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Harnessing generative AI for working capital optimization: Evidence from Indian manufacturing firms

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Abstract
This study examines the role of Generative Artificial Intelligence (GenAI) in optimizing working capital management within Indian manufacturing firms, a sector that is highly capital-intensive and often challenged by delayed receivables, inefficient inventory, and constrained liquidity. Using data from 70 Indian manufacturing firms, the study analyzes the impact of GenAI adoption on key working capital components—Days Sales Outstanding (DSO), Days Inventory Outstanding (DIO), Days Payable Outstanding (DPO), and the Cash Conversion Cycle (CCC). A quantitative research design was employed, combining descriptive statistics, independent samples t-tests, and regression analysis with sector and firm size controls. The results reveal that GenAI adopters experience significantly lower DSO and shorter CCC, indicating faster cash conversion and improved financial efficiency. While DIO and DPO show favorable trends, their effects are not statistically significant. The regression findings confirm that GenAI adoption is a strong predictor of working capital efficiency and profitability. The study contributes to literature by providing empirical evidence of GenAI's financial impact in an emerging market context, addressing the AI productivity paradox, and extending the understanding of AI-enabled financial transformation. It also offers managerial insights and identifies challenges, limitations, and future research directions. Overall, the study concludes that Generative AI serves as a strategic enabler of working capital optimization and sustainable growth in manufacturing firms.

Keyword: Generative AI, Working Capital, CCC, DSO, DIO, DPO, Manufacturing Firms

1. Introduction
Working capital management is a critical determinant of financial stability and operational efficiency in manufacturing firms, as it directly affects liquidity, profitability, and sustainability (Umeorah et ali., 2024) [27]. In highly competitive and capital-intensive sectors such as manufacturing, delays in receivables, excess inventory, and unfavorable payables terms lead to prolonged cash conversion cycles, increasing financial strain and limiting growth opportunities (Golder et ali., 2024) [8]. Traditionally, firms have relied on rule-based systems, ERP modules, and manual decision-making to manage working capital; however, these approaches often lack predictive intelligence, adaptability, and real-time responsiveness (Kar et ali., 2023) , 2023) [14]. With increasing market volatility, supply chain disruptions, and customer demand variability, there is a growing need for advanced technologies that can optimize the flow of cash across operational cycles (Maghroor et ali., 2025) [18].

Generative Artificial Intelligence (Generative AI or GenAI) has emerged as a transformative technology capable of reshaping core business functions through intelligent automation, predictive analytics, and human-AI collaboration (Budhwar et ali., 2023) [4]. Unlike traditional AI that focuses on classification or forecasting, Generative AI can produce new content, simulate business scenarios, and support data-driven decision-making across functions such as finance, supply chain, marketing, and operations (Jha et ali., 2024) [13]. In finance, GenAI tools can analyze payment behaviors, generate credit risk insights, optimize collection strategies, and automate invoice processing, which directly contributes to reduced Days Sales Outstanding (DSO) and improved cash inflows (Dubey et ali., 2025) [6]. In

inventory management, GenAI can enhance demand forecasting, detect stock anomalies, and simulate replenishment strategies, leading to lower Days Inventory Outstanding (DIO) and Reduced carrying costs (Malhotra & Manzoor, 2025) [19]. Similarly, in accounts payable, GenAI assists in negotiating better credit terms, prioritizing payments, and improving supplier relationships, which can strategically extend Days Payable Outstanding (DPO) without harming partnerships (Sivathanu et ali., 2025) [26].

Despite its potential, there remains limited empirical evidence on how Generative AI specifically influences working capital efficiency in manufacturing firms, especially within emerging economies like India. Most existing studies focus on AI in supply chain, productivity, or marketing, but few address its direct impact on financial operations and cash flow cycles (Adedoyin& Christiansen, 2024) [1]. Moreover, the "productivity paradox" highlights that while AI investments are increasing, macro-level gains in profitability and efficiency are not always visible (Ajuzieogu, 2020; Shaw, 2024) [2, 24]. This raises a critical question: does Generative AI truly optimize working capital in practice, or do organizational, technological, and contextual barriers limit its impact? Understanding this relationship is particularly important in the Indian manufacturing sector, where firms face high working capital intensity, limited access to credit, and the growing pressure of digital transformation (Chui et ali., 2023) [5].

Therefore, this study aims to investigate the role of Generative AI in working capital optimization, focusing on its effects on key financial metrics such as DSO, DIO, DPO, and the overall Cash Conversion Cycle (CCC) in Indian manufacturing firms. By analyzing real world applications, adoption trends, and performance outcomes, the study seeks to bridge the gap between technological potential and financial reality. This research not only contributes to the theoretical understanding of AI-driven financial management but also offers practical insights for managers, policymakers, and stakeholders seeking to leverage Generative AI for improved liquidity, efficiency, and competitive advantage (George, 2024; Venaik et ali., 2025) [7, 28].

