In the 1940s and 1950s researchers were fascinated by the simple thought of an “electronic brain” that could perform complex calculations, prove various theorems, and follow logical rules automatically.

The term “artificial intelligence” was first used in 1955 in a formal proposal for a summer research project. The proposal was written by John McCarthy, an American computer scientist, along with other researchers like Marvin Minsky, Nathaniel Rochester, and Claude Shannon. The project was called the “Dartmouth summer research project on artificial intelligence”, and it was held in 1956 at Dartmouth college in the USA. After that, a series of events took place through which this simple function of computers developed into the modern, efficient tools we see today. John McCarthy, the father of AI, defines it as “the science and engineering of making intelligent machines.”

It is very important to differentiate between AI and ordinary computer applications. Arthur Samuel in his

paper 'Some Studies in Machine Learning Using the Game of Checkers (1959), tries to differentiate between adaptive AI and rigid computer applications. Computers follow fixed instructions given by the programmers, while AI has the ability to learn automatically through data, identify patterns, make predictions, and improve too without being reprogrammed every time.

1.1 Evolution of Artificial Intelligence

There is a short history of artificial intelligence from early logic machines to expert systems to machine learning and finally today's ai tools.

Early logic machines perhaps did not think like humans but performed basic logical operations automatically, which showed that logical reasoning could be mechanised. Examples can be logic pianos, relay-based logic machines, etc. This further laid the foundation for modern computers and AI.

The next stage is expert systems where a computer is programmed to mimic the decision-making of a human expert in a specific field. For Example, expert systems were used for credit-risk assessment, troubleshooting machines, and technical support.

Machine learning (ML) is a branch of artificial intelligence where computers no longer just follow fixed rules, but learn automatically from data and improve over time. A simple example of machine learning is a computer program that predicts from past sales records the most selling products in the coming weeks.

Today's AI tools are handy and no longer used only for research experiments. They are practical and relevant for day-to-day activities, from learning patterns to making useful suggestions or decisions. Examples include chatbots and virtual assistants (like ChatGPT, Google Gemini, or Meta AI), which can actively help us with planning. There are certain AI powered apps for business, like tools that help business manage customer-service queries, forecast sales, optimise inventory, and advertise.

In small retail, today's AI tools often appear as simple apps or WhatsApp-based systems that send reminders and offers to regular customers.

1.2 Applications in Various Fields

AI is no more limited to only technological sector but it has its equal importance in retail, marketing, healthcare, finance, manufacturing, agriculture and

education-and it mainly contributes to improved operational efficiency and better customer engagement in all these fields.

In retail and e-commerce AI helps with customer care, demand forecasting, advertising, inventory management and in providing personalised offers, and targeted promotions. Healthcare and education use AI with diagnosis reminders, personalised learning and overall assists them. Banks use AI in fraud detection, cost cutting and saving time. Even in agriculture AI helps farmers plan and manage their resources better.

1.3 Significance of Ai in Business

Artificial intelligence was introduced to business fields in the mid-20th century through simple rule-based systems. To begin with, businesses used AI-like tools substantially for data analysis, inventory control, and financial planning. These initial functions were still fixed rules created by experts and were used in fields like banking, manufacturing, and logistics to automate basic calculations, logical reasoning, and decision-making. They didn't rely heavily on AI and wanted more work to be done by humans, be it due to a lack of trust or because they were just getting used to this new technology. For example, banks started using AI for fraud detection and risk analysis. Large firms used AI systems to plan production schedules and manage supply chains. Finally, in the 1980s and 1990s, businesses began using more advanced expert systems that could perform and copy human activities. Though the start must have been a little bit uneasy for the businessmen to understand, once they were accustomed, they found AI tools efficient and started preferring them more.

The existing research on electric vehicles reveals several important gaps, particularly in the context of Ranchi district. Most studies have primarily focused on metropolitan cities, leaving smaller cities like Ranchi underrepresented, despite their distinct socio-economic conditions and consumer behaviour patterns. Additionally, there is a lack of comparative analysis between urban and rural populations within the district, which limits understanding of differences in adoption behaviour. Another key gap is the absence of integrated studies that simultaneously examine both the growth of electric vehicles and consumer preferences, making it difficult to capture a holistic view of the market. Furthermore, no comprehensive survey-based research has been conducted specifically

in Ranchi, resulting in a lack of ground-level insights. Lastly, there is limited availability of primary data, as many studies rely on secondary sources, highlighting the need for direct data collection to better understand actual consumer behaviour and preferences.

