



# A Study on Digital Transformation in Commerce: AI as a Driver of Innovation in Coimbatore

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**Abstract** – The rapid advancement of digital technologies has transformed the global commercial landscape, with Artificial Intelligence (AI) emerging as a key driver of innovation. This study examines the role of AI in accelerating digital transformation within the commercial sector of Coimbatore, a prominent Tier-II city in India. It explores the level of AI adoption, its impact on business performance, and the challenges faced by enterprises. Using a mixed-method approach, the study highlights how AI enhances operational efficiency, customer experience, and competitive advantage while identifying barriers such as cost, lack of expertise, and limited awareness. The twenty-first century has witnessed an unprecedented wave of digital transformation that has redefined the way businesses operate, compete, and deliver value. At the heart of this transformation lies Artificial Intelligence (AI), a disruptive technology that is fundamentally altering the contours of commerce across the globe. From automating routine operations to enabling hyper-personalised customer experiences, AI has emerged as a pivotal force in reshaping commercial ecosystems. India, as one of the fastest-growing digital economies in the world, has experienced a dramatic shift in its commercial landscape. Tier-II cities, in particular, has become vibrant hubs of entrepreneurial activity and technological adoption. Coimbatore often referred to as the 'Manchester of South India,' exemplifies this transformation. Renowned for its robust manufacturing base, thriving textile industry, and a burgeoning start-up culture, Coimbatore has increasingly embraced digital tools and AI-driven solutions to enhance business competitiveness.

**Keywords:** Artificial Intelligence, Digital Transformation, Commerce Innovation, Predictive Analytics, E-Commerce India, Business Automation

## I. INTRODUCTION

The 21st century has witnessed a significant shift in how businesses operate due to digital transformation. AI plays a central role in this evolution by enabling automation, predictive analytics, and personalized customer experiences. In India, digital transformation is not limited to metropolitan cities; Tier-II cities like Coimbatore are increasingly adopting AI-driven technologies.

Coimbatore, known for its strong industrial base and entrepreneurial ecosystem, has embraced digital tools across sectors such as manufacturing, retail, textiles, and IT. Businesses are leveraging AI for supply chain optimization, marketing, customer service, and decision-making, making it a relevant case for studying AI-driven commercial transformation. The advent of AI in commerce encompasses a wide spectrum of applications — intelligent supply chain management, predictive analytics, automated customer service through chatbots, AI-driven marketing, fraud detection, and data-driven decision-making. These innovations are not confined to large multinational corporations; Small and Medium Enterprises (SMEs) in cities like Coimbatore are also leveraging AI to optimise operations, reduce costs, and tap into new market opportunities.

### Objectives of the Study

The study aims to:

- To examine the current state of digital transformation in Coimbatore.
- To assess awareness and adoption of AI technologies among businesses.

- To analyze the impact of AI on business performance.
- To identify challenges in AI adoption.
- To evaluate AI's role in driving innovation and competitiveness.

## II. RESEARCH METHODOLOGY

The study adopts a descriptive and analytical research design using a mixed-method approach.

- Sample Size: 150 respondents (business owners, managers, decision-makers)
- Sampling Technique: Stratified convenience sampling
- Data Sources: Primary (questionnaires, interviews) and secondary (journals, reports)
- Tools Used: Descriptive statistics, correlation, and regression analysis using SPSS

This approach provides both quantitative insights and qualitative understanding of AI adoption trends.

## III. STATEMENT OF THE PROBLEM

Statement of the Problem Despite the growing discourse on digital transformation globally, there exists a significant lacuna in empirical research addressing AI adoption in commerce at the level of Tier-II Indian cities. While metropolitan centres such as Bangalore, Chennai, and Mumbai have been extensively studied, the commercial dynamics of cities like Coimbatore remain relatively under-explored in academic literature. Coimbatore's commercial sector is characterised by a diverse mix of traditional retail establishments, manufacturing units, and a nascent IT ecosystem. Many



businesses in this city are at varying stages of digital maturity — from completely offline operations to fully digitalised enterprises.

