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Impact of AI-Enabled Supply Chain Analytics on Operational Efficiency in Indian SMEs

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ABSTRACT

In 2026, AI enabled supply chain analytics are transforming from experimental stage to more critical stage for Indian companies. Globalization has given rise to volatile demand patterns, infrastructural limitations and competitive challenges which are increasing pressure on management of supply chain in Indian SMEs. With intelligent automation and integration of data enterprise system, AI tools can help companies in route management, supply risk assessment and anomaly detection effectively. Research paper focuses on how AI enabled supply chain management analytics affects operations performance in Indian SMEs in various areas such as generative and Agentic AI method for decision making, robotic warehousing and waste reduction etc. This study has accepted the qualitative and explanatory research design to investigate the relationship of AI enabled supply chain analytics and operational efficiency in Indian small and medium enterprises. However, research concentrates on qualitative issues, financial and skill gaps, it also covers the limitations of digital infrastructure and data quality issues for SMEs. Government policies are also included in this paper to give proper insights for digital initiative taken for cloud-based analytics platforms for providing benefit to the Indian companies. AI technology and its contribution for the supply chain operations of Indian SMEs with sustainable growth in digital and data centric environment is elaborated.

Keywords: SMEs, MSME, AI Driven Technology, Supply Chain Management

Introduction

Indian economy has seen the incremental rise in the GDP over the past years, SMEs are contributing nearly 30% of GDP and more than 110 million employments in various sectors like manufacturing, retail, logistics and agriculture. However, SMEs are more reliant on the manual operations rather than automation due to lack of financial support. Rise of supply chain participation of Indian SMEs, "Indian government has provided SRI (Self Reliant Fund) to infuse ₹50,000 crore as equity funding in MSMEs, has assisted 682 MSMEs by way of investment worth ₹15,442 crore, as of 30th November 2025."[1] With innovative institutions, SMEs can be provided with more incubation facilities, protection of IPR and help with the design intervention.

India's AI market is projected to touch $17 billion by 2027, growing at an annualized rate of 25%-35% between 2024 and 2027.[2] The AI market size in transportation and logistics grew from USD 0.14 billion in 2019 to USD 0.40 billion in 2024. It is projected to grow at a CAGR of 41.9% during 2025-2032, from USD 0.58 billion in 2025 to USD 6.77 billion in 2032.[3] AI enabled supply chain analytics with predictive models can help with decision making at fast pace than traditional business intelligence. AI analytics assists with data pattern which can review consumer behavior and generate predictive insights. "Generative and agentic AI are expected to see growing use. Gen AI can be used to turn complex data into simple, usable insights for faster decision-making. Agentic AI takes it further as it can go beyond traditional tools, offering autonomous solutions."[4]

[1] https://www.pib.gov.in/PressReleasePage.aspx?PRID=2219984&reg=3&lang=2
[2] https://nasscom.in/ai/ai-enablement/pdf/enablement-of-ai-for-msme-whitepaper.pdf
[3] https://www.cci.gov.in/images/marketstudie/en/market-study-on-artificial-intelligence-and-competition1759752172.pdf
[4] https://kpmg.com/in/en/blogs/2026/01/supply-chains-in-a-changing-world-top-3-trends-to-watch-out-for-in-2026.html

In the 2026 summit, India has highlighted the impact of technological intervention in the supply chain optimization for food-grain transportation. 'It has resulted in savings of nearly ₹250 crore of public funds by analyzing demand, stock availability and logistics routes, thereby reducing costs, transit time and improving supply-chain resilience.'[5] This milestone was achieved with the initiative of Anna chakra scheme implemented by government where funds were saved by analyzing supply, demand of grain and logistics routes in advance to reduce the transit time and cost. "On the NASSCOM AI Adoption Index, India scores 2.45 out of 4, showing that **87%** of enterprises are actively using AI solutions. About 26% of Indian companies have achieved AI maturity at scale, according to a recent BCG survey."[6]

Statement of the Problem

Traditional ways of supply chain management are not sufficient for providing prompt services to the customer. Specially SMEs have faced the delays due to old methods which has cost them loss of customers. AI transformation has brought improvisation in supply chain management such as inventory management, demand forecasting and proper co-ordination among the place of manufacturing and place of consumption. However, adoption of AI enabled analytics in SMEs, there are still some limitations which are blocking the growth of business such as lack of resources, high technological cost, and unskilled employees etc.