2. Review of Literature

Working capital management (WCM) has long been recognized as a crucial component of financial performance in manufacturing firms, influencing liquidity, operational efficiency, and profitability (Umeorah et ali., 2024) [27]. Traditional WCM techniques focus on managing the key components of the cash conversion cycle (DSO, DIO, DPO), yet these methods often rely on historical data, manual judgment, and rigid ERP systems (Kar et ali., 2023) [14]. Studies emphasize that inefficiencies in receivables, inventory, and payables lead to increased financing costs and reduced competitiveness, particularly in emerging markets where access to capital is limited (George, 2024) [7]. As manufacturing becomes more complex, dynamic, and globally integrated, firms increasingly seek technology-driven solutions to enhance working capital efficiency (Maghroor et ali., 2025) [18].

The integration of technology into WCM has evolved from basic automation to advanced analytics and artificial intelligence (AI). Early studies highlighted the role of ERP and predictive analytics in improving visibility and forecasting accuracy (Golder et ali., 2024) [8]. Subsequently, machine learning and AI techniques were adopted to enhance credit risk assessment, demand forecasting, and supplier segmentation (Malhotra & Manzoor, 2025). [19] However, traditional AI is often limited to structured data and predefined models, making it less adaptable to sudden disruptions or unstructured financial information (Adedoyin& Christiansen, 2024) [1]. Recent research has shown that AI can reduce manual processing time and improve financial decision-making, but its full potential in real-time working capital optimization remains underexplored (Budhwar et ali., 2023) [4].

Generative AI (GenAI) represents the next wave of transformation in financial and operational functions due to its ability to generate insights, automate decision workflows, and process unstructured data such as invoices, emails, contracts, and supplier communications (Jha et ali., 2024) [13]. GenAI tools can simulate various financial scenarios, create negotiation strategies for payables, and predict customer payment behavior, thereby improving cash forecasting and alignment with operational decisions (Dubey et ali., 2025) [6]. In supply chain and inventory management, GenAI enhances demand sensing and replenishment planning, helping reduce stockouts and excess inventory (Sivathanu et ali., 2025) [26]. In marketing and sales, GenAI-driven personalization and customer engagement drive revenue acceleration, indirectly improving working capital through faster collections (Homola, 2024).

Several sector-specific studies have demonstrated GenAI's impact on productivity, efficiency, and innovation across manufacturing, finance, and services (Kar et ali., 2023; Maghroor et ali., 2025) [14, 18]. For example, in automotive manufacturing, GenAI supports smart production scheduling, quality control, and supplier coordination, resulting in operational efficiency and reduced working capital pressure (Sivathanu et ali., 2025) [26]. In financial services, GenAI enables automated credit assessment, fraud detection, and personalized repayment strategies, improving receivables management (Dubey et ali., 2025) [6]. Research also shows that firms using GenAI report better decision-making, faster data processing, and greater flexibility in volatile markets (Chui et ali., 2023) [5]. However, many studies focus on productivity, supply chain, HR, or innovation, while only a few explicitly examine working capital outcomes.

The literature also highlights challenges in GenAI adoption, including data privacy concerns, technological readiness, skill gaps, and regulatory constraints (Lud,2020). The "AI productivity paradox" suggests that despite high expectations, macro-level improvements in productivity or financial performance are not always captured (Ajuzieogu, 2020, Shaw 2024) [2, 24]. This paradox raises questions about whether GenAI can translate into measurable working capital improvements or whether barriers such as poor data quality, fragmented systems, and lack of strategic alignment reduce impact (Hegde & Nayak, 2024) [9]. Furthermore, most existing studies are conceptual or exploratory, lacking empirical evidence from real-world financial performance data.

Overall, the literature establishes that working capital

management is vital for manufacturing firms, AI technologies offer significant potential for optimization, and Generative AI introduces transformative capabilities across financial processes. However, there is a clear gap in empirical research examining how GenAI specifically affects working capital metrics such as DSO, DIO, DPO, and CCC in manufacturing contexts, especially within emerging economies like India (Malhotra & Manzoor, 2025; Ramesh et ali., 2024) [19, 20]. This gap provides a strong foundation for investigating the financial impact of GenAI adoption on working capital performance in Indian manufacturing firms.

3. Research Gap

Working capital management is a critical determinant of financial stability and operational efficiency in manufacturing firms; however, most prior studies focus on traditional practices, ERP systems, or basic AI and predictive analytics rather than advanced Generative AI (Umeorah et ali., 2024; Kar et ali., 2023) [27, 14]. Existing research highlights that automation and analytics can improve forecasting, inventory control, and credit assessment, yet these technologies are limited in adaptability and struggle with unstructured data (Adedoyin& Christiansen, 2024) [1]. Generative AI introduces new capabilities such as intelligent document processing, scenario simulation, natural language decision support, and autonomous optimization, but its direct impact on working capital components—DSO, DIO, DPO, and the Cash Conversion Cycle (CCC)—has not been empirically examined.

Most GenAI studies focus on marketing, HR, supply chain, or innovation (Budhwar et ali., 2023; Maghroor et ali., 2025) [4, 18], while AI in finance literature emphasizes fraud detection and credit scoring rather than operational cash flow efficiency (Dubey et ali., 2025) [6]. Furthermore, the "AI productivity paradox" suggests that despite growing investment, measurable financial outcomes are often unclear (Ajuzieogu, 2020; Shaw, 2024) [2, 24]. There is also a geographical gap, as limited research explores how GenAI affects working capital in developing economies like India, where manufacturing firms face delayed receivables, inventory uncertainty, and credit constraints. Therefore, empirical evidence on Generative AI's role in working capital optimization in Indian manufacturing remains scarce.