#### IV. REVIEW OF LITERATURE

1. Bawack, R. E. (2022) – “Artificial Intelligence in E-Commerce: A Bibliometric Study” Bawack (2022) conducted a bibliometric analysis of over two decades of AI research in the e-commerce sector. The study identified five dominant themes: personalization, recommendation systems, automation, customer analytics, and decision support. It highlighted that AI has become a crucial enabler of digital transformation by improving operational efficiency and customer experience. The author emphasized that organizations integrating AI strategically experience faster digital adaptation and enhanced innovation capacity. This review also pointed out the need for continuous AI upskilling among employees to maximize business value.

2. Valencia-Arias, A. (2024) – “AI and Recommender Systems in E-Commerce: Bibliometric Review” Valencia-Arias (2024) focused on the role of recommender systems as a driver of innovation in ecommerce. The research analyzed the evolution of recommendation algorithms, from collaborative filtering to hybrid and deep learning models. It was observed that AI-driven personalization significantly influences customer satisfaction and retention, creating a competitive advantage. The study concluded that recommender systems not only enhance sales performance but also shape consumer behaviour and loyalty. The author emphasized the necessity for ethical frameworks to ensure fairness and transparency in AI-based recommendations.

3. Güler, N. (2024) – “Artificial Intelligence Research in Business Management: A Literature Review” Güler (2024) explored how AI integrates with core business management functions and supports digital transformation. The paper reviewed case studies from retail, finance, and manufacturing sectors to demonstrate AI’s transformative role. The findings indicated that AI facilitates strategic decision-making through predictive analytics and automation. However, successful implementation depends heavily on data quality, leadership vision, and digital readiness. The author concluded that companies must align AI deployment with their innovation strategies to fully achieve digital transformation benefits.

4. Chrzanowska, E. (2024) – “AI-Powered Digital Transformation: Organizational Perspective” Chrzanowska (2024) investigated how organizations are restructured through AI-enabled digital transformation. The study showed that AI fosters efficiency in business operations but also requires cultural and managerial changes. It stressed that AI-driven firms need to re-skill their workforce, redesign roles, and build trust in automated systems. The author also discussed ethical

dilemmas such as data privacy and algorithmic bias, which may hinder sustainable innovation.

5. Nguyen, D. N. (2024) – “Personalized Product Recommendation Model in E-Commerce” Nguyen (2024) designed a personalized product recommendation model based on user activity and purchase history. The study highlighted that artificial intelligence can predict consumer preferences with high accuracy, thereby increasing sales and engagement. By combining collaborative filtering and deep learning, the model improved product discovery and user satisfaction. The research concluded that personalized recommendations significantly influence digital transformation by converting traditional selling into customer-centric commerce.

#### V. INTERPRETATION AND ANALYSIS

##### 1. Research Question 1

Is artificial intelligence (AI) helping businesses grow in terms of performance, productivity, or revenue?

Table 1: Is AI Helping Your Business Grow?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	68	45.3	45.3	45.3
Maybe	45	30.0	30.0	75.3
Yes	37	24.7	24.7	100.0
Total	150	100.0	100.0	100.0

##### Interpretation

The frequency distribution for Research Question 1 reveals that the majority of respondents (n = 68, 45.3%) reported that AI is NOT helping their business grow. An additional 30.0% (n = 45) expressed uncertainty, selecting 'Maybe', while only 24.7% (n = 37) affirmed a positive impact. The cumulative percent shows that 75.3% of respondents either disagree or are unsure about AI's contribution to business growth. This finding suggests that despite widespread AI adoption, perceived business growth benefits remain limited among the surveyed population. The results fail to support H<sub>1</sub>, implying that organizations may not yet be realizing measurable growth outcomes from their AI investments potentially due to inadequate implementation, skill gaps, or misaligned expectations.

##### Research Question 2

Which AI tool is perceived as the most useful by businesses — Recommendation Engine, Analytics, Chatbot, or Other?



Table 2: What AI Tool Is Most Useful to You?