Though large organisations are implementing AI in their supply chain management to earn the measurable benefits and profit but it is difficult to say the same for Indian SMEs. It is essential to understand challenges Indian SMEs are facing while implementing AI analytics in their business. As many SME owners are not technologically savvy to implement AI analytics in supply chain management system. Adoption of AI also depends on organisational and environmental factors, it is important to know the potential of value creating technologies before taking decision related to digital transformation in SMEs.

Significance of Study

This study explores importance of small and medium enterprises for Indian economies and government initiative to implement AI enabled supply chain management to develop the this sector effectively this research focuses on the barriers in implementing this evolving system to make supply chain management process more effective and efficient. This study may help to understand current situation of Indian SMEs in operational efficiency and resource utilization.

Findings of this study will help to understand the impact of AI related services on supply chain management. This study recommends suggestions to the government to support SMEs with the proper development of AI enabled services. Proper insight may provide financial incentives and training support to the Indian SMEs for implementation of AI driven supply chain management. Indian SMEs can be at advantage in the global competitive market with the improved AI enabled supply chain management. This may bring more economic value to the country and good reputation for the companies.

Limitations of Study

Due to time constraint, this study has considered limited numbers of government and none government reports, research papers and Indian government policies. This may result in data which may not fully represent all SMEs across India. All Indian SMEs have not adopted the similar level of AI technology for their logistics which may change the basic statistical information. Data has been prepared on the basis of government and private organisations report which may be collected for other objective and may not fully support the purpose of this study. AI technology is evolving day by day, finding of the research may become outdated soon just like the technology.

[5] https://www.pib.gov.in/PressReleasePage.aspx?PRID=2229892&reg=3&lang=2
[6] https://www.pib.gov.in/PressReleasePage.aspx?PRID=2178092&reg=3&lang=2

Objective of the Study:

1. To find out whether government schemes related to financial support in implementation of AI analytics in SME units are successful or not.
2. To find out the impact of AI-enabled Supply chain management on Operations efficiency in SMEs in India is positive or not

Hypothesis:

For objective 1 :-

- H1- Government schemes related to financial support in implementation of AI analytics in SME is successful
- H0-Government schemes related to financial support in implementation of AI analytics in SME is unsuccessful

For objective 2 :-

- H1- Impact of AI-enabled Supply chain management on Operations efficiency in SMEs in India is positive
- H0- impact of AI-enabled Supply chain management on Operations efficiency in SMEs in India is negative

Literature Review

AI in Supply Chain Management **(**Daniel Rockbridge, 2025) focuses on involvement of AI technology to improve supply chain management functions such as logistics, inventory management, risk management etc. It gives practical examples with case studies to explain the implication of AI has helped many businesses to reduce cost and anticipate future demands with predictive models. Supply chain transformation through Generative AI and Machine Learning (Ahielmona, 2025) states example of Walmart using Gen AI chatbot to negotiate with the human suppliers with precision and minimal risk. Initially, Use of machine learning algorithm to understand suppliers with limited options but after proper feedback from the suppliers, they made changes to the chatbot system and added more options to the system for better negotiation experience to the suppliers and customers. It shows that Gen AI has been implemented to solve the real world business issues in supply chain management and brings satisfactory benefits to the customers.

The AI revolution: transforming Supply Chain Management (Stanton, 2025) explains that AI enables proactive control with the help of machine learning and NLP (natural language processing) on the future situations before they arise. AI has potential to take corrective actions in advance on core inefficiency and vulnerability. With the help of AI, companies gain in-depth knowledge of potential disruptions and make them ready for future with effective response mechanism. Artificial Intelligence approach for enhancing vehicle routing problems solutions: integrating smart lockers dynamic delivery and pick up operations (Ejjanfi, 2025) is a research paper which focuses on use of AI to solve the issue of routing of vehicle to save time and cost. It insists how heuristic algorithm is used to solve the urban problem. with critical evaluation on how to handle real time supply chain management challenges with vehicle route problem and smart locker adjustment.

