



The Transformative Role of Artificial Intelligence in Procurement and Vendor Management: A Study of WOOP Model at Select Supermarkets in the Twin Cities of Hyderabad and Secunderabad

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ABSTRACT :It's a silent revolution taking place outside the out and out counters of city supermarkets in Hyderabad and Secunderabad. This study investigates the increasing utilization of AI in procurement and vendor management, by considering the latter's impact on the retail sector. With the need for supply optimization and cost minimization in the global retail environment, AI is not just the helper; it's the partner that simplifies their tasks and provides prescriptive and predictive analytics to guide super market owners to take essential decisions. Furthermore, the implication of AI is enormous.

Our research integrates qualitative and quantitative data, drawing insights from key areas to highlight the benefits and challenges of integrating AI into existing processes. We delve into how traditional human workflows are evolving and investigate whether artificial intelligence genuinely enhances the resilience and efficiency of supply chains or if it brings forth new challenges. This study aims to serve as a practical guide for businesses navigating the changing retail landscape, with a focus on future AI implementations informed by an analysis of current adoption trends.

Key Words:Artificial Intelligence (AI), Procurement, Vendor Management, Supply Chain Management, Supermarkets, Retail, Predictive Analytics, Automation.

Introduction

The role of procurement management has significantly changed from being a mere administrative task to a vital strategic function that impacts an organization's financial stability and supply chain effectiveness. Traditionally, procurement has been bogged down by manual processes, scattered data, and a reactive mindset, which can result in inefficiencies, unclear spending, poor supplier relationships, and increased supply chain risks. However, the rise of artificial intelligence (AI) is transforming this landscape, ushering in an era of "intelligent procurement." With technologies such as machine learning and predictive analytics, procurement professionals can now analyse large and complex datasets quickly and effectively, enhancing their decision-making capabilities. This introduction will delve into how AI is revolutionizing the procurement lifecycle, automating routine tasks, and enabling advanced functions such as risk assessment and demand forecasting. As a result, procurement teams can shift their focus from administrative duties to more strategic activities, fostering innovation and building a resilient supply chain for the future.

In the fast-paced and interconnected world of business today, effective vendor management is essential for success. Companies depend on a diverse range of third-party partners for everything from materials and software to services and logistics. However, traditional vendor management often relies on time-consuming manual processes, scattered data, and reactive strategies, which can create problems such as poor visibility, inefficient contract handling, increased compliance risks, and lost opportunities for savings and innovation. The rise of Artificial Intelligence (AI) is changing this scenario dramatically. AI is evolving from just a tech tool to a key player in enhancing vendor management by automating, analysing, and optimizing processes. With capabilities such as machine learning and predictive analytics, AI can handle large volumes of data—such as contract details and performance metrics—much faster and more effectively than human teams can. This shift is transforming every aspect of the vendor lifecycle, from smarter vendor selection and automated contract negotiations to ongoing performance monitoring and risk assessment. By streamlining routine tasks and providing valuable insights, AI empowers vendor management professionals to focus on building stronger, more collaborative partnerships that drive value.

Need for the Study

Artificial intelligence (AI) presents a valuable opportunity to address ongoing inefficiencies in various sectors. Despite its potential, there is a significant gap between the advantages that AI can offer and its actual use in procurement, particularly in India. This study seeks to bridge that gap by showcasing real examples of AI being used in Indian procurement, evaluating its benefits such as improved efficiency and cost reductions, identifying the obstacles organizations encounter when integrating AI, and providing practical recommendations for businesses and policymakers to effectively leverage AI for a more flexible and resilient supply chain. The present study is undertaken in the **WOOP (Wish Outcome Obstacles Plan) Model**, in which the goal inspired is the application of AI with an Outcome of Visualizing the most successful way to focus on procurement and vendor management against the obstacles faced by supermarkets that might hinder their progress and Planning for development with clear steps to overcome these challenges.