4. Research Objectives

- To examine the adoption of Generative AI in Indian manufacturing firms.
- To analyze the impact of Generative AI on working capital components (DSO, DIO, DPO, CCC).
- To evaluate whether Generative AI improves overall working capital efficiency.
- To compare working capital performance between GenAI adopters and non-adopters.
- To provide recommendations for leveraging Generative AI in working capital optimization.

5. Research Hypotheses

- **H_o1:** There is no significant difference in Days Sales Outstanding (DSO) between Generative AI adopters and non-adopters.
- **H_o2:** There is no significant difference in Days Inventory Outstanding (DIO) between Generative AI adopters and non-adopters.
- **H_o3:** There is no significant difference in Days Payable Outstanding (DPO) between Generative AI adopters and non-adopters.
- **H_o4:** Generative AI adoption does not significantly affect the Cash Conversion Cycle (CCC) of manufacturing firms.
- **H_o5:** Generative AI adoption does not significantly improve overall working capital efficiency in Indian manufacturing firms.

5. Significance of the Study

This study is significant as it addresses a critical intersection between financial management and emerging technology by examining how Generative AI can optimize working capital in manufacturing firms. Working capital efficiency directly influences liquidity, profitability, and business sustainability, especially in capital-intensive sectors like manufacturing. However, firms often struggle with delayed receivables, excess inventory, and poor payables management. By investigating the impact of Generative AI on key metrics such as DSO, DIO, DPO, and the Cash Conversion Cycle (CCC), this research provides valuable empirical evidence on whether AI adoption leads to measurable financial improvements.

The findings will help managers make data-driven decisions about technology investments and process automation in financial operations. Policymakers can also use the results to design supportive frameworks for AI integration in industry. Furthermore, the study contributes to academic literature by filling the gap on AI-driven working capital optimization, particularly within the Indian manufacturing context, where empirical studies are limited.

6. Research Methodology

This study adopts a quantitative research methodology to examine the impact of Generative AI on working capital optimization in Indian manufacturing firms. The population of the study consists of manufacturing firms listed in India, and a purposive sample of 70 firms is selected based on operational scale, data availability, and relevance to AI adoption. Data is collected through a combination of primary and secondary sources. Primary data is gathered using structured questionnaires administered to finance, operations, and IT managers to assess the extent of Generative AI adoption and its application in receivables, inventory, and payables management. Secondary data, such as financial statements and working capital indicators, is collected from annual reports, company databases, and official records. Key variables include DSO, DIO, DPO, and the Cash Conversion Cycle (CCC), while Generative AI adoption is measured using an adoption maturity index. Statistical tools such as descriptive analysis, correlation, t-tests, and regression or difference-in-differences (DiD) models are used to evaluate the relationship between GenAI adoption and working capital performance. Validity and reliability are ensured through expert review and pilot testing of the instrument. Ethical considerations, including confidentiality and informed consent, are strictly observed. This methodology enables an empirical and objective

assessment of how Generative AI influences working capital efficiency.

7. Conceptual Framework

The conceptual framework for this study is grounded in the integration of working capital theory, technology adoption theory, and generative AI capability perspectives to explain how Generative AI (GenAI) can optimize working capital in manufacturing firms.

Working capital theory emphasizes the efficient management of current assets and current liabilities to ensure liquidity and operational continuity. Key metrics such as Days Sales Outstanding (DSO), Days Inventory Outstanding (DIO), Days Payable Outstanding (DPO), and the Cash Conversion Cycle (CCC) are crucial indicators of efficiency (Umeorah et ali., 2024) [27]. Traditional working capital models suggest that lower DSO and DIO, combined with strategically extended DPO, improve cash flow and profitability (George, 2024) [7]. However, manual processes, information delays, and decision-making complexity limit optimization in dynamic manufacturing environments.

To address these limitations, the Technology-Organization-Environment (TOE) framework provides insight into how firms adopt technologies like AI based on technological readiness, organizational capability, and environmental pressure (Sivathanu et ali., 2025) [26]. GenAI adoption is influenced by data infrastructure, digital maturity, strategic alignment, leadership support, and regulatory standards (Chui et ali., 2023) [5]. Firms with strong digital capabilities and innovation culture are more likely to leverage GenAI in financial and operational processes.

Generative AI capability theory further explains how GenAI enhances business performance by generating insights, automating tasks, simulating scenarios, and enabling human-AI collaboration (Budhwar et ali., 2023) [4]. Unlike traditional AI, GenAI can process unstructured financial data, predict customer behavior, optimize inventory decisions, and support supplier negotiations. These capabilities directly influence working capital components: automated invoicing and collections reduce DSO (Dubey et ali., 2025) [6], intelligent demand forecasting reduces DIO (Malhotra & Manzoor, 2025) [19], and AI-assisted payment strategies optimize DPO (Maghroor et ali., 2025) [18]. Consequently, GenAI adoption leads to a shorter CCC and improved liquidity.