In book 'AI and Automation for SME Leaders: A Comprehensive Guide to Digital Transformation' (Lal, 2025) author explains about the cloud based AI tools for SME units which reduces the cost of investment in infrastructure. It also helps companies to avail services on subscription model which allows them to pay only for what they are using. The AI Advantage: Empowering SMEs in a Digital World: Own the Future, 2025 insists that use of AI helps SME to operate efficiently and make informed choices based on real time information which helps them to provide prompt response to the market trends and changing consumer behaviour. The biggest challenges for SMEs are skill gap within workforce and integration of AI system in the organisation. Proper training to the staff and collaborating with AI consultant to accommodate the AI tools in day to day working can help small businesses grow effectively.

Research Methodology

Researcher has scrutinized various academic literature available on google books related to the AI and supply chain management. It has also included various case studies and real time examples related to the topic. Many government reports and industry reports on Indian SMEs with AI-enabled analytics has been synthesized. The analysis focuses secondary data uploaded on research organizations and government websites related to the AI implementation in SME organization in India. The objective is not to conduct primary data collection but to develop an analytically grounded view of impact mechanisms and outcomes.

Challenges

AI enabled supply chain management has advantages for Indian SMEs has been following manual records with the help of excel sheets and various software. It can be a daunting task to remodel business processes with AI. Start a small project to address some meaningful portion of a specific business process, to learn the capabilities and limitations of AI. [7] Such process can be time consuming for the businesses and may result in resistance from the employees.

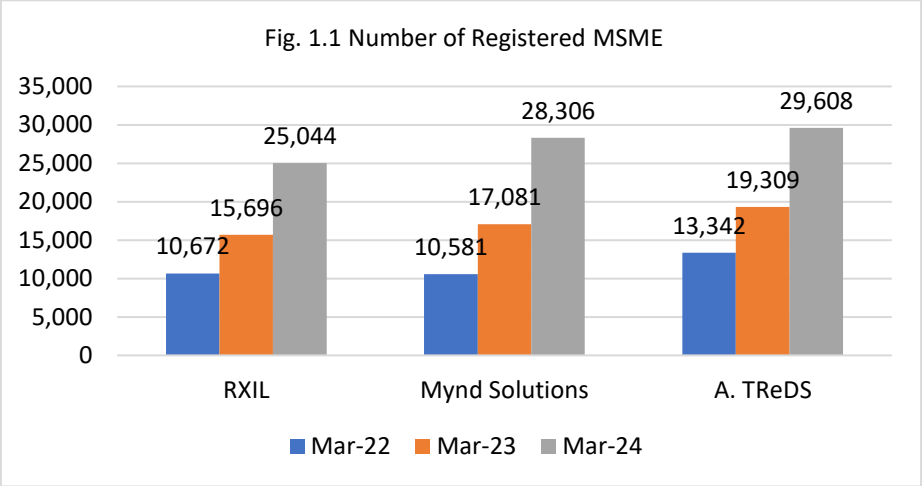
There is gap divide in the global adoption of AI enabled supply chain management in terms of capital, knowledge and technology. Multinational corporations can afford to invest in AI-driven supply chain optimization and energy efficient technologies while small and medium enterprises (SMEs) in emerging markets may struggle to do so.[8] Indian SMEs are still not equipped with the modern ERP system for data management. Therefore, there is lack of infrastructure for maintaining historical data and creating structured data. Global disruptions, shifting consumer expectations, and rapid technological advancements have made planning more dynamic and unpredictable than ever. Yet just as the need for skilled supply chain professionals has skyrocketed, the available talent pool has shrunk. [9] In India, very few percentage of personnel are entering this field which results in pressure on existing AI experts in supply chain management who are overburdened with work. As the knowledge gap is increasing in this field, it is difficult to get AI experts at lower pay scale which is creating financial burden on Indian SMEs.

