

IMPACT OF ARTIFICIAL INTELLIGENCE (AI) ON EMPLOYMENT IN GARMENT INDUSTRY

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ABSTRACT

The integration of Artificial Intelligence (AI) into the garments industry marks a structural transformation from labor-intensive production to technology-driven manufacturing. This paper provides an in-depth analysis of AI's impact on employment, focusing on labor displacement, job creation, skill transformation, gender implications, and wage inequality. Drawing on theoretical frameworks such as Skill-Biased Technological Change (SBTC) and Routine-Biased Technological Change (RBTC), along with empirical evidence from global apparel hubs, the study reveals that AI leads to job polarization rather than absolute job loss. While routine and low-skilled jobs decline, demand rises for skilled and semi-skilled workers. The study emphasizes the importance of policy interventions, reskilling initiatives, and inclusive growth strategies to mitigate adverse impacts and maximize benefits.

INTRODUCTION

The garments industry plays a pivotal role in economic development, particularly in emerging economies. It contributes significantly to employment generation, export earnings, and women's economic empowerment. However, the Fourth Industrial Revolution—characterized by AI, robotics, and automation—is disrupting traditional production systems.

Historically, the garments industry has relied on labour-intensive production processes characterized by low-skilled work, repetitive tasks, and minimal technological integration. However, the emergence of Artificial Intelligence (AI) and Industry 4.0 technologies has initiated a paradigm shift in manufacturing systems.

AI refers to the simulation of human intelligence by machines, enabling them to perform tasks such as learning, reasoning, pattern recognition, and decision-making (Russell & Norvig, 2021). In the garments industry, AI is increasingly being deployed in areas such as design automation, robotic sewing, quality inspection, demand forecasting, and supply chain optimization.

This transformation raises critical concerns regarding employment. While AI improves productivity and efficiency, it also threatens traditional labour-intensive jobs. At the same time, it creates new opportunities for skilled employment.

AI technologies such as computer vision, machine learning, and robotic process automation are increasingly replacing human labor in repetitive tasks. This shift raises critical question

EMPLOYMENT IN GARMENTS INDUSTRY

The textile and garment sector employs around 45 million people in India. It is the second-largest employer after agriculture.

A large portion of workers are in the informal/unorganised sector. This makes the industry crucial for mass employment generation, especially for low-skilled workers.

Women constitute 60–70% of the workforce in the garment sector. In some regions (like Tamil Nadu, Bengaluru, Tiruppur), women participation reaches 80–90%. Around 27 million women are employed in textile-related activities. The industry is often called a “women-dominated industry.”

NATURE OF JOBS

The job role in the garments industry are as follows

- Sewing machine operators
- Cutting and finishing workers
- Embroidery and design work
- Packing and quality inspection

Women are mostly concentrated in low-paid, labour-intensive jobs like stitching and finishing. The garments industry contributes about 2% to GDP around 7% of industrial output. More than 11% of India's export earnings. The sector is vital for export-led growth and foreign exchange earnings.

Advantages of Garment Employment

1. Provides large-scale employment for women
2. Requires low skills → easy entry for rural migrants
3. Promotes economic empowerment of women
4. Supports MSMEs and small industries

MAJOR PROBLEMS IN EMPLOYMENT

- a) **Low Wages** :-Women earn 15–25% less than men for similar work.
- b) **Poor Working Conditions**:-Long working hours , Overtime often unpaid High production pressure
- c) **Gender Inequality** :-Women in low-level jobs .Only 10–20% in managerial roles □
- d) **Informal Employment** :- Lack of contracts, job security, and social protection
- e) **Social Issues** :- Workplace harassment ,Limited maternity benefits ,Mobility and safety concerns

