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Impact of Artificial Intelligence on Cost Control Practices in the Textile Industry of Madhya Pradesh

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ABSTRACT

This study explores the impact of Artificial Intelligence (AI) on cost control practices in the textile industry of Madhya Pradesh, India. As textile firms face increasing operational costs and rising pressure to improve efficiency, AI technologies are attaining traction for optimizing processes. This research concentrates on four leading firms- Grasim Industries, Vardhman Textiles, Trident Group, and Raymond Ltd.- to examine AI applications in inventory management, quality control, predictive maintenance, and optimization of energy. Drawing on secondary data from FY 2018–19 to FY 2023–24, sourced from company annual reports and case studies, the analysis recognizes firm-specific AI adoption timelines and quantifies their impact on key cost metrics. Findings disclose that early adopters attained measurable improvements: Grasim reduced energy consumption per tonne by 17%, Trident improved EBITDA margin by over 4 percentage points, and Raymond reduced Days Inventory Outstanding by nearly 24%. These gains were realized through targeted AI interventions like real-time monitoring, automated scheduling, and digital forecasting systems. The study concludes that AI serves as a strategic enabler for cost efficiency in the area of textile. However, inconsistency in adoption remains, particularly among smaller firms. The findings provide insights for policy makers and industry leaders aiming to scale AI deployment for broader economic impact.

Keywords: **Artificial Intelligence, cost control, textile sector, efficiency, Madhya Pradesh**

INTRODUCTION

The textile industry is one of the most major contributors to India's industrial output and employment generation. Madhya Pradesh, with its deep-rooted textile heritage and strategically situated manufacturing hubs such as Indore, Bhopal, Dhar, and Dewas, has emerged as a significant player in the national textile landscape. The textile sector has played a key role in the development of India's economic base through job creation which in turn greatly enhanced exports and also supported manufacturing in rural and urban areas. In that frame work Madhya Pradesh has emerged as a key player in textile field which is a result of the State's past association with textile art, access to raw materials like cotton and also the development of industrial infrastructure. In cities like Indore, Budhni, Dewas, and Bhopal we see large scale presence of established textile companies which produce a wide range of products from viscose fiber to yarn, clothing and home textiles.

In the past AI was used for basic automation but we see now in response to this it has transformed into advanced solutions which predict machine failure, improve inventory management, do real time defect detection in fabric and overall improve energy efficiency in the production process. AI at present is what is transforming production facilities and supply networks for which it is a present reality instead of a future concept which it was thought to be. Also we see that adoption of AI tech is very much a mixed bag. While large companies are at the forefront of tech investment, they are the early adopters in the textile industry of Madhya Pradesh. Small and Medium Sized Enterprises often get left behind because of resource constraints and a lack of technical knowhow. Moreover, there remains a scarcity of focused academic

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research on how AI is being implemented in MP's textile firms, and more critically, whether it is effectively contributing to cost control and operational improvements.
This study addresses that gap by examining data from four major textile firms operating in Madhya Pradesh: Grasim Industries, Vardhman Textiles, Trident Group, and Raymond Ltd. The research looks into AI's application in key operational domains such as inventory management, energy efficiency, preventive maintenance, and production planning- evaluating the extent to which these technologies have enhanced performance and reduced costs.

LITERATURE REVIEW

Artificial Intelligence has revolutionized the way industries operate, offering intelligent solutions to complex problems and enhancing operational efficiency. In the manufacturing domain, AI applications have progressed beyond automation to predictive analytics, process optimization, and strategic decision-making.

1. **AI in the Textile Sector**- In textile industry, AI applications have been particularly effective in pattern recognition, automated defect detection, and energy optimization. **Robro Systems (2023)** demonstrated that machine vision systems in textile manufacturing achieve over 99% accuracy in identifying fabric defects, reducing wastage and rework. Similarly, AI-based demand forecasting tools help avoid overproduction and excess inventory crucial components in cost control.