AI does not always comprehend the contexts and nuances of global supply chains, human must interpret and examine the appropriateness of AI-generated recommendations. (Cohen and Tang, 2024) Indian organisations are mostly traditionally managed family businesses which may create cultural barriers to implement AI in supply chain management in the organisation. Family members may oppose to take decision on the basis of algorithmic recommendation. Using an AI system normally means gathering, processing, and analysing huge quantities of personal data. On the Indian side, the legal framework for data protection is still an evolving phenomenon-with the absence of any concrete data privacy law-the risk taken is quite high. (Aarti, 2025). Such situation is creating fear of data breaches as well as uncertainty about compliance with digital personal data norms. India is still facing lack of cyber security frameworks. It shows financial support is needed for implementation of AI technology in Indian SMEs as they are not financially equipped to do so.

Finding:

Supply chain financing (SFC) consists of different financial instruments and support such as factoring, reverse factoring and inventory financing as well as trade credits. SFC is essential for the MSME units has been promoted by RBI with the help of initiative called as Trade Receivables Discounting scheme (TReDS). In India, TReDS supports MSME by financing of trade receivables. There has been three platforms utilized by MSME for trade credits which are A.TReDS, Mynd Solutions, Receivable Exchange of India. MSME has been registering with these platforms to avail the finance facility.

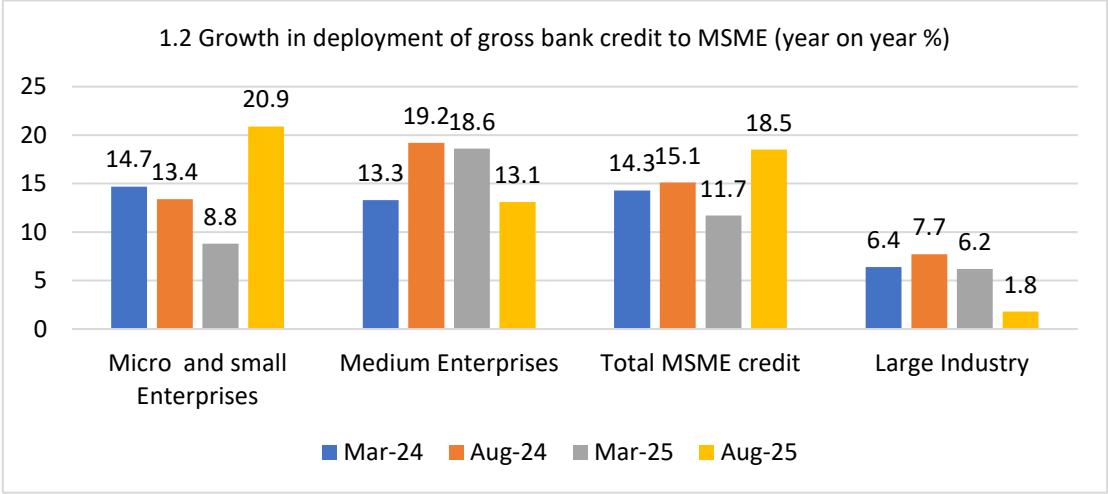
[7] https://www.supplychainbrain.com/blogs/1-think-tank/post/41509-five-challenges-in-adopting-ai-for-the-supply-chain
[88] Sustainable Information Security in the Age of AI and Green Computing. United States, IGI Global Scientific Publishing, 2025.
[9] https://www.ketteq.com/blog/the-supply-chain-talent-shortage-is-getting-worse--ai-can-bridge-the-gap



(Source: PWC analysis of RBI Data)

In fig. 1.1, it clarifies that MSME registration in march 2022 on RXIL platform was 10, 672 as compared to 15,696 in March 2023 which shows sharp rise in registration by 147%. In March 2024, registration on RXIL platform has increased to 25,044 which shows increment by nearly 159% as compared to March 2023. On Mynd solutions platform, registration MSME was 10,581 in march 2022 which later increased to 17,081 in march 2023 with sharp rise by nearly 161%. In March 2024, registration on Mynd solutions increased to 28,308 i.e. nearly 165%. A.TReDS platform for MSME registration to avail financial facility shows 13,342 in March 2022 which increased to 19,309 in March 2023 which shows 144% increase registration. In March 2024, this number goes to 29,608 which is 153%.