Review of Literature

Artificial Intelligence (AI) is fundamentally transforming procurement and supply chain management across multiple dimensions. AI technologies are revolutionizing traditional procurement processes through advanced data analytics, automated decision-making, and predictive capabilities, enabling organizations to address longstanding challenges in supplier selection, demand forecasting, and contract management (Tatini, 2025). Key AI technologies, including machine learning, natural language processing, and robotic process automation, are reshaping logistics, procurement, and distribution networks while facilitating real-time monitoring and data-driven decision-making (Mohammed et al., 2025). The integration spans critical supply chain functions such as procurement, production, inventory management, and customer service, with AI enhancing efficiency, reducing costs, and improving overall decision-making processes (Jubair, 2025). However, implementation challenges persist, including data security concerns, high initial investment costs, technical difficulties, and the need for skilled professionals (Mohammed et al., 2025; Jubair, 2025). Despite these challenges, AI is transforming procurement from a purely operational function into a strategic driver of business value (Tatini, 2025).

AI's transformative impact on business operations and supply chain management was demonstrated in recent research. Mohammed et al. (2025) explore how AI revolutionizes business efficiency through enhanced demand forecasting, inventory management, and automated processes. The authors highlight key AI technologies, including machine learning, natural language processing, and robotic process automation, that reshape logistics, procurement, and distribution networks. AI enables data-driven decision-making, improved supplier collaboration, and real-time supply chain monitoring while supporting sustainability through waste reduction and energy efficiency improvements (Mohammed et al., 2025). Jubair (2025) provides a comprehensive review of AI integration across supply chain functions, examining applications in procurement, production, inventory management, logistics, and customer service. The study identifies various AI technologies, including predictive analytics, robotics, computer vision, blockchain, and IoT, that enhance efficiency and reduce costs (Jubair, 2025). Both studies acknowledge implementation challenges, including data security concerns, high initial investment costs, technical difficulties, and the need for skilled professionals, emphasizing the importance of strategic integration and ethical guidelines for successful AI adoption.

The integration of artificial intelligence in procurement presents both significant opportunities and implementation challenges. AI applications in procurement can streamline processes such as invoice processing, demand planning, supplier selection, and order management, leading to improved efficiency and cost reduction (Behera & Tjprc, 2020; Guida et al., 2023). The technology enables comprehensive purchase-

to-pay and source-to-pay management within single modules, eliminating physical documentation and increasing productivity threefold (Behera & Tjprc, 2020). However, despite AI's potential, its adoption in procurement remains limited compared to other sectors (Guida et al., 2023). Implementation faces obstacles, including data quality issues and the need for skill enhancement among procurement professionals (Guida et al., 2023). Research suggests that hybrid intelligence—combining human and artificial intelligence—may be more effective than purely AI-driven approaches, as it mitigates individual limitations while enhancing performance in cost, time, and quality metrics (Burger et al., 2023). This iterative hybrid approach addresses the risks associated with unilateral application of either human or artificial intelligence in procurement processes.

The economic perspective on artificial intelligence in procurement centers on AI's fundamental capability to reduce prediction costs. Agrawal et al. (2019) argue that AI's primary economic function is significantly lowering the cost of prediction rather than delivering true intelligence. This insight has direct applications in procurement, where reduced prediction costs enable more affordable forecasting of supplier performance, demand fluctuations, and supply chain disruptions (Heath, 2019).

In procurement operations, AI addresses critical challenges by searching and extracting relevant information across thousands of digital sources to identify potential suppliers, leading regional vendors, and market developments like consolidations or mergers (Chopra, 2019). The technology's ability to process contextual training on procurement market intelligence allows for rapid categorization and analysis across various procurement subjects (Chopra, 2019). This transformation enables procurement teams to shift from reactive, historical data-dependent approaches to proactive, data-driven strategies, fundamentally changing procurement into prediction-centered process that can achieve notable improvements in supply chain management (Chopra, 2019).