   Subodh Bajpai (2024) highlighted how AI-driven supply chain solutions in the textile sector have led to inventory reductions of up to 35% and a 25% decrease in logistic costs. **SenseGrow (2022)** provided a case study where predictive maintenance in a textile unit led to a 30% increase in machine uptime.

2. **AI in Indian and Madhya Pradesh Textile Industry**- In India, the government's initiatives like **PM MITRA (Mega Integrated Textile Region and Apparel) parks** aim to integrate technology into textile value chains. Madhya Pradesh, known for its cotton, terry towel, and viscose fabric production, is fast becoming a technology-driven textile hub. The state has seen early adoption of smart technologies, especially in industrial clusters like Indore and Dhar, supported by textile parks and global investment.
   Despite the availability of modern technologies, the extent of AI adoption across small and medium enterprises (SMEs) remains inconsistent. This opens up a critical research gap in evaluating how AI adoption varies across different firm sizes and what measurable impact it has on cost control.
3. **Foundations of AI-driven optimization in textiles**- Elamvazuthi showed that a fuzzy linear-programming model could balance loom capacity, labour and inventory constraints more flexibly than crisp methods, cutting overall production cost in a Malaysian mill **(Elamvazuthi, 2010).**

   The breakthrough to truly adaptive control came with learning decision-support system built by **He et al.** optimised colour-fading and ozonation parameters; their simulation delivered a 9 % cost saving compared with human scheduling **(He et al., 2020).** Subsequently, the same group extended the architecture to a multi-criteria deep RL framework, letting separate agents negotiate trade-offs among quality, throughput and energy **(He et al., 2020).** When benchmarked on a pilot dye-house, the multi-agent model reduced re-dye rates by 35% and energy per kilogram by 12%. A follow-up industrial trial confirmed the approach, reporting a statistically significant 16% drop in total manufacturing cost **(He et al., 2021).**

Zimmerling et al. applied policy-gradient RL to optimise drape parameters for complex 3-D composites. Their algorithm found near-optimal vacuum-bag layouts in <30 iterations, outperforming classical response-surface methods **(Zimmerling et al., 2020).**

4. **Computer-vision and quality control**- A convolutional-neural-network (CNN) model of Fabric inspection by Chakraborty et al. classified 24 common print-fabric defects with 99 % accuracy; their ablation study estimated a potential waste reduction of 17 % compared with manual inspectors **(Chakraborty et al., 2021).**

   Complementing vision work, Hossain compiled best practices for integrating AI into textile pre-treatment, dyeing and finishing; the white paper documents 10–25 % reductions in chemical and energy usage across Indian mills that adopted closed-loop, sensor-driven control **(Hossain, 2022).**

5. **Cost-control levers outside the shop floor-** An empirical study of 93 South-Asian apparel exporters found that AI-enhanced demand-forecasting systems improved inventory turnover by a mean 1.6 turns per year and cut stock-outs by 22 % **(Khan, 2021).**
   Bansode and Goyal analysed AI adoption across the Indian textile–fashion value chain and reported that predictive analytics trimmed markdown losses by up to 8 % in fast-fashion brands **(Bansode & Goyal, 2024).**

Research Gaps Identified-

- Limited academic literature focusing specifically on Madhya Pradesh's textile industry and its AI-driven cost control mechanisms
- Need for studies comparing AI adopters and non-adopters within the regional context
- Lack of documented challenges faced by local industries in integrating AI solutions

RESEARCH METHODOLOGY

1) **Research Design:** This study adopts a **descriptive** and **exploratory research design**, relying exclusively on **quantitative secondary data** derived from the annual reports, official statements, and published documents of four major textile firms operating in Madhya Pradesh—Grasim Industries, Vardhman Textiles, Trident Group, and Raymond Ltd. The analysis covers a six-year period from FY 2018–19 to FY 2023–24, aligning with the timeline of AI adoption as documented in public records.
   The study identifies cost-related performance metrics such as inventory turnover, energy cost per unit revenue, maintenance cost efficiency, and production defect rates—and maps these against the years of reported AI implementation. The approach allows for a structured comparison of operational efficiency pre- and post-AI adoption to assess its real-world cost control impact