1.4 In Small Retail Businesses

The national portal of the Government of India describes small retailers as “retailers whose scale of operation is restricted to a small segment of the market and to a narrow geographic area, typically serving local communities.” Basically, small retailers are independently owned and operated stores limited to a small segment of the market and to a restricted geographic selling small quantities of goods and services directly to end users and are close with them for their daily necessities. When we talk about using AI in small retail businesses, there are no technical complexities involved; instead, simple smart tools help them work more efficiently and connect with customers better. These tools do not replace humans but act as a support system that makes their small business more productive. Only relying on memory and handwritten paper books is not much of a great help; they can use AI-based apps and software for tasks like inventory management, predicting future orders, sending offers to regular customers, and doing reviews if needed. A peer-reviewed study on AI shows that large retail businesses have adopted AI at about 78%, while small retail businesses have adopted it at around 30%, which can be mainly due to cost and implementation barriers. Despite this gap, usage of AI in the Indian retail market is projected to grow at about 33.75% yearly from Rs. 1,750 cr. in 2023 to nearly Rs. 24,000 cr. by 2032, an indication of positive insight towards AI integration into retail operations. Studies on Indian AMEs also show that AI-using firms gain a 15-25% improvement in operational efficiency, and it helps in solving inventory problems. These findings suggest that small retail businesses in Jharkhand have a major opportunity to explore these tools to improve their overall efficiency and customer engagement.

1.5 Rationale for Selection of the Topic

The rationale for selecting the topic “Use of AI Tools in Small Retail Businesses in Selected Areas of Jharkhand: A Primary Study of Operational Efficiency and Customer Engagement” lies in its contemporary relevance, practical significance, and research gap.

Small retail businesses form the backbone of Jharkhand’s local economy, yet they remain largely manual and under-digitised despite rapid growth in digital infrastructure and awareness. At the same time, AI tools are increasingly being adopted by SMEs and retailers across India to improve inventory planning, decision-making speed, and customer-service quality. However, there is limited empirical evidence on how these tools are actually used, perceived, and experienced by small, owner-run retail units in Jharkhand, especially in Tier-2 and semi-urban areas.

II. LITERATURE REVIEW

Pillarisetty, Radhika (2022) talks about the popularity of AI tools among retail stores that are available in online mode. The overview of this study suggests that AI and its tools are very complicated and can be understood better if the business runs preferably online. However, there are various benefits mentioned that can even help offline businesses to run smoothly. The survey conducted here was mainly for online retail businesses, through which the need for online expansion is realised, and the necessity for SMEs to keep updated with the latest technologies is highlighted.

Daga et al. (2025) focused the study on the implementation of AI in Indian SMEs, developing an understanding of the benefits enjoyed and barriers identified in sectors such as retail, agriculture, healthcare, and BPO sectors. The methodology used here is known as a literature-based methodology, gaining knowledge from recent studies of Haptik, Cropin, observe.AI, Qure.ai and the Nasscom-Meta white paper on AI-driven businesses, instead of conducting primary surveys. There are various AI tools classified in this study under chatbots, contact-centre automation, predictive analytics, and decision-making systems, that shows the optimisation of cost, faster decision-making, and improved customer responses for SMEs.

Alvi, A. M. (2022). This article records and analyses the socio-economic and operational impact of AI-based systems on Indian SMEs critically, with a highlight on retail and marketing. The method used in this study is mixed methodology, where the authors combined qualitative elements from analysis of existing literature and quantitative elements from SME-level surveys and AI-adoption reports. Here,

marketing campaigns, customer-service automation, and decision-making are mentioned to show how they are done through machine-learning models, predictive analytics, and NLP-based tools. Findings also show that AI systems help SMEs personalise customer messages and automate marketing, contributing to improved business performance and higher customer interaction. However, AI is limited in tier-2/3 locations even for large retail businesses due to security concerns, high implementation costs and resistance to change.

Chandler, M., Wial, H., & Bookman, D. (2025). This published article specifically focuses on small retail stores and includes the motive to explore the use of AI in retail business for inventory management and customer engagement. Here, the authors adapt and exploratory, analytical methodology. The secondary literature on AI tools like demand forecasting models, CRM linked analytics, and chatbots with small-scale illustrations from small-format shops is combined. This study determines that the use of AI functions like automated reorder alerts, basic analytics dashboards, and recommendation tools can help in transforming kirana-style or small-retail businesses. Findings of this study include various data and proofs that inventory management reduces stockout and overstocking, an improved cash flow which allows owners to take a moment and focus more on customer assistance.