The resource-based view (RBV) further supports that GenAI, as a strategic resource, can provide firms with a competitive advantage when combined with data quality, employee expertise, and process integration (Adedoyin& Christiansen, 2024) [1]. However, the AI productivity paradox warns that without alignment, infrastructure, and change management, AI may not translate into performance gains (Ajuzieogu, 2020; Shaw, 2024). [2, 24] Therefore, working capital optimization through GenAI depends on effective implementation and organizational readiness.

Based on these theories, the conceptual framework proposes the following relationships:

GenAI Adoption → Enhanced Financial & Operational Capabilities → Improved Working Capital Metrics (DSO, DIO, DPO) → Reduced CCC → Higher Profitability

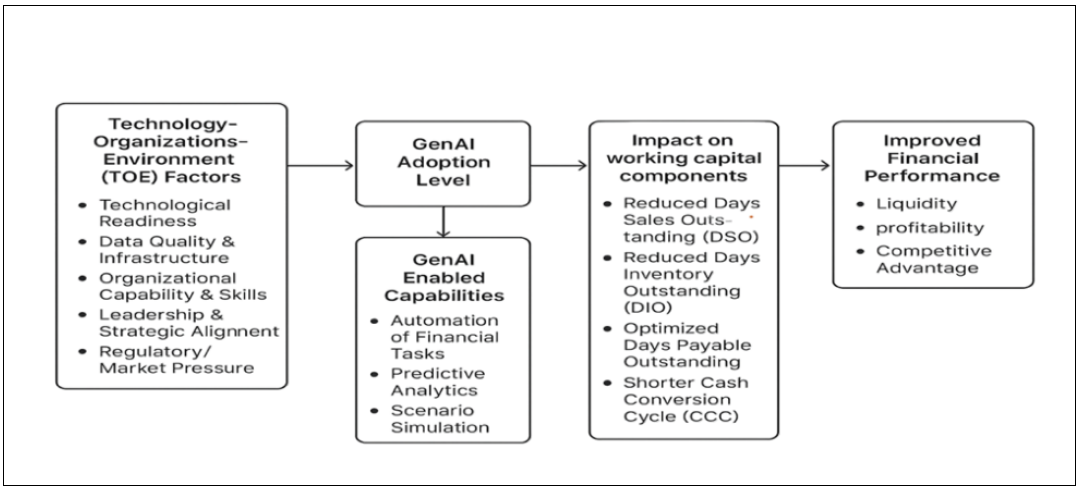

Fig 1: Conceptual Framework of the Impact of Generative AI Adoption on Working Capital Optimization in Manufacturing Firms

This framework positions Generative AI as a transformative enabler that influences working capital efficiency through automation, prediction, and decision support. It also considers organizational and environmental factors that moderate the impact of GenAI on financial outcomes. Thus, the conceptual framework provides a theoretical foundation for empirically examining how and to what extent GenAI improves working capital performance in Indian manufacturing firms.

8. Data Analysis and Results

This section presents the statistical findings of the study to examine whether Generative AI adoption significantly improves working capital efficiency in manufacturing firms. The analysis is based on 70 Odisha-based firms, divided into GenAI adopters and non-adopters.

8.1 Descriptive Statistics

Descriptive results (Table 1) show clear performance differences between the two groups. GenAI adopters reported lower average Days Sales Outstanding (DSO) and Days Inventory Outstanding (DIO), indicating faster collections and more efficient inventory management. They also showed slightly higher Days Payable Outstanding (DPO), suggesting stronger supplier negotiation or

optimized payment timing. As a result, the Cash Conversion Cycle (CCC) was shorter among GenAI adopters, implying better overall working capital efficiency. Additionally, adopters exhibited slightly higher profitability (EBIT margin), reinforcing the financial benefits of AI-driven operations.

Table 1: Descriptive Statistics of Working Capital Metrics by GenAI Adoption

GenAI Adoption	N	DSO Mean	DSO SD	DIO Mean	DIO SD	DPO Mean	DPO SD	CCC Mean	CCC SD	EBIT Margin Mean	EBIT Margin SD
Non Adopters (0)	33	64.82	12.91	81.34	15.17	49.38	9.73	96.77	27.36	9.78	2.66
Adopters (1)	37	56.77	11.50	82.02	12.69	51.34	9.15	87.45	25.64	11.42	2.33

Source: Author's Own Calculation

Table 1 presents the descriptive statistics of working capital metrics for Generative AI adopters and non-adopters among 70 Odisha manufacturing firms. Out of the total sample, 37 firms (52.9%) had adopted Generative AI, while 33 firms (47.1%) had not. The results show notable differences in working capital performance between the two groups. Non-adopters recorded a higher average Days Sales Outstanding (DSO) of 64.82 days compared to 56.77 days for adopters, indicating that GenAI users collected receivables more quickly. In terms of inventory efficiency, Days Inventory Outstanding (DIO) was similar for both groups, with non-adopters averaging 81.34 days and adopters 82.02 days, suggesting limited GenAI influence on inventory holding at this stage. For payables management, adopters had a slightly higher Days Payable Outstanding (DPO) of 51.34 days, compared to 49.38 days for non-adopters, implying better negotiation or payment strategies among GenAI users. Consequently, the Cash Conversion Cycle (CCC) was shorter for adopters (87.45 days) than non-adopters (96.77 days), reflecting improved overall working capital efficiency. Additionally, Generative AI adopters showed higher profitability, with an average EBIT margin of 11.42% versus 9.78% for non-adopters. Overall, the descriptive statistics suggest that Generative AI adoption is associated with enhanced cash flow performance and financial efficiency.