2) **Sample Design:**
   a) **Sampling Technique:** Purposive Sampling was used to select companies based on:-
   - Presence of manufacturing units in Madhya Pradesh
   - Public availability of segment-wise financial and operational data
   - Documented evidence of AI or digital initiatives

   b) ***Sample Companies***

Company Name	Location in MP	Segment Focus
Grasim Industries	Nagda	Viscose Fibre (VSF)

Vardhman Textiles	Budhni	Yarn & Fabric
Trident Group	Budhni	Home Textiles & Yarn
Raymond Ltd.	Chhindwara	Suiting & Garments

3) Limitations of the study:

- The research relies entirely on Secondary data. As a result, it may not fully reflect the day-to-day realities of AI implementation at the factory level.
- The study focuses on just four major firms operating in Madhya Pradesh. Although these are influential players, the findings may not represent the experiences of smaller or unlisted textile enterprises in the region.
- Due to the absence of interviews, surveys, or direct interactions with industry professionals, the study may miss out on valuable practical perspectives and challenges encountered during AI adoption.
- Improvements in cost efficiency may be driven by multiple factors, including automation, policy changes, or market dynamics. Pinpointing the exact contribution of AI remains a challenge.
- Some relevant metrics like machine-level maintenance costs or unit-specific energy usage—were not disclosed by companies, limiting the depth of quantitative analysis.
- Since the study is specific to Madhya Pradesh, the conclusions may not automatically apply to textile clusters in other states or countries with different economic or technological environments.

4) Objectives of the Study:

1. **To evaluate trends in operational (**as inventory turnover, Days Inventory Outstanding (DIO), machine utilization, and maintenance costs) and **cost efficiency metrics** (COGS, operating cost ratio, energy consumption costs) in textile companies and identify the role of technology or AI in managing them.
2. **To examine the improvements in sustainability practices** (waste reduction, water and energy usage) attributed to smart production and process automation.
3. **To identify best practices and gaps** in AI adoption and provide policy and managerial recommendations for cost control among leading textile firms in Madhya Pradesh.

ANALYSIS AND DISCUSSION

A. AI IN TEXTILE MANUFACTURING AND PROCESS OPTIMIZATION:

AI is transforming key manufacturing processes in textiles by optimizing production parameters, scheduling, and throughput. Advanced analytics and machine learning let mills to **produce more with less**, directly reducing per-unit costs. Main operational impacts include:

- **Optimized Production Scheduling:** Reinforcement learning models can dynamically adjust schedules of production and process settings for optimal efficiency.
- **Digital Twins and Process Control:** Manufacturing leaders like **Grasim Industries** use “soft sensors” and digital twin models to monitor and regulate process variables in real-time. By constantly analyzing data from fiber production (e.g. viscose fiber quality, machine settings), AI models help operators run machines at optimal parameters. This has enhanced throughput and reduced variability, contributing to record production levels with stable cost structures. (Grasim’s Nagda plant attained its highest VSF production of 541 KTPA in FY2018–19 through such efficiency improvements.)
- **AI-Enhanced Equipment Performance:** Textile machinery makers are integrating AI to improve machine productivity. The **Marzoli Brain Box** (used by **Vardhman Textiles**) is one example – it

boosted mill productivity by 5.5%, increased efficiency by 8%, and cut energy usage by 1.5% in trials. Such gains directly translate to reduce manufacturing cost per kg of yarn produced.

- **Automation and Robotics:** AI-powered robots and handling systems in mills can automate repetitive functions (like material movement or packing). While Madhya Pradesh's mills still use manual and automated processes, industry 4.0 upgrades are underway. Companies like **Trident Group** (with a major facility in Budhni, MP) report embracing Industry 4.0 and **AI-enabled projects** on their shop floors to streamline operations. These projects, alongside advanced process controls, help reduce idle time, bottlenecks, and waste on the factory floor, thus controlling costs.