AI IN GARMENTS INDUSTRY

AI is transforming the garment industry by boosting efficiency, enhancing quality control, and reducing waste through machine learning, computer vision, and robotics. Key applications include automated, high-precision cutting and sewing, AI-powered design generation, and predictive maintenance of machinery. These technologies reduce operational costs and shorten production cycles. AI is transforming the garment industry by boosting efficiency, enhancing quality control, and reducing waste through machine learning, computer vision, and robotics. Key applications include automated, high-precision cutting and sewing, AI-powered design generation, and predictive maintenance of machinery. These technologies reduce operational costs and shorten production cycles. AI is transforming the garment industry by boosting efficiency, enhancing quality control, and reducing waste

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APPLICATION OF AI IN GARMENTS INDUSTRY

Design and Product Development: AI algorithms analyze trends to help designers create unique styles, predict color trends, and generate digital samples, significantly reducing design time. **Production Planning & Supply Chain:** AI tools like Forecast Pro or Blue Yonder optimize inventory and predict demand, reducing overstock and preventing bottlenecks. **Quality Control & Inspection:** AI-powered cameras inspect fabric in real-time, detecting defects, stitching errors, or color mismatches faster and more accurately than human inspectors, reducing losses. **Automated Manufacturing:** AI-driven robots handle complex tasks such as sewing and fabric cutting, increasing speed and improving precision. **Waste Reduction:** AI, including specialized platforms like SxD AI, helps optimize material utilization, reducing fabric waste by up to 46%. **Sustainability:** AI optimizes energy consumption by monitoring machinery and optimizing production schedules.

IMPACT OF AI IN GARMENTS INDUSTRY

Positive impact

- 1 **Creation of Skilled Jobs:** AI creates new roles such as:
- 2 Data analysts
- 3 Machine operators
- 4 AI system managers
- 5 Digital designers

These jobs require higher skills and offer better wages.

Increased Productivity and Industry Growth

AI improves efficiency, reduces errors, and lowers production costs. This can lead to industry expansion and indirectly generate employment opportunities.

Emergence of New Business Models

Technologies like AI-driven customization and fast fashion analytics create new markets and employment opportunities in:

- E-commerce
- Digital marketing
- Supply chain management

Improved Working Conditions

Automation reduces physically demanding and hazardous tasks, leading to better workplace safety.

NEGATIVE IMPACT

1.Replacement of Low-Skilled Workers

AI and automation mainly affect repetitive and routine tasks such as stitching, cutting, and packaging. These jobs are easily programmable and thus vulnerable to automation. Studies show that routine manufacturing roles are at the highest risk of displacement.

2.Decline in Labour Demand

Automation reduces the need for large workforces. In the long run, industries adopting automation experience a decline in employment for unskilled workers.

3.Impact on Developing Countries

Countries like Bangladesh and India rely heavily on garment exports for employment. Automation may reduce their competitive advantage of cheap labour, leading to job losses and economic challenges.

4.Gender Implications

The garments industry employs a large number of women. Automation may disproportionately affect female workers who are concentrated in low-skilled roles.

The above are the positive and negative impact of AI in Garments industry.

AI does not eliminate jobs uniformly—it selectively replaces routine-intensive roles.

job Creation and New Employment Opportunities

AI generates new employment in areas such as:

- a) Technical Roles :- AI system operators ,Robotics engineers ,Data scientists
- b) Creative Roles:- Fashion designers using AI tools Digital product developers
- c) Support Services -Machine maintenance ,Software support

Challenges and Risks

- Technological Unemployment
- Short-term job losses due to rapid automation.
- Skill Gap
- Mismatch between industry needs and worker skills.
- Digital Divide
- Small firms lag behind large firms.
- Ethical Issues
- Worker exploitation

CONCLUSION

AI is reshaping the garments industry by altering employment patterns, skill requirements, and wage structures. While it poses challenges such as job displacement and inequality, it also offers opportunities for innovation and growth. The key lies in managing the transition through effective policies, education, and inclusive technological adoption.

While AI improves efficiency across all stages, its adoption also shifts the industry structure from labor-intensive to skill-intensive, requiring workers to adapt to new technological environments.

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