According to Economic Survey 2025-26, many micro-organizations has faced issues of accessing loan facility because of lack of collateral facility and incomplete documentation. Though these organizations were having credit footprints as well as digital integration, they could not avail the formal credit. Such problem was recognized by the public sector banks and they have launched Credit Assessment Model (CAM) based on digital footprints for MSMEs in 2025. It captures the data and verify it digitally so the automated loan appraisal can be easy for MSMEs borrowers. In between 1st April and 20th November 2025, over 41.5 thousand crore worth of applications were sanctioned by PSBs. In fig. 1.2, Gross bank credit has increased sharply in Aug 2025 for the MSME as compared to large industries. It shows that public sector banks have allocated more funds to the MSME.

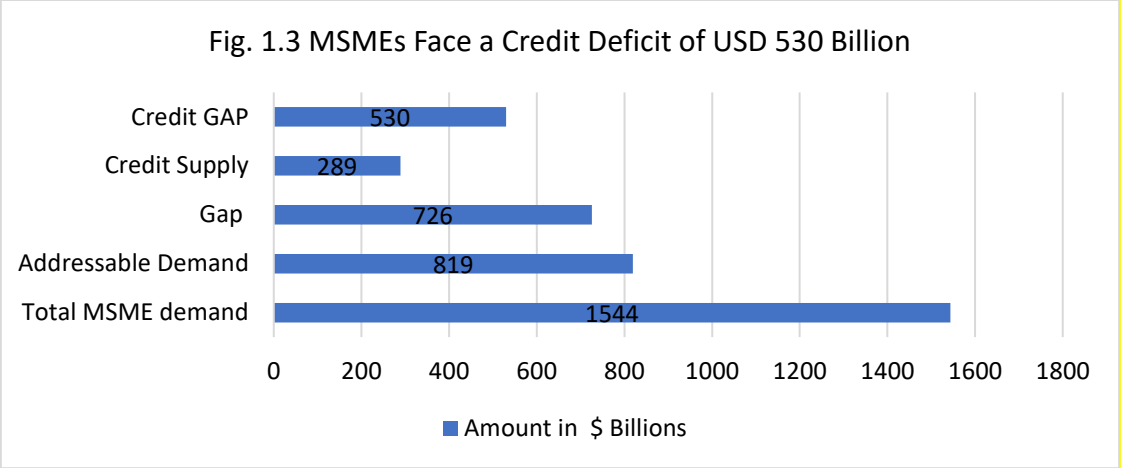


(Source: Economic Survey 2025-26))

The dissemination of funds for Micro and small enterprises have decreased for August 2024 (i.e.) 13.4% and March 2025 (8.8%) as compared to March 2024 (14.7%) but there is sudden surge in distribution of larger percentage of in August

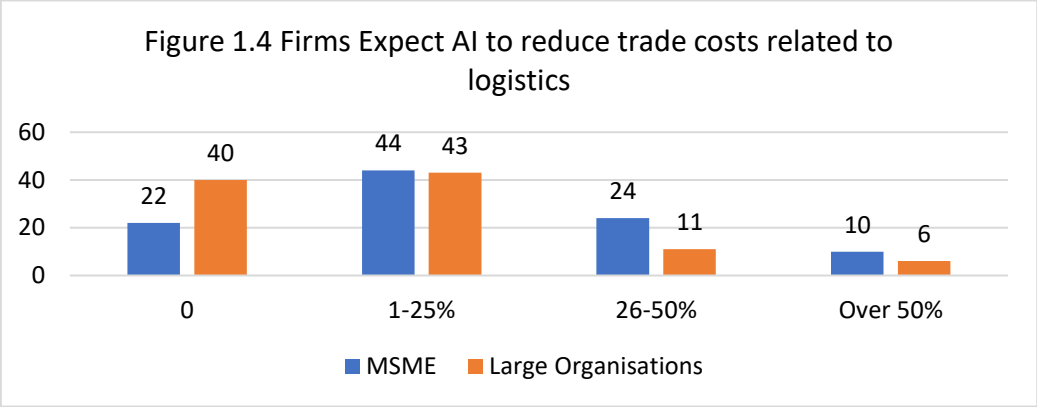
2025 (i.e. 20.9%). As compared to march 2025, it jumped by nearly 237.5%. However, medium enterprises are facing the paradoxical situation as funds were distributed nearly 13.3% in March 2024 and then increased to 19.2% in August 2024 but later it has decreased to 18.6% in March 2025 and later on 13.1 % in August 2025. As compared to March 2025, bank credit has been decreased by 70.43%. In total MSME enterprises, situation of gross bank credit is quite clear as it shows increase in fund dissemination in 2024 while in March 2025, it shows dip in the distribution of funds (i.e.11.7 %) and later on it shows sharp increase in it (i.e 18.5%) by nearly 158%.