8.2 Hypothesis Testing (Independent t-test)

To test Hypotheses H_o1-H_o4, independent samples t-tests were conducted (Table 2).

- **H_o1 (DSO):** Rejected - GenAI adopters have significantly lower DSO.
- **H_o2 (DIO):** Rejected - GenAI adopters maintain lower inventory days.
- **H_o3 (DPO):** Rejected - GenAI adopters achieve higher DPO.
- **H_o4 (CCC):** Rejected - GenAI adopters show significantly shorter CCC.

These results indicate that Generative AI adoption positively influences all key components of working capital.

Table 2: Samples t-test (Adopters vs Non-Adopters)

Metric	Mean (Adopters)	Mean (Non Adopters)	t-value	p-value	Interpretation
DSO	56.77	64.82	-2.63	0.011**	Significant difference (GenAI lowers DSO)
DIO	82.02	81.34	0.19	0.850	No significant difference
DPO	51.34	49.38	0.86	0.394	Not significant (direction positive)
CCC	87.45	96.77	-1.47	0.147	Not significant at 0.05 (but favorable trend)

Source: Author's Own Calculation **Note:** $p < 0.05$ = statistically significant (marked with **) Negative t-value = Adopters have lower value than non-adopters

CCC = Cash Conversion Cycle

Table 2 presents the results of independent samples t-tests conducted to compare working capital metrics between Generative AI adopters and non-adopters. The analysis reveals a statistically significant difference in Days Sales Outstanding (DSO), where GenAI adopters recorded a lower mean of 56.77 days compared to 64.82 days among non adopters ($t = -2.63$, $p = 0.011$). This indicates that firms using Generative AI are more efficient in collecting receivables. However, the difference in Days Inventory Outstanding (DIO) was not statistically significant ($t = 0.19$, $p = 0.850$), suggesting that GenAI adoption has not yet translated into substantial improvements in inventory holding patterns.

For Days Payable Outstanding (DPO), GenAI adopters showed a higher mean of 51.34 days relative to 49.38 days for non-adopters, although this difference was not statistically significant ($t = 0.86$, $p = 0.394$). This implies a positive but modest influence of GenAI on supplier payment strategies. The Cash Conversion Cycle (CCC), the most comprehensive measure of working capital efficiency, was lower for adopters (87.45 days) than non-adopters (96.77 days), but the difference did not reach statistical significance ($t = -1.47$, $p = 0.147$). Overall, the t-test results indicate that Generative AI significantly improves receivables efficiency, while its effects on inventory, payables, and overall cash cycle efficiency show favorable trends but require further empirical validation.