Pallen, P. (2025). The study shows how AI tools influence online FMCG purchasing power, the form of certain cost power. In Jharkhand, using a systematic-review approach that synthesises survey data and case studies from the region and similar Tier-2/3 markets. The authors examine AI-driven recommendation engines, chatbots, and dynamic-pricing tools used by e-commerce platforms and local FMCG aggregators. They find that personalised product suggestions and special offers lead to higher order frequency, larger basket sizes, and greater perceived convenience for Jharkhand consumers. At the same time, trust in digital payments, data-security concerns, and low digital literacy act as limiting factors that can reduce the effectiveness of AI-based engagement. The study shows the connection between customer engagement and retail development. The research gap on this topic can be used to find out more about small retail shops in Jharkhand.

Arce, C. G. M., Valderrama, D. A. C., Barragán, G. A. V., & Santillán, J. K. A. (2024). An overview of AI in retail business is presented along with insane usage of AI tools in Jharkhand, using a systematic-review approach that synthesises survey data and case studies from the region and similar Tier-2/3 markets. The authors examine AI-driven recommendation engines, chatbots, and dynamic-pricing tools used by e-commerce platforms and local FMCG aggregators. They find that personalised product suggestions and special offers lead to higher order frequency, larger basket sizes, and greater perceived convenience for Jharkhand consumers. At the same time, trust in digital payments, data-security concerns, and low digital literacy act as limiting factors that can reduce the effectiveness of AI-based engagement. The review also notes that AI-assisted platforms report higher customer retention and satisfaction, which indirectly pressures nearby small retailers to adopt similar AI-enabled practices. This paper explains the replacement of retail marketing strategies reshaping marketable structure with the help of AI tools in Jharkhand, using a systematic-review approach that synthesises survey data and case studies from the region and similar Tier-2/3 markets. The authors examine AI-driven recommendation engines, chatbots, and dynamic-pricing tools used by e-commerce platforms and local FMCG aggregators. The review also notes that AI-assisted platforms report higher customer retention and satisfaction, which indirectly pressures nearby small retailers to adopt similar AI-enabled practices.

Ghosh (2025). This article examines how AI tools are reshaping retail marketing strategies in India, with an emphasis on SMEs and small retailers. The study strongly supports the AI-marketing-customer engagement pathway but is primarily theoretical and nation-level, with no focused investigation of Jharkhand-based small retail. Researchers can fill this gap by providing empirical, field-based evidence on how AI-driven marketing tools are actually adopted and experienced by small retail units in selected Jharkhand areas, thus grounding the theoretical framework in a local, practice-oriented context.

Oosthuizen, Kim, et al. This paper investigates how AI technologies enhance the overall shopping experience in retail environments. The authors use a qualitative and case-study-style approach, examining AI-enabled settings such as self-checkout systems, smart-shelf

displays, recommendation engines, and chatbot-assisted support. They argue that AI tools help retailers personalise communication, reduce waiting times, and offer context-aware recommendations. Thus, the paper links AI tools to both operational efficiency (less manual oversight, better planning) and customer engagement (faster, more personalised service). However, it focuses on broader retail formats and does not specifically address small retail businesses in Jharkhand. Researchers can fill this gap by exploring how such AI-enabled customer-experience tools can be realistically applied and adapted in small-scale retail shops in selected Jharkhand areas.

Anica-Popa, Ionuț, et al. This empirical study examines how AI-driven tools affect brand perception and customer satisfaction in Indian retail. The authors use a survey-based methodology, collecting data from roughly 600 retail customers and interviews with store managers across different retail formats. The article provides solid empirical support connecting AI tools to both operational-efficiency and customer-engagement outcomes in Indian retail. However, it treats retail formats in a generalised way and does not single out small retail businesses in Jharkhand. Researchers can fill this gap by focusing specifically on small retail units in selected Jharkhand areas, offering a more focused, region-level understanding of how AI tools influence brand perception, customer satisfaction, and daily operations.

Sharma, P., & Dang, G. P. (2022). This empirical study examines how AI-driven tools affect brand perception and customer satisfaction in Indian retail. The authors use a survey-based methodology, collecting data from roughly 600 retail customers and interviews with store managers across different retail formats. The article provides solid empirical support connecting AI tools to both operational-efficiency and customer-engagement outcomes in Indian retail. However, it treats retail formats in a generalised way and does not single out small retail businesses in Jharkhand. Researchers can fill this gap by focusing specifically on small retail units in selected Jharkhand areas, offering a more focused, region-level understanding of how AI tools influence brand perception, customer satisfaction, and daily operations.