Artificial intelligence plays a vital role in supply chain risk management (SCRM). AI and machine learning technologies enable organizations to process vast, multidimensional data sources from news articles, social media, and weather updates to identify, assess, and mitigate supply chain risks in realtime (D'Aquila, 2020; Baryannis et al., 2018). These technologies facilitate predictive capabilities for forecasting supplier failures, geopolitical tensions, and natural disasters, enabling more resilient sourcing strategies (D'Aquila, 2020). AI applications span various SCRM phases, from mathematical programming to big data analytics, addressing identification, assessment, and response tasks (Baryannis et al., 2018). The evolution from manual to AI-driven processes has improved operational efficiency, cost optimization, and strategic decision-making across manufacturing, retail, and technology sectors (Tatini, 2025). However, implementation challenges persist, including data privacy concerns, legacy system integration, and skill gaps (Tatini, 2025). Despite these challenges, AI is transforming procurement from an operational function to a strategic driver of business value (Ganesh & Kalpana, 2022).

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Ganesh & Kalpana (2022) conducted a systematic review of 127 papers, revealing that AI and machine learning enable proactive and predictive risk management mechanisms, helping supply chains become more resilient through intelligent decision-making based on multiple data sources. Baryannis et al. (2018) provided a comprehensive mapping of AI methodologies in SCRM, categorizing applications from mathematical programming to machine learning across risk identification, assessment, and response tasks. Riad et al. (2024) proposed a conceptual framework showing how AI technologies like machine learning and predictive analytics enhance supply chain resilience through improved demand forecasting, inventory optimization, and real-time visibility. Daio et al. (2025) confirmed AI's critical role in promoting supply chain visibility and resilience during global crises while identifying implementation challenges and emphasizing the importance of human-centric AI approaches for sustainable supply chain management.

Research Gap

The present research highlights AI's transformative role in vendor management; significant gaps remain. Most studies focus on large corporations, leaving limited empirical data on AI adoption and its impact on cost savings and efficiency in small and medium-sized enterprises (SMEs) across diverse industries. This is important to understand as it emphasizes AI's automation of routine tasks but underexplores its potential to improve strategic vendor relationships and drive innovation for long-term value. Challenges and opportunities in human-AI collaboration and shifts in vendor managers' roles are rarely addressed. Moreover, bridging the gap between procurement and vendors' perspectives on AI-enhanced systems, including concerns about transparency, data sharing, and algorithmic bias, is often overlooked, yet crucial for building trust and successful AI implementation.

Objectives of the Study

1. To assess the impact of AI on key performance indicators in procurement and vendor management.
2. To examine the adoption and specific applications of Artificial Intelligence in the procurement and vendor management.
3. To analyse the perceived benefits and challenges of integrating AI technologies into the procurement and vendor management

Research Methodology

Objective: To explore how AI is transforming procurement and vendor management, focusing on adoption levels, perceived benefits, and implementation challenges.

Methodology: Mixed-methods, with a primary focus on quantitative data collected via a structured questionnaire.

Framework: WOOP (Wish, Outcome, Obstacles, Plan) Model to guide the study.

Participants: Procurement and vendor management professionals in supermarkets in Hyderabad and Secunderabad.

Data Collection: Online Google Form for broad reach and efficient data gathering.

Analysis: MS Excel is used for correlations analysis.

Outcomes: Insights into AI adoption levels, benefits, and challenges in the industry.

Artificial Intelligence

Artificial Intelligence (AI) is transforming the role for procurement and vendor management in super markets has the capability of machines and computer systems to carry out tasks that typically require human intelligence. These tasks encompass learning, reasoning, problem-solving, decision-making, speech recognition, and visual perception. AI operates by analysing vast amounts of data, identifying patterns, and utilizing algorithms to make predictions or take actions. It is crucial to approach the use of AI responsibly and thoughtfully to ensure efficient operations in the field of procurement and vendor management.

Procurement Management

The traditional procurement function, which has typically focused on tactical and transactional tasks, is experiencing a significant change due to the rise of Artificial Intelligence (AI). This evolution shifts procurement from a manual and reactive approach to a proactive and data-driven strategy, fundamentally altering how organizations source, purchase, and manage their supply chains. The integration of AI goes beyond simple task automation; it enhances human decision-making, offers strategic insights, and fosters a more resilient and efficient procurement process.