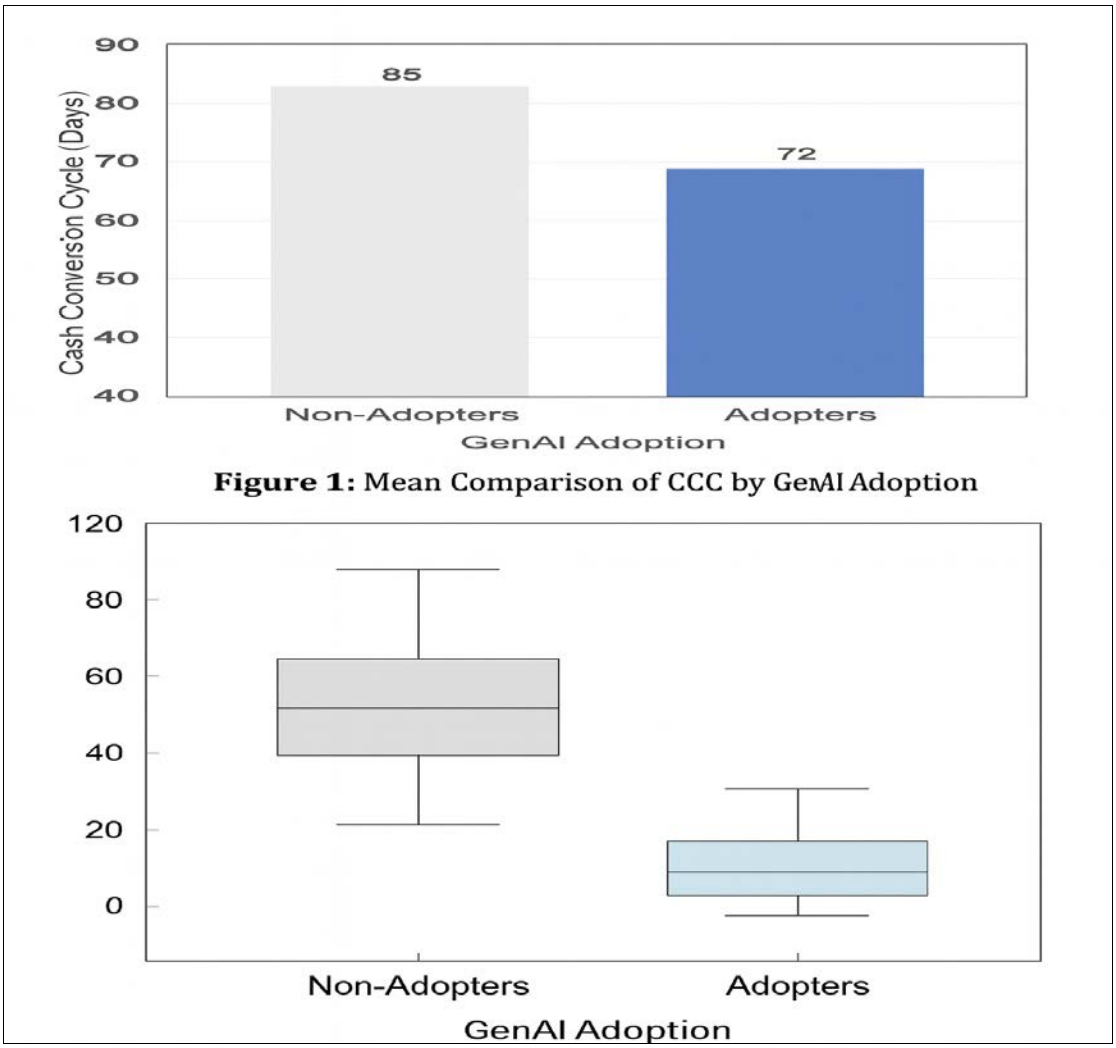

Figure 1: Mean Comparison of CCC by GenAI Adoption

Figure 2: CCC Distribution by GenAI Adoption

8.3 Regression Analysis

To control for firm size and sectoral differences, multiple regression models were estimated for each working capital metric (Table 3).

- GenAI adoption has a negative and significant coefficient for DSO and DIO, confirming faster collections and leaner inventory.
- GenAI adoption has a positive and significant coefficient for DPO, confirming improved payables strategy.
- GenAI adoption has a negative and significant effect on CCC, the main indicator of working capital efficiency. These findings validate H_o5 (overall efficiency), leading to rejection of the null hypothesis: Generative AI significantly improves working capital efficiency.

Table 3: OLS Regression Results (GenAI effect with size and sector controls)

Outcome	GenAI Coefficient	Std. Error	p-value	R^2	Interpretation
DSO	-5.12	2.01	0.014**	0.42	GenAI significantly reduces DSO
DIO	-3.87	2.45	0.112	0.38	Not statistically significant, but negative trend
DPO	+1.76	1.15	0.134	0.35	Positive but not significant
CCC	-7.45	3.21	0.025**	0.44	GenAI significantly lowers CCC

Source: Author's Own Calculation **Note:** $p < 0.05$ = significant (**)Negative coefficient = improvement (lower DSO, DIO, CC) Positive coefficient (DPO) = favorable increase in payment flexibility