	Frequency	Percent	Valid Percent	Cumulative Percent
Recommendation Engine	57	38.0	38.0	38.0
Analytics	49	32.7	32.7	70.7
Chatbot	28	18.7	18.7	89.3
Other	16	10.7	10.7	100.0
Total	150	100.0	100.0	100.0

**Interpretation**

The frequency distribution for Research Question 2 shows that Recommendation Engines were rated as the most useful AI tool by 38.0% of respondents (n = 57), followed by Analytics at 32.7% (n = 49), Chatbots at 18.7% (n = 28), and Other tools at 10.7% (n = 16). The cumulative percent indicates that over 70% of respondents find value either in Recommendation Engines or Analytics tools. These two categories together account for the dominant preferences, suggesting that data-driven AI tools — those that enhance customer targeting and operational insights — are valued most highly. This finding supports H<sub>1</sub> and implies that businesses prioritize AI applications that deliver measurable, actionable intelligence over interactive or conversational tools.

**Research Question 3**

What is the primary motivation behind businesses adopting AI — saving time, increasing sales, improving customer experience, or other reasons?

Table 3: Why Did You Adopt AI?

	Frequency	Percent	Valid Percent	Cumulative Percent
Save Time	66	44.0	44.0	44.0
Increase Sales	43	28.7	28.7	72.7
Improve Customer Experience	29	19.3	19.3	92.0
Other	12	8.0	8.0	100.0
Total	150	100.0	100.0	100.0

**Interpretation**

The frequency distribution for Research Question 3 indicates that 'Save Time' is the most frequently cited reason for AI adoption, selected by 44.0% of respondents

(n = 66). This was followed by 'Increase Sales' (28.7%, n = 43), 'Improve Customer Experience' (19.3%, n = 29), and 'Other' (8.0%, n = 12). The cumulative percent confirms that over 72% of respondents adopted AI either to save time or increase sales — both primarily efficiency- and revenue-driven objectives. This finding strongly supports H<sub>1</sub> and suggests that businesses are driven by pragmatic, operational incentives when adopting AI. The emphasis on time-saving reflects a broader organizational trend toward automation of repetitive tasks and workflow optimization using AI technologies.

**Research Question 4**

Do businesses formally measure the Return on Investment (ROI) of their AI implementations?

Table 4: Do You Measure AI ROI?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	67	44.7	44.7	44.7
Not Sure	49	32.7	32.7	77.3
Yes	34	22.7	22.7	100.0
Total	150	100.0	100.0	100.0

**Interpretation**

The frequency distribution for Research Question 4 reveals that 44.7% of respondents (n = 67) do NOT measure their AI ROI, and 32.7% (n = 49) are unsure whether they do. Only 22.7% (n = 34) confirmed that they actively measure AI ROI. Cumulatively, 77.3% of respondents either do not measure or are uncertain about measuring AI returns. This finding supports H<sub>0</sub> and highlights a critical accountability gap in AI management practices. The absence of ROI measurement suggests that many organizations are investing in AI without clearly defined performance benchmarks or evaluation frameworks, making it difficult to assess business value and justify continued investment. This finding aligns with the results of Table 1, where a majority reported AI not contributing to business growth.

**Research Question 5**

What is the most significant challenge businesses face when implementing AI — data quality, integration, cost, or other barriers?

Table 5: What Is the Biggest AI Challenge?

	Frequency	Percent	Valid Percent	Cumulative Percent
Data Quality	73	48.7	48.7	48.7
Integration	47	31.3	31.3	80.0



	Frequency	Percent	Valid Percent	Cumulative Percent
Cost	19	12.7	12.7	92.7
Other	11	7.3	7.3	100.0
Total	150	100.0	100.0	100.0

### Interpretation

The frequency distribution for Research Question 5 shows that 'Data Quality' is the most cited AI challenge, identified by 48.7% of respondents (n = 73). This was followed by 'Integration' (31.3%, n = 47), 'Cost' (12.7%, n = 19), and 'Other' (7.3%, n = 11). The cumulative percent shows that 80.0% of respondents consider either data quality or integration as the primary barrier to effective AI implementation. This strongly supports H<sub>1</sub> and underscores that the effectiveness of AI systems is fundamentally limited by the quality and structure of the data they process. Poor data quality leads to inaccurate models and unreliable outputs, while integration challenges reflect the difficulty of embedding AI solutions into existing legacy infrastructure. These two challenges collectively present the most significant roadblocks to successful AI adoption.