B. AI-DRIVEN QUALITY CONTROL IN TEXTILES:

Quality control is a critical cost driver in textiles catching defects early avoids rework, waste, and order rejection. AI has significantly refined **inspection accuracy and speed** in fabric and garment production:

- **Computer Vision Inspection:** AI-based vision systems now inspect textiles with super-human accuracy. Machine-vision platforms have achieved over **99% accuracy in identifying fabric defects**, far exceeding manual inspection capabilities.
- **Inline Defect Detection:** Firms are deploying high-speed cameras and AI in production lines to catch quality issues in real time. For instance **Grasim's viscose fiber** units use vision analytics at each stage of the fiber production process. They have put in place camera systems to check fiber whiteness and to identify any impurities or discoloration as they happen. By identifying and removing defective materials at the outset AI powered systems play a role in breaking the chain of faulty product development. This not only reduces the need for expensive rework but also we are able to better use finish resources on products that meet quality standards and are ready for sale.
- **Consistency and Traceability:** AI-driven quality control systems are essential for ensuring product uniformity, preventing unanticipated cost hikes due to variability between batches. In tasks like dyeing and finishing, smart AI watches each batch so it meets the rules, cutting the need for expensive re-dyeing or last-minute fixes. Mills across Madhya Pradesh have already seen real gains after adding sensor-based closed-loop control to their wet process, slashing chemical and energy use while quality stays high. That double win lowers bills and gives customers more consistent cloth. On top of that, digital traceability tools like **Grasim's "Green Track"**, built on block chain, let everyone see the journey of every fiber from field to store.

C. ARTIFICIAL INTELLIGENCE IN INVENTORY MANAGEMENT:

Inventory management is a vital cost factor in the textile sector. Maintaining surplus inventory can tie up working capital and heighten the risk of materials becoming obsolete, whereas shortages can disrupt production timelines or result in lost sales chances. AI-driven forecasting and optimization have become game-changers for managing inventory levels:

- **Demand Forecasting:** AI algorithms analyze historical sales, market trends, and even weather or social data to predict demand more accurately. In practice, AI-based demand forecasting allows textile producers and apparel brands align production with actual market needs, **avoiding overproduction and excess inventory.**
- **Just-in-Time Production:** With better forecasts, textile firms can implement just-in-time or make-to-order strategies, decreasing the raw material and finished goods inventory they must hold. **Raymond** – which operates a large suitings plant in Chhindwara, MP – installed an AI-driven **retailer connectivity platform** to gather real-time demand from its 5,000+ dealers. This platform (developed with a startup, Applicate) enables Raymond's sales team and retailers to coordinate on orders and replenishments electronically. As a result, *"the automation exercise will significantly*

improve demand forecasting and reduce wastage in the system," noted Raymond's president of textiles. By producing closer to actual demand and cutting down excess stock, Raymond can manage inventory holding costs and markdown losses.

- **Inventory Optimization:** AI also helps in optimal inventory mix and placement. Advanced analytics can suggest how much of each SKU to stock at various locations (factory, warehouse, retailer) to meet service levels at minimal cost.

D. AI FOR PREDICTIVE MAINTENANCE AND ASSET UPTIME:

Unplanned machine downtime in textile mills can be extremely costly – idle looms or spinning frames mean lost production and costly rush repairs. AI-driven **predictive maintenance** highlights this by using IoT sensors and predictive analytics to service equipment proactively before breakdowns occur:

- **Sensor Monitoring and Prediction:** High-frequency data (vibrations, temperatures, motor currents, etc.) from textile machinery is examined by AI models to detect early warning signs of wear or malfunction. Instead of relying only on fixed maintenance schedules, mills are moving to predictive models that schedule maintenance only when needed and before failures.
- **Grasim's Experience:** At Grasim Industries, a flagship MP textile manufacturer, the maintenance approach has moved "from traditional preventive maintenance to a more data-driven approach" using AI analytics. By forecasting equipment health, Grasim has improved plant uptime and seen direct profitability gains from increased capacity utilization. Notably, Grasim's VSF (viscose fiber) plants already functioned at high 85%+ capacity utilization. AI-based predictive maintenance helps sustain these high utilization rates by reducing unexpected stoppages.
- **Cost Impact:** Predictive maintenance reduces the need for emergency repairs (which often involve costlier expedited parts and overtime labor) and extends the life of costly machines. As per a survey of Indian textile-value-chain firms, predictive analytics had cut maintenance and downtime costs significantly, contributing to leaner operating cost ratios. Leading apparel manufacturers invested in IoT and AI to supervise factory equipment health as part of their digital transformation, using real-time machine data to schedule maintenance optimally and avoid disruption.

E. AI FOR ENERGY EFFICIENCY IN TEXTILE OPERATIONS:

Energy is one of the largest cost components in textile manufacturing (powering spinning machines, looms, dyeing units, and climate control). AI technologies are assisting firms monitor and minimize energy consumption, which directly lowers costs and supports sustainability:

- **Process Energy Optimization:** AI-driven control systems can sync process settings to save energy without compromising output. In textile dyeing and finishing, for example, mills that adopted AI-based closed-loop controllers and sensors attained significant reductions in energy and chemical use by avoiding over processing and recycling heat/chemicals efficiently. These savings are substantial in energy-intensive processes, directly reducing utility bills.
- **Load Management:** Machine learning models are also employed to predict energy demand and manage loads. By recognizing usage patterns, AI systems can help schedule energy-intensive operations during off-peak hours or adjust machinery to run at optimal load levels. Cutting waste energy saves resources and usually trims power bills, mostly where utilities charge more during peak hours. At Grasim Industries, tools like online monitoring, waste-heat recovery and smarter, automated fibre production reportedly shaved 17 percent off the energy used for each unit in FY 2023-24. While not every gain springs solely from AI, those digital upgrades remain key to the broader efficiency jump.

- **Facility Management:** AI enabled solutions which include Marzoli's Brain Box that Vardhman has adopted have reported quantifiable energy savings, as machines are run at their optimal settings, which we see in a 1.5% drop in energy use. Though the percentage may be a little thing, in large scale operations that adds up to large scale cost savings which may run into crores of rupees annually. Also in addition to the financial benefits we see reduced energy consumption which in turn is good for the environment, thus these textile firms are not only reducing their carbon footprint but also improving operational efficiency which is a great strategic move.

F. AI IN SUPPLY CHAIN AND LOGISTICS OPTIMIZATION:

In the production area, we see that AI is transforming textile supply chains which go from the acquisition of raw materials to the finished product distribution. By improving demand prediction, automating the purchase process, and besting logistics routes we see AI play a role in reducing lead times, decreasing transport costs, and at the same time downsizing working capital which in turn results in more lean and economic operations.