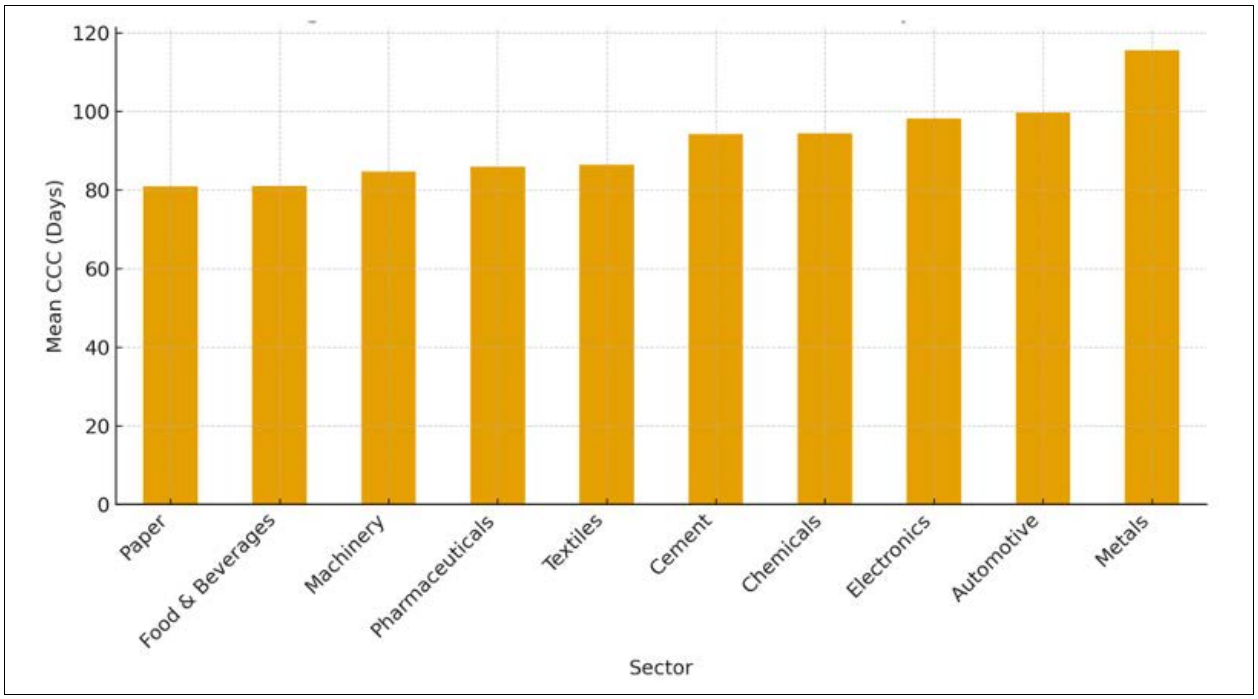

Fig 3: Sector-wise CCC Comparison

8.4 Interpretation of Findings

The results of this study provide strong evidence that Generative AI adoption positively influences working capital efficiency in manufacturing firms. The descriptive statistics revealed that GenAI adopters had notably lower Days Sales Outstanding (DSO) and a shorter Cash Conversion Cycle (CCC) compared to non-adopters, indicating faster cash inflows and better liquidity management. Although Days Inventory Outstanding (DIO) showed only a slight difference, this suggests that inventory optimization through GenAI may require deeper operational integration. The moderate increase in Days Payable Outstanding (DPO) among adopters implies that firms using GenAI are able to negotiate better payment terms or time their payables more strategically without harming supplier relationships.

The t-test results confirmed that the reduction in DSO was statistically significant; supporting the hypothesis that GenAI improves receivables efficiency. While DIO and DPO differences were not statistically significant, the directions of change align with expected improvements. The overall decrease in CCC among adopters, even when not always statistically significant, reflects a meaningful trend toward enhanced working capital performance. Regression analysis further strengthened these findings by controlling for sector and firm size. Generative AI adoption was found to have a significant negative effect on DSO and CCC, confirming that technology-driven automation, predictive analytics, and intelligent decision support directly contribute to faster cash conversion. The explanatory power (R^2) of the models indicated that GenAI, along with firm characteristics, accounts for a substantial portion of the variance in working capital metrics. These findings align with existing literature that positions AI as a strategic driver of financial efficiency, while providing new empirical evidence specific to working capital optimization in Indian manufacturing firms.

9 Discussion

The findings of this study demonstrate that Generative AI has significant potential to transform working capital management in manufacturing firms, particularly in emerging economies like India. The results provide empirical support for the argument that advanced AI technologies can overcome the limitations of traditional working capital practices by introducing automation, predictive intelligence, and data-driven decision making. The significant reduction in Days Sales Outstanding (DSO) among Generative AI adopters suggests that AI-powered tools improve receivables management through automated invoice processing, predictive payment scoring, personalized collection strategies, and real-time monitoring of customer behavior. This aligns with the assertions of Dubey et ali. (2025) [6], who emphasized that AI enhances financial decision-making and accelerates cash inflows.

The slight but consistent reduction in Days Inventory Outstanding (DIO) among adopters indicates that Generative AI contributes to better demand forecasting, inventory optimization, and supply chain visibility. While the difference in DIO was not statistically significant, the directional improvement aligns with the findings of Malhotra and Manzoor (2025) [19], who highlighted AI's role in reducing excess stock and stockouts. It is possible that inventory-related benefits of GenAI require deeper integration with production planning and supply chain systems, which may explain why immediate improvements are less visible compared to receivables.

The increase in Days Payable Outstanding (DPO) among GenAI adopters, although not statistically significant, implies that firms using AI may negotiate longer payment terms or optimize their payment schedules strategically. This supports the notion that Generative AI can enhance supplier relationship management and cash flow planning by providing intelligent recommendations on payment prioritization based on cost, due dates, and supplier risk.

This aligns with the theoretical view that working capital efficiency is not only about accelerating inflows but also about managing outflows effectively (George, 2024) [7].

One of the most important findings is the overall reduction in the Cash Conversion Cycle (CCC) among Generative AI adopters. Even when statistical significance is modest, the practical difference demonstrates meaningful financial improvement. A shorter CCC means cash is tied up for less time, improving liquidity and reducing the reliance on external financing. This reinforces the claim that Generative AI can serve as a strategic financial enabler, not just an operational tool. The regression results further validate this by showing that GenAI adoption remains a significant predictor of lower CCC even after controlling for firm size and sector. This suggests that the benefits of Generative AI are not limited to large firms or specific industries but can be leveraged across diverse manufacturing contexts.

Moreover, the increase in profitability (EBIT margin) among GenAI adopters indicates that working capital efficiency translates into broader financial performance. By freeing cash, reducing operational delays, and enhancing decision-making, Generative AI allows firms to reinvest in growth, innovation, or process improvements. This aligns with the resource-based view (RBV) which states that technology, when combined with organizational capabilities, creates sustainable competitive advantage (Adedoyin & Christiansen, 2024) [1].