AI is being utilized throughout the entire procurement lifecycle, from sourcing to payment, with key applications that enhance its effectiveness. One notable application is intelligent spend analysis, where AI systems can process and analyse large amounts of both structured and unstructured spend data from various sources, such as invoices and purchase orders. By employing natural language processing (NLP), these systems can automatically categorize spending, detect non-compliant purchases, and reveal cost-saving opportunities that human teams might miss. This advancement transforms spend analysis from a historical review into a real-time, predictive tool, granting procurement leaders valuable insights into spending patterns and enabling informed decisions regarding supplier management and category strategies.

AI algorithms can efficiently evaluate thousands of potential suppliers by analysing various factors such as financial stability, sustainability scores, historical performance, and real-time risk signals like news reports and geopolitical issues. This technology streamlines the often-tedious Request for Proposal (RFP) process, allowing businesses to quickly and accurately identify the most suitable suppliers.

This innovative approach shifts sourcing from a slow, keyword-focused task to a more intelligent, risk-aware strategy. It shortens the time needed to onboard new vendors, increases supplier diversity, and ensures that partnerships are based on solid, data-driven insights rather than outdated and limited research methods.

Vendor Management

Vendor management plays a vital role in businesses by managing relationships with third-party suppliers to ensure they provide value, comply with contracts, and meet performance expectations. Historically, this process has been labour-intensive, relying heavily on manual data entry and often reacting to issues and risks. However, the introduction of Artificial Intelligence (AI) is significantly reshaping this area, turning vendor management from a basic operational task into a strategic element that enhances efficiency, value, and resilience.

AI's influence is apparent throughout the vendor lifecycle, enhancing human efforts and automating repetitive tasks. For instance, AI-driven systems can sift through extensive datasets of potential vendors, evaluating not just standard criteria but also factors like financial stability, reputational risks, compliance records, and sustainability efforts. This data-driven approach streamlines the vendor selection process, cutting down on the time needed for manual evaluations, broadening the supplier pool, and reducing the chances of partnering with unreliable or non-compliant vendors. Additionally, AI can simplify onboarding by automating the collection and verification of vendor information, including contracts and certifications, while Natural Language Processing (NLP) can analyse legal documents to ensure they align with internal policies.

Results

In the select super markets, an inventory system is adopted to place an order with vendors as Economic Ordering Quantity in respect of various items.

The EOQ analysis has been carried out by selecting 10 different products. The products are selected using simple random sampling technique.

The formula used to calculate EOQ is:

$$\text{Economic Order Quantity } Q^* = \sqrt{2AB/C}$$

Where; D= Demand or consumption; K=ordering cost; h=carrying cost

Product A: Ashirvad Aata

A=3721; B=10000; C=5

$$EOQ = \sqrt{2 \times 3721 \times 10000 / 5}; \text{ Therefore, } EOQ = 3858$$

Analysis & Interpretation:

The consumption of this product is 3721 units, whereas we can see the economic order quantity of this product is 3878 units, which indicates that there may be an increase in the ordering cost of that particular product at the time of shortages.

Product B: Chilli Powder

A=1947; B=2000; C=2

$$\sqrt{2 \times 1947 \times 2000}$$

Therefore, EOQ=1973 units

Analysis & Interpretation:

The consumption of this product is 1947 units, whereas we can see the economic order quantity of this product is 1973 units, which indicates that there may be an increase in the ordering cost of that particular product at the time of shortages. But there is not much difference between the consumption and EOQ hence it will not have much impact on the ordering cost.

Product C: Turmeric Powder

A=927; B=1000; C=2

$$\sqrt{2 \times 927 \times 1000}$$

$$Q = \frac{\quad}{2}$$

Therefore, EOQ=962 units

Analysis & Interpretation:

The consumption of this product is 927 units, whereas we can see the economic order quantity of this product is 962, which indicates that there may be an increase in the ordering cost of that particular product at the time of shortages. But there is not much difference between the consumption and EOQ hence it will not have much impact on the ordering cost.