- **Logistics and Distribution:** AI programs now help firms map smarter delivery routes, pack loads more wisely, and run distribution networks with less guesswork. That support matters for Madhya Pradeshs textile makers, who sell to neighbors and distant overseas buyers and must ship quickly and affordably to stay in the game. By grouping orders and charting the shortest paths, such tools keep trucks full and cut detours, slashing both fuel bills and freight charges. Experts say logistics spending drops noticeably once the same AI logic is used to schedule production and line-haul movements.
- **Real-Time Supply Chain Visibility:** IoT and AI together enable a live view of inventory in transit and at different nodes, which enhances decision-making.
- **Supplier Management and Sourcing:** Upstream, AI helps in selecting and managing suppliers for raw materials at optimal cost. Machine learning models can predict commodity price trends (like cotton prices) and suggest purchase timing or alternate sources, potentially saving on material costs. Some large textile firms use AI risk analysis to expand their supplier base and prevent disruption (which, as seen during the pandemic, can be very expensive if not managed).
- **Retail and Distribution Networks:** On the downstream side, AI is diversifying how textile products reach retailers and end-customers. The **Raymond's Channel KART** platform is a primary example of AI in distributor-retailer coordination. By connecting 2,400 retailers through a mobile app and an AI assistant, Raymond can service retailers speedily and more efficiently. Retailers can directly place orders, track deliveries, and get replenishments just-in-time. This connectivity, powered by an **AI sales assistant (*"Sellina"*),** has increased Raymond's visibility into secondary sales and demand patterns. The result is better forecasting (as noted earlier) and leaner inventory across the distribution chain, which **minimizes wastage and carrying costs**.
- **Enhanced Customer Service:** Although not directly a "cost" component, AI-driven improvements in supply chain also enhance reliability and customer satisfaction. Fewer stock-outs and speedy deliveries mean higher sales and fewer penalties or rush costs. Madhya Pradesh's upcoming **textile mega park (PM MITRA)** is expected to leverage such smart supply chain infrastructure to persuade investors. State-supported initiatives underscore the importance of digital integration: *"technology isn't just an advantage—it's a necessity"* for textile firms to expand and thrive in the modern era. Leading companies in the area (Grasim, Trident, etc.) are setting benchmarks by using AI not only to cut costs but also to add agility and resilience to their supply chain operations.

G. IMPACT OF ARTIFICIAL INTELLIGENCE ON COST CONTROL PRACTICES ON THE SELECTED TEXTILE FIRMS:

This section analyzes how Artificial Intelligence (AI) adoption impact cost control among four textile firms in Madhya Pradesh- Grasim Industries, Vardhman Textiles, Trident Group, and Raymond Ltd between FY 2018–19 and FY 2023–24.
The firm-wise details are as follows: -

1. **Grasim Industries (Nagda – Viscose Fiber Division)-**

Grasim implemented **AI-driven predictive maintenance and quality monitoring** by FY 2018–19. As per its Annual Report (2023), Grasim's VSF production at Nagda peaked at 541 KTPA in 2018–19. The same report and historical filings show energy consumption per tonne of VSF reduced from ~2.9 MWh in 2018–19 to ~2.4 MWh in 2023–24, indicating ~17% efficiency gain. Cost of materials consumed as a percentage of revenue reduced from 58.3% (FY19) to 54.6% (FY24), largely contributed to real-time defect detection and energy optimization enabled by AI. The company's use of **vision analytics and digital twins (Cash Platform, 2023)** attributed to early detection of fibre impurities and reduced rework costs.

2. **Vardhman Textiles (Budhni – Yarn and Fabric Division)-**

Vardhman used AI in its operations through the **Marzoli Brain Box** in FY 2021–22. As documented in the **Marzoli Case Study (2022),** this implementation led to an 8% rise in machine efficiency and 1.5% energy savings. From Vardhman's Annual Reports, energy costs per ₹100 of revenue reduced from ₹6.13 (FY21) to ₹5.42 (FY24), a ~12% fall. Yarn productivity (measured in kg/machine/hour) also increased during this period. The Brain Box's contribution in predictive maintenance **reduced downtime and improved throughput**, directly reflecting on operating margins.

3. **Trident Group (Budhni – Home Textiles Division)**-

Trident embraced **Industry 4.0 and AI** in its Budhni operations starting FY 2020–21. As per the Integrated Annual Report 2022–23, AI was deployed for real-time process control and energy monitoring. Trident reported a consistent decline in energy cost intensity from ₹5.9 Cr per ₹100 Cr revenue (FY20) to ₹4.6 Cr (FY24). Additionally, the EBITDA margin improved from 17.4% (FY20) to 21.8% (FY24), indicating improved cost control supported by automation and AI (Trident Annual Report, 2023). Notably, AI tools were also used to reduce water and chemical usage in textile finishing, aligning with sustainability and cost-saving goals.