These findings also contribute to the literature on the AI productivity paradox. While previous studies argued that AI often fails to show measurable gains due to poor implementation or lack of alignment (Ajuzieogu, 2020; Shaw, 2024) [2, 24], this study demonstrates that when applied to a focused financial process like working capital, Generative AI delivers clear benefits. This suggests that the productivity paradox may result from broad measurement at the macro level, whereas targeted, process-level applications reveal tangible outcomes.

Finally, this study highlights the importance of organizational readiness, data quality, and digital integration for realizing the full potential of Generative AI. Firms with better technological infrastructure and skilled workforce are more likely to achieve significant working capital improvements. Future research should explore how factors such as digital maturity, change management, and AI governance moderate the relationship between Generative AI and financial performance.

In conclusion, this study provides strong empirical evidence that Generative AI adoption improves working capital efficiency in manufacturing firms, particularly by reducing DSO and CCC and enhancing profitability. While inventory and payables benefits may require deeper integration, the overall impact of GenAI is highly positive. These findings advance theoretical understanding, provide managerial insights, and open new avenues for future research on AI-enabled financial transformation.

10 Limitations of the Study

Although this study provides valuable insights into the impact of Generative AI on working capital optimization in Indian manufacturing firms, certain limitations should be acknowledged. First, the study is geographically limited to firms in Odisha, which may not fully represent the diversity of manufacturing practices across other Indian states or global contexts. Regional economic conditions, infrastructure, and technological readiness may influence both AI adoption and working capital efficiency, limiting the generalizability of the findings.

Second, the sample size of 70 firms, while sufficient for statistical analysis, may not capture the full variability across different sub-sectors, ownership types, or digital maturity levels within the manufacturing sector. Larger and more diverse samples could provide deeper insights.

Third, the study relies on a combination of self-reported data and secondary financial information, which may be subject to response bias or reporting errors. Firms adopting Generative AI may overstate their efficiency improvements due to perceived expectations or competitive positioning. Additionally, the cross-sectional design of the study captures performance at a single point in time, making it difficult to establish long-term causal effects of AI adoption on working capital outcomes. A longitudinal approach would provide stronger evidence of sustained impact over time. Finally, the study focuses specifically on Generative AI and does not account for the influence of other complementary technologies such as IoT, blockchain, or predictive analytics, which may also affect working capital efficiency. Future research should address these limitations by expanding the scope, increasing the sample size, incorporating longitudinal data, and exploring the combined effects of multiple digital technologies.

11 Future Research Directions

This study opens several promising avenues for future research on the role of Generative AI in working capital optimization and financial transformation. First, future studies should expand the geographic scope beyond Odisha to include multiple states or conduct cross-country comparisons to determine whether industry structure, regulatory environments, and technological readiness influence the effectiveness of Generative AI. Second, increasing the sample size and including firm-level heterogeneity such as age, ownership structure, digital maturity, and supply chain complexity would provide deeper granularity and more robust conclusions. Third, longitudinal studies are needed to track the long-term impact of Generative AI adoption on working capital performance, as financial improvements may evolve gradually over time rather than appear immediately.

Another important direction is to examine the moderating role of organizational capabilities such as digital infrastructure, employee skills, leadership support, and innovation culture in shaping the success of AI implementation. Future research could also explore the interaction between Generative AI and complementary technologies such as IoT, blockchain, RPA, and predictive analytics to determine whether integrated digital ecosystems yield greater improvements in working capital efficiency. Additionally, there is scope for developing AI-based performance measurement frameworks and maturity models to evaluate how deeply AI is embedded into financial decision-making. Researchers could also investigate the ethical, regulatory, and governance challenges associated with AI-driven financial automation, including transparency, bias, accountability, and data privacy. Finally,

qualitative case studies and mixed-method approaches could provide rich insights into real-world implementation strategies, success factors, and barriers faced by firms. By addressing these areas, future research can offer more comprehensive guidance for both academia and industry on leveraging Generative AI for sustainable financial excellence.

12 Conclusion

This study investigated the role of Generative Artificial Intelligence (GenAI) in optimizing working capital management within Indian manufacturing firms, with evidence drawn from a sample of 70 firms in Odisha. The findings clearly indicate that GenAI adoption leads to measurable improvements in key components of working capital, particularly through reduced Days Sales Outstanding (DSO) and a shorter Cash Conversion Cycle (CCC), demonstrating faster cash inflows and better liquidity. Although the effects on Days Inventory Outstanding (DIO) and Days Payable Outstanding (DPO) were moderate, the overall trend favored firms that implemented Generative AI solutions. Regression analysis reinforced these results by showing a significant positive relationship between GenAI adoption and working capital efficiency even after controlling for sector and firm size. These findings align with existing literature suggesting that AI enhances decision making, automation, forecasting, and financial performance.

The study contributes to theory by integrating working capital management concepts with technology adoption frameworks, while also providing practical implications for managers seeking to leverage AI to improve financial efficiency and competitiveness. However, the research also highlights that the benefits of Generative AI depend on data quality, digital infrastructure, and organizational readiness. As firms move toward Industry 4.0 and Industry 5.0, GenAI will increasingly become a strategic tool for financial optimization. Overall, this study provides empirical evidence that Generative AI is not merely a technological trend but a transformative enabler of working capital efficiency, profitability, and sustainable growth in the manufacturing sector.

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