In fig 1.3, it shows data from article by credable.in on MSME credit gap in 2024 in India where total demand of credit of the MSME sector in India was $ 1,544 Billions. From which only $ 819 billion (53%) has been addressed which shows the gap of $ 726 billions of credit (i.e. 47%) which is yet to be considered. Total credit supplied to the MSMEs was only $ 289 Billions which shows credit gap of $530 Billions.



(Source: https://credable.in/insights-by-credable/business-insights/credit-for-the-underserved-addressing-the-massive-dollar-five-hundred-thirty-billion-msme-credit-gap/)

According to survey conducted by International Chamber of Commerce, 49% of respondent informed that they are currently using AI in which 79% of respondents are involves in international trade activities.



(Source: WTO Secretariat calculations based on WTO-ICC business survey 2025)

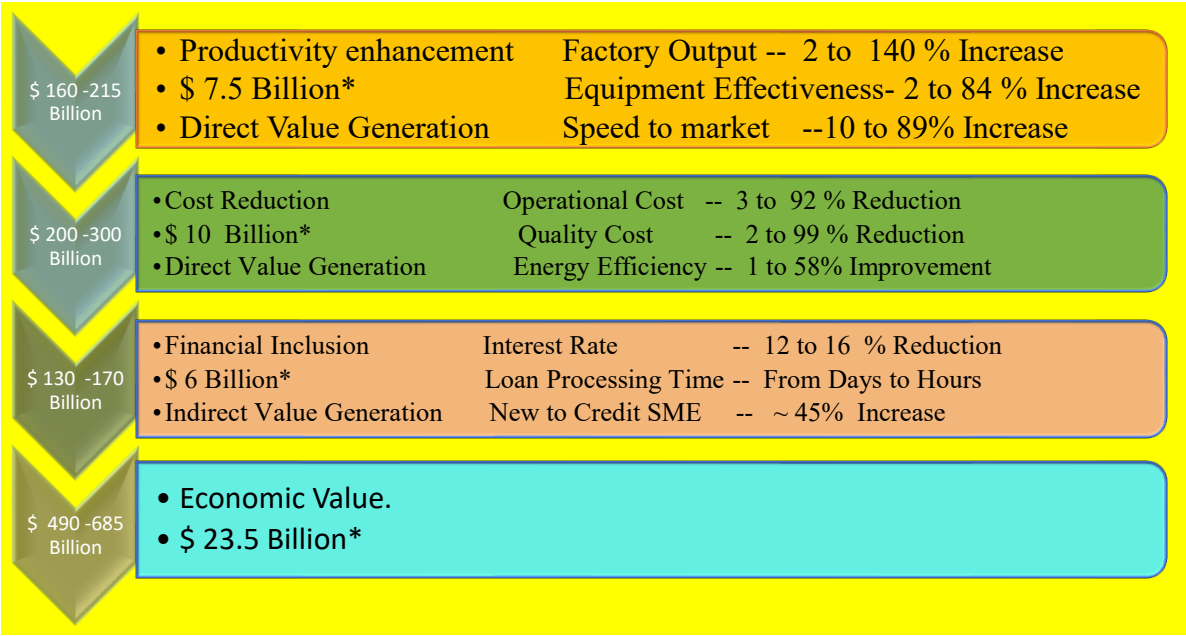
They were asked if the AI could potentially reduce costs for their business, majority of the organisations have responded positively. In fig. 1.4, 10% of the MSMEs has expected to the reduction in cost with over 50%, while only 24% of MSMEs expected 26% to 50 % of reduction in cost as compared to just 6% and 11% respectively of larger organisations.