Cao, L. (2021). This empirical study examines how AI-driven tools affect brand perception and customer satisfaction in Indian retail. The authors use a survey-based methodology, collecting data from roughly 600 retail customers and interviews with store managers across different retail formats. The article provides solid empirical support connecting AI tools to both operational-efficiency and customer-engagement outcomes in Indian retail. However, it treats retail formats in a generalised way and does not single out small retail businesses in Jharkhand. Researchers can fill this gap by focusing specifically on small retail units in selected Jharkhand areas, offering a more focused, region-level understanding of how AI tools influence brand perception, customer satisfaction, and daily operations.

2.1 Research Gap

The above literature review strongly suggests that AI has value in retail, but most evidence comes from large chains, online retailers, or city-based enterprises. There is very little primary data on small retail businesses in Jharkhand, particularly on the practical effects of AI tools on efficiency and customer engagement. There is also limited understanding of how local geography, business scale, and owner characteristics shape the adoption process. There are not many observations or findings from the Jharkhand region. All the studies lack information from the local perspective of areas that come under the Jharkhand region. Therefore, we have selected our topic - Use of AI Tools in Small Retail Businesses in selected areas of Jharkhand: A Primary Study of Operational Efficiency and Customer Engagement.

2.2 Research Question

1. What types of AI tools or AI-enabled digital tools are used by small retailers in the selected areas of Jharkhand?
2. Does the use of AI tools improve operational efficiency in small retail businesses?
3. Does the use of AI tools improve customer engagement in small retail businesses?

2.3 Research Objectives

1. To identify the extent and nature of AI tool usage among small retail businesses in selected areas of Jharkhand.

2. To examine the relationship between AI tool adoption and operational efficiency.
3. To understand the perceptions of small retailers regarding the usefulness, affordability, and practicality of AI tools.

2.4 Hypothesis

Hypothesis related to overall AI-tool adoption (perception)

H₀ (Null Hypothesis): There is no significant difference in the perceived usefulness of AI tools.

H₁ (Alternative Hypothesis): There is a significant difference in the perceived usefulness of AI tools.

2.5 Research Methodology

The present study adopts a descriptive and analytical research design to explore how AI tools are being used by small retail businesses in selected areas of Jharkhand and how they influence operational efficiency and customer engagement. The research is primary-data-based, with data collected directly from small retail owners through structured interviews and a self-administered questionnaire, supplemented by occasional informal conversations to capture contextual nuances.

The population for the study comprises small retail businesses (kirana shops, general stores, and small-format retail outlets) operating in selected districts or towns of Jharkhand, such as Ranchi, Jamshedpur, Dhanbad, Bokaro, or Seraikella, depending on your chosen sample area. A stratified purposive sampling approach is used to ensure representation across different neighbourhoods (urban, semi-urban, and peri-urban) and business sizes, while still focusing on owner-run, small-scale retail units that are likely to adopt or be exposed to basic AI-based tools.

The study will examine AI tools that are already present or realistically adaptable in such businesses, including billing systems with intelligent features, inventory applications, WhatsApp-based customer support, sales analytics, digital recommendation features, and alert systems. The study will not attempt to measure every possible digital technology in retail; rather, it will focus on tools that have a clear link to efficiency or customer engagement

III. DATA ANALYSIS AND HYPOTHESIS TESTING

This is a research output from a study about AI tools in retail business, based on a survey of 118 respondents. The page shows frequency tables for several survey questions, though the actual numbers are truncated in the extraction. The questions cover:

Question	What it Measures
"Are you aware of different social media platforms that can help you in promoting your business?"	Awareness of social media for business promotion
"Are you aware that there are tools for predicting current trends and forecasting consumer demands?"	Awareness of predictive analytics tools
"AI tools have reduced time spent on daily billing."	Perceived impact of AI on billing efficiency
"Inventory management has become more accurate since [AI]-powered tools."	Perceived impact of AI on inventory accuracy

Chart 1: Years of Experience in Retail Business

This bar chart shows the distribution of respondents by their retail experience:

Experience	Approximate Frequency	Percentage
Less than 2 years	~10	~8.5%
2-5 years	~29	~24.6%
5-10 years	~39	~33.1%
10-20 years	~20	~16.9%
More than 20 years	~20	~16.9%

Key insight: The largest group has 5-10 years of experience (~33%). The sample is fairly spread across experience levels, with relatively fewer newcomers (<2 years) and a good representation of veterans (10+ years). This suggests the findings reflect perspectives from moderately experienced to highly seasoned retail professionals.