Product D: Oreo biscuit

A=16072; B=5000; C=1

$$Q = \sqrt{2 \times 16072 \times 5000 / 1}$$

Therefore, EOQ=12677 units

Analysis & Interpretation:

The consumption of this product is 16072 units whereas we can see the economic order quantity of this product is 12677, which indicates that there may be an increase in carrying cost of the product. The reason behind the high stock maintained by the company may be discounts given by distributors for purchasing in bulk quantity but because of this the carrying cost increases.

Product E: Cool Drink (Coke)

A=45912; B=20000; C=1

$$\sqrt{2*45912*20000}$$

$$Q = \frac{\quad}{1}$$

Therefore, EOQ=42854 units

Analysis & Interpretation:

The consumption of this product is 45912 units whereas we can see the economic order quantity of this product is 42854 units, which indicates that there may be an increase in carrying cost of the product. The reason behind the high stock maintained by the company may be discounts given by distributors for purchasing in bulk quantity but because of this the carrying cost increases.

Product F: Lays Chips

A=3965 units; B=1500; C=1

$$Q = \sqrt{2*3965*1500/1}$$

Therefore, EOQ=3448 units

Analysis & Interpretation:

The consumption of this product is 3965 units, whereas we can see the economic order quantity of this product is 3448 units, which indicates that there may be an increase in carrying cost of the product. The reason behind the high stock maintained by the company may be discounts given by distributors for purchasing in bulk quantity but because of this the carrying cost increases.

Product G: Cool Drink (Pulpy Orange)

A=10266 units; B=5000; C=1

$$Q = \sqrt{2*10266*5000/1}$$

Therefore, EOQ=10132 units

Analysis & Interpretation:

The consumption of this product is 10266 units whereas we can see the economic order quantity of this product is 10132, which indicates that there may be an increase in carrying cost of the product. The reason behind the high stock maintained by the company may be discounts given by distributors for purchasing in bulk quantity but because of this the carrying cost increases.

Product H: Coffee powder

A=5878 units; B=3000; C=1.5

$$Q = \sqrt{2*5878*3000/1.5}$$

Therefore, EOQ=4849 units

Analysis & Interpretation:

The consumption of this product is 5878 units, whereas we can see the economic order quantity of this product is 4849 units, which indicates that there may be an increase in carrying cost of the product. The reason behind the high stock maintained by the company may be discounts given by distributors for purchasing in bulk quantity but because of this the carrying cost increases.

Product I: Orange Juice (Tropicana)

A=1390 units; B=1500; C=2

$$Q = \sqrt{2*1390*1500/2}, \text{ Therefore, EOQ}=1443 \text{ units}$$

Analysis & Interpretation:

The consumption of this product is 1390 units, whereas we can see the economic order quantity of this product is 1443 units, which indicates that there may be an increase in carrying cost of the product. The role of procurement has significantly changed from being a mere administrative task to a vital strategic function that impacts an organization's financial stability and supply chain effectiveness. Traditionally, procurement has been bogged down by manual processes, scattered data, and a reactive mindset, which can result in inefficiencies, unclear spending, poor supplier relationships, and increased supply chain risks. However, the rise of artificial intelligence (AI) is transforming this landscape, ushering in an era of "intelligent procurement." With technologies such as machine learning and predictive analytics, procurement professionals can now analyse large and complex datasets quickly and effectively, enhancing their decision-making capabilities. This introduction will delve

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Product j: Chocolate (Dairy Milk silk)

A=1025 units; B=1000; C=2

$Q = \sqrt{2 \times 1025 \times 1000 / 2}$, Therefore, EOQ=1012 units

Analysis & Interpretation:

The consumption of this product is 1025 whereas as we can see the Economic order quantity of this product is 1012, which indicates that there may be increase in carrying cost of the product. The reason behind the high stock maintained by the company may be discounts given by distributors for purchasing in bulk quantity but because of this the carrying cost increases.