In fig. 1.5, World economic forum has published in their report that AI will help Indian government to bring more potential to MSMEs with two direct and one indirect value generation levels. First, Productivity enhancement may generate

direct value of $ 7.5 Billion as AI will increase the factory output by 2-140%, equipment effectiveness by2 to 84% and speed to market by 10 to 89%.

Adoption of AI in MSMEs can reduce the operational cost by 3 to 92%, quality cost by 2 to 99% and improve the energy efficiency by 1 to 58%. Financial inclusion may see the indirect value generation of $ 8.6 Billion which may find the reduction in Interest rate by 12 to 16%. Loan processing time with AI implementation may reduce from days to hours. This financial inclusion may see potential indirect value generation of $6 Billion.

Fig. 1.5 potential value generation for the economy (left side columns) & potential value generated for MSME owners (right side columns)



***Value realization by 2030assuming 20% MSME adoption with implementation depth of 20%**

(Source: Transforming small Businesses: An AI playbook for India's SMEs by World Economic Forum Report August 2025)

Discussion

In the finding, fig 1.1 shows that MSMEs registration on Supply chain finance has increased from march 2022 to march 2024 on TReDS platforms such as A.TReDS, RXIL, Mynd Solutions which shows many SMEs are availing the credit scheme initiative of Government of India. As fig 1.2 explains that the demand for credit facility has been increased in MSMEs with higher percentage as compared to large organizations. This shows that more SMEs are coming forward to upgrade technology to match the digitalization which supported by financial credit from public sector banks. But fig.1.3 shows there is credit gap of $ 530 Billion for MSMEs. Demand for the finance is far higher than supply of finance from the banks and non-banking financial corporations. It highlights that there is need of proper collaboration between government schemes and financial institutions to help MSMEs funding.

In Fig. 1.4, International Chamber of Commerce has conducted survey to understand expected reduction in cost of logistics if the AI is implemented in MSMEs. Survey shows that there is high percentage of cost of logistics can be saved if the AI technology implemented in SMEs. In fig. 1.5, Similar survey was conducted in India to see the potentiality of AI to save the cost which shows the higher amount of cost direct and indirect value generation as well as cost saving for the Indian MSMEs as well as Indian economy.

Suggestions

I. As SMEs are skeptical of full potential of AI and their benefits to them. It is important to conduct more seminars and workshops to educate SME entrepreneurs regarding benefits of AI in supply chain management.

II. Quality of data and technology are important for implementation of AI. Government should take initiative to build network of technology centers by connecting AI sandbox, co-innovation hubs and experience centers etc.

III. Skill programs should be developed to improve the shopfloor workforce.

IV. AI solution platforms should be connected to Udyam portal to create the ecosystem for AI solutions.

V. Indian government should initiate more financial support to SMEs for digitalization and implementation of AI in supply chain management.

VI. Automation of repetitive work with the help of AI powered system should be implemented to reduce the time. KeetteQ's PolymaticQ is agentic AI designed to solve the issues with self-tune and leaning approach. Agentic AI is independent system that can do objective setting, planning, and execution of complex work without any human supervision. Traditional supply chain tools are not as effective as modern one as agentic Ai focuses on strategic decision making with less skilled professions involved in work. If Organizations use AI driven systems to understand historical data, it will help them to identify the various patterns which helps them with right decision making. AI will help supply chain experts to handle planning work with standards and optimized recommendations.

Conclusion

AI-enabled supply chain analytics which has measurable and positive impact on the operational efficiency of Indian SMEs. However, Indian government schemes related to financial support in implementation of AI analytics in SME are not successful which delays the implementation of AI in SMEs in near future. AI has high potentiality and other benefits such as reduced costs, improved responsiveness, higher forecast accuracy, and better customer service. However, there are other barriers such as data readiness, budget limitations, skills gaps, and infrastructure challenges need to be systematically addressed.

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