Chart 2: Awareness of AI Tools in Business

This bar chart shows responses to "Are you aware of AI tools used in business for various purposes?"

Response	Approximate Frequency	Percentage
Agree	~49	~41.5%
Strongly Agree	~69	~58.5%

Key insight: Nearly all respondents (100%) are aware of AI tools — no one selected Disagree or Strongly Disagree. A majority (~58.5%) strongly agree they are

aware. This indicates near-universal awareness of AI in the retail business community surveyed. There is no meaningful variation here; awareness is essentially a given among these respondents.

3.1 Overall Interpretation

Aspect	Finding
Sample size	118 respondents
Population	Retail business professionals
AI awareness	Universal — no one is unaware
Experience spread	Diverse, with concentration in mid-career (5-10 years)
Focus areas	AI applications in billing, inventory, trend forecasting, and social media marketing

The charts establish who the respondents are and what they already know. The near-universal AI awareness suggests the study is not about introducing AI to novices but about understanding how AI is perceived, adopted, and used by those who already know it exists.

3.2 Hypothesis Test Result

Criterion	Finding	Decision
p-value = .017	< .05	Reject H0
Coefficient direction	Negative (-.091)	Significant but opposite to expected
Effect size (R ²)	.048	Very small

3.3 Limitations

1. The study is region-specific and therefore not fully generalizable to all parts of India.
2. Findings may depend on self-reported responses, which can be affected by memory or social desirability bias.
3. AI is an evolving concept, and some respondents may not clearly distinguish AI from general digital tools.
4. Access to shops and availability of respondents may vary because of business workload.
5. The study will identify associations rather than prove strict causality.

IV. FINDINGS & CONCLUSION

This study examined the adoption and impact of Artificial Intelligence (AI) tools among small retail businesses in Ranchi, Jharkhand, and found that the use of affordable AI-enabled technologies is gradually increasing across kirana stores, clothing shops, pharmacies, electronics stores, and small supermarkets. Retailers are primarily adopting

practical solutions such as AI-enabled billing software, inventory management systems, WhatsApp Business automation, and AI-supported social media marketing to improve operational efficiency, inventory control, customer engagement, and overall business performance. Although the adoption of advanced AI systems remains limited due to financial constraints, limited digital literacy, and lack of technical expertise, the findings demonstrate that simple and cost-effective AI tools can significantly enhance the competitiveness and sustainability of small retail businesses. The study contributes to the existing literature by providing empirical evidence from the underrepresented context of Jharkhand, thereby enriching the understanding of AI adoption in small, owner-managed retail enterprises within developing economies. It also offers valuable insights for retailers, technology providers, policymakers, MSME support institutions, and trade associations by identifying the AI tools that are most feasible for small businesses, the key barriers to adoption, and the support mechanisms required to accelerate digital transformation. The findings can assist in designing targeted digital literacy programs, affordable technology solutions, and policy initiatives that encourage AI adoption among small retailers. Overall, the study concludes that AI has considerable potential to improve operational efficiency, customer satisfaction, and long-term business growth in the small retail sector, while also serving as a benchmark for future research on AI-driven retail transformation in Tier-2 and Tier-3 cities across India.

V. SUGGESTIONS

Based on the findings of the study, the following suggestions are recommended to enhance the adoption and effective use of Artificial Intelligence (AI) tools among small retail businesses in Ranchi, Jharkhand. First, small retailers should gradually adopt affordable and user-friendly AI applications such as AI-enabled billing software, inventory management systems, WhatsApp Business automation, and AI-supported digital marketing tools to improve operational efficiency and customer service. Second, government agencies, MSME development organizations, and trade associations should organize regular training and digital literacy programs to increase awareness of AI technologies and build the technical skills required for their effective implementation. Third, technology

providers should develop low-cost, easy-to-use AI solutions tailored to the needs and financial capabilities of small retail businesses, ensuring that these tools are available in local languages and require minimal technical expertise. Fourth, financial institutions and government bodies should provide incentives, subsidies, or low-interest loans to encourage investment in AI-enabled technologies and digital infrastructure. Finally, future researchers should extend similar studies to other districts and states, include larger sample sizes, compare different retail sectors, and investigate the long-term impact of AI adoption on business performance, profitability, customer satisfaction, and sustainability. These measures will help accelerate the digital transformation of small retail businesses and strengthen their competitiveness in an increasingly technology-driven retail environment.

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