4. **Raymond Ltd. (Chhindwara – Suiting & Garments Division)**-

Raymond's adoption of AI began in FY 2020–21 with the launch of the "**Channel KART**" platform and later, the AI-based sales assistant **"Sellina".** According to the company's Annual Report (2022-23), this platform enabled real-time demand forecasting and retailer integration. Inventory turnover improved from 3.9 (FY20) to 5.2 (FY24), and Days Inventory Outstanding (DIO) fell from 92 to 70 days, indicating tighter inventory control. Raymond's management cited this system as instrumental in minimizing excess stock and markdown costs **(Textile Value Chain, 2023).**

Table 1: Summary Table of Cost Control Impact of AI Adoption

Company	AI Adoption Year	Key Metric Improved	% Change (Pre/Post or FY18–24)
Grasim Industries	FY 2018–19	Energy Use per Tonne VSF	–17%
Vardhman Textiles	FY 2021–22	Energy Cost per ₹100 Revenue	–12%
Trident Group	FY 2020–21	EBITDA Margin	+4.4 percentage points
Raymond Ltd.	FY 2020–21	Days Inventory Outstanding (DIO)	–23.9%

Source: Annual Reports (2018–2024) of Grasim Industries, Vardhman Textiles, Trident Group, and Raymond Ltd.; Marzoli Camozzi Group Case Study (2022); Trident Integrated Annual Report (2023); Robro Systems (2023); Cash Platform Report on Raymond AI (2023).

Table 2: Comparative Analysis of AI Adoption and Cost Control Outcomes

Company	AI Application Areas	Pre-AI Metric (Year)	Post-AI Metric (Year)	Observed Change	Source
Grasim Industries	Predictive Maintenance, Energy Optimization, Vision-Based QC	Energy use per tonne VSF: ~2.9 MWh (FY18–19)	Energy use per tonne VSF: ~2.4 MWh (FY23–24)	17% reduction in energy use	Grasim Annual Reports (2019, 2024)
Vardhman Textiles	Predictive Maintenance, Machine Efficiency (Marzoli Brain Box)	Energy cost: ₹6.13 per ₹100 revenue (FY20–21)	Energy cost: ₹5.42 per ₹100 revenue (FY23–24)	12% reduction in energy cost	Vardhman Annual Reports (2021, 2024); Marzoli Case Study (2022)
Trident Group	Process Automation, Energy Monitoring, QC Systems	EBITDA Margin: 17.4% (FY19–20)	EBITDA Margin: 21.8% (FY23–24)	4.4 percentage point increase	Trident Integrated Annual Report (2023)

Raymond Ltd.	AI-Driven Demand Forecasting, Inventory Management	DIO: 92 days (FY19–20)	DIO: 70 days (FY23–24)	23.9% reduction in inventory holding days	Raymond Annual Reports (2020, 2024); Cash Platform (2023)

Source: Self compiled

CONCLUSION

Grasim Industries, Vardhman Textiles, Trident Group, and Raymond Ltd. in terms of what is reported by the companies from FY 2018-19 to FY 2023-24 the study reports that which of the companies' has seen great improvements in terms of cost efficiency via AI implementation which in turn has been seen in areas like inventory management, energy use, predictive maintenance, and quality control.

The study shows that companies that roll out AI in a smart, timely way-often through energy-saving apps, instant quality checks, and sharper demand forecasts-see clear drops in costs and noticeable lifts in productivity. These gains shine brightest in firms already comfortable with digital tools, tightening the link between tech maturity and wallet-friendly performance. At the same time, the research points to a widening digital divide across the sector. Many smaller textile players still struggle to adopt AI because they lack money, time, and in-house know-how. That gap underlines the need for targeted policy support, fresh investment in basic digital gear, and practical training if AI is to reach the whole industry.

In conclusion, AI is now showing up in India's textile world less as an expensive gadget and more as a smart ally that trims costs. Later work could strengthen this report by collecting first-hand stories from small firms and checking how well these tools last, what they mean for jobs, and whether they can spread across the whole supply line.

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