Table 1: Correlation Matrix of Key Variables: Technological Maturity, Perceived Efficiency, and Risk Mitigation from AI Implementation

Variable	Technological Maturity	AI Improved Efficiency	AI Enhanced Risk Mitigation
Technological Maturity	1	0.87	0.9
AI Improved Efficiency	0.87	1	0.84
AI Enhanced Risk Mitigation	0.9	0.84	1

Discussion in the WOOP (Wish, Outcome, Obstacles, Plan) Model

Discussion on Objective 1:

The study revealed that there is a strong awareness of artificial intelligence in procurement and vendor management, with 95% of respondents acknowledging its importance. However, the actual adoption of AI in these areas remains quite low, with fewer than 20% of organizations having implemented it. Additionally, a notable 45% of organizations are still in the early stages, either piloting or planning to integrate AI into their processes. The most common application of AI is in tactical, back-office processes, such as invoice processing and three-way matching (used by 65% of implementing firms), while its use in strategic functions like predictive risk assessment (15%) is significantly lower. There is a strong positive relationship between the maturity of technology and the perceived enhancement of operational efficiency through AI, with a correlation coefficient of approximately 0.87. This indicates that individuals who view their procurement systems as more advanced in technology are also more likely to believe that AI contributes to improved efficiency in their operations.

A significant negative correlation of approximately -0.72 was identified between the challenges of data quality and the trust in AI-driven decisions. This suggests that when organizations face difficulties with data quality, their trust in the accuracy and dependability of insights generated by AI tends to decrease. The use of AI in spend analysis showed a significant positive impact on perceived cost reduction ($t=3.45$, $p<0.01$). This indicates that organizations using AI for this purpose reported greater success in identifying and realizing cost savings compared to those that do not identify cost savings. The application of AI in managing vendor risks has demonstrated a moderate yet significant link to fewer disruptions in the supply chain, with a correlation coefficient of approximately 0.45. This indicates that AI contributes to strengthening the resilience of supply chains.

Discussion on Objective 2:

Organizations have a very positive outlook on AI's potential to enhance operational efficiency. This suggests that AI is mainly viewed as an effective tool for streamlining internal processes that are predictable and measurable. The favourable perception likely stems from AI's success in automating routine tasks like data entry, invoice matching, and report generation, which results in noticeable improvements in speed and cost savings. The analysis reveals a significant yet often neglected obstacle to the adoption of AI: ethical concerns. Notably, these issues emerge as the primary challenge, even more pressing than factors like trust and vendor readiness, which is a critical insight.

Discussion on Objective 3:

The analysis indicates that organizations generally have a favourable outlook on AI's potential to enhance operational efficiency, but they are less optimistic about its effectiveness in reducing supply chain risks.

This implies that while companies recognize AI as a valuable asset for streamlining internal processes, they may lack confidence in its capacity to tackle external, complex, and unpredictable challenges. Furthermore, ethical concerns emerge as the primary obstacle to AI adoption, overshadowing issues related to trust and vendor readiness. The neutral perspective on trust and the mild disagreement regarding vendor preparedness suggest that these factors are not currently significant barriers.

Conclusion

The research shows a stark contrast in the way businesses perceive AI's role. However, many businesses are comfortable with AI to drive efficiencies in internal processes, where return on investment can be readily calculated, such as improving operational productivity. Yet, there is a clear hesitancy around how effective AI can be when dealing with external and complex issues – in particular, by reducing exposure to supply chain risk. This suggests that even if businesses are willing to trust AI to manage structured data, and for relatively routine activities, they are less certain of its capability to process the unpredictable world of global supply chains. It also underscores a key but often forgotten hurdle to AI adoption: ethics come before trust and vendor support.

It has been evidenced by this research that AI is perceived very positively, however, supermarkets are considered to be in the early stages of adopting such a technology. Organisations are working on whether this will work and how to implement it rather than using it to saturate an entire infrastructure. Firstly, they're applying AI in an automation first approach to improve operational efficiency to easily measure those digital transformation results, and then move on to more complicated applications that require better data and higher levels of confidence in the predictions made by AI. This observation is consistent with the notion that the benefits of AI are greatest among companies with an already robust tech stack. It also highlights a major challenge of successful AI deployment — critical to achieving a form of effective data governance and cleansing that is a prerequisite to developing working AI.

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