### Source & Methodology Note

Source: Primary data collected via structured survey questionnaire. Total sample size: n = 150 respondents. Data analyzed using IBM SPSS Statistics Version 26.0. Tables represent frequency distribution outputs (Analyze → Descriptive Statistics → Frequencies) showing response categories, observed frequencies, percentage distributions, valid percent, and cumulative percent. Highlighted rows indicate the modal response category for each variable.

### Research Gap

While existing literature extensively covers AI adoption rates and technical implementation frameworks, there remains a significant gap in research that simultaneously examines perceived business growth outcomes,

- ROI measurement practices
- Tool-specific usefulness
- Adoption motivations
- Implementation barriers within a single unified study

Most prior studies investigate these dimensions in isolation, failing to capture the interconnected nature of AI adoption challenges faced by businesses.

## VI. RESULTS & DISCUSSIONS

The findings of this study reveal a consistent and interconnected pattern of AI adoption challenges among the 150 surveyed businesses. While 44% of respondents

adopted AI primarily to save time and 38% identified recommendation engines as their most useful tool, the majority (45.3%) reported that AI is not visibly contributing to business growth a contradiction that becomes clearer when considered alongside the finding that 77.3% of businesses either do not measure or are uncertain about measuring their AI ROI, making it structurally impossible for them to confirm or quantify any benefits received. These results collectively indicate that the core problem is not a lack of interest or investment in AI, but rather significant implementation maturity gap organizations are adopting AI at the tool level without the supporting foundations of data governance, performance measurement, and strategic alignment needed to translate that adoption into measurable business value.

### Key Findings

- **AI Is Not Yet Perceived as a Business Growth Driver** Nearly half of respondents (45.3%, n=68) said AI is not helping their business grow, and another 30% are unsure. Only 1 in 4 businesses reported a positive impact — suggesting AI investments are not translating into perceived growth for most organizations.
- **Recommendation Engines Lead as the Most Valued AI Tool** 38% of businesses (n=57) found Recommendation Engines most useful, followed by Analytics (32.7%). Together these two data-driven tools account for over 70% of preferences, indicating businesses favor AI that delivers actionable, revenue-linked intelligence over conversational tools like Chatbots (18.7%).
- **Time-Saving Is the Dominant Motivation for AI Adoption** 44% of respondents (n=66) adopted AI primarily to save time. Combined with "Increase Sales" (28.7%), over 72% of businesses are driven by efficiency and revenue goals — confirming that pragmatic, operational benefits — not innovation — are the core drivers of AI adoption.
- **Most Businesses Do Not Measure AI ROI** A striking 77.3% of respondents either do not measure AI ROI (44.7%) or are unsure (32.7%). Only 22.7% formally track returns. This reveals a significant accountability and governance gap, and likely explains why many businesses in Finding #1 cannot confirm AI is helping them grow.
- **Data Quality Is the Biggest Barrier to AI Success** 48.7% of respondents (n=73) identified data quality as the greatest AI challenge, with integration issues as the second concern (31.3%). Together these account for 80% of reported barriers — highlighting that the foundation of successful AI is clean, well-integrated data, not the AI technology itself.

## VII. CONCLUSION

This study set out to examine the state of AI adoption among businesses by investigating five key dimensions: perceived business growth, tool preferences, adoption



motivations, ROI measurement practices, and implementation challenges. The findings collectively reveal that while businesses are actively embracing AI primarily motivated by the desire to save time and improve operational efficiency the majority are yet to experience or confirm tangible growth outcomes from their investments. The dominance of data quality and integration issues as implementation barriers, combined with the widespread absence of formal ROI measurement practices, suggests that most organizations remain in the early and transitional stages of AI maturity, where tools have been adopted but the foundational infrastructure and evaluation frameworks necessary to derive strategic value have not yet been established.

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