The Impact of Automation on Jobs in Small Scale Industries with Special Reference to Bhiwandi Taluka, Thane District, Maharashtra

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Abstract: *Automation is bringing major changes to the way industries function across the world. In particular, small-scale industries (SSIs) are undergoing a transformation due to the adoption of new technologies like robotics, artificial intelligence, and computer-controlled machinery. These tools are helping businesses work more efficiently, produce better-quality products, and reduce human errors. However, while these changes are positive for production and business growth, they are also affecting employment patterns, especially in areas that depend heavily on manual labor. This study explores how automation is impacting jobs in small-scale industries in Bhiwandi Taluka, located in the Thane District of Maharashtra. Bhiwandi has a long-standing reputation as a center for textile production, where power looms and labor-intensive methods have been the norm for decades. These industries have provided jobs to thousands of semi-skilled and unskilled workers, making them a vital part of the local economy. But with more businesses turning to automation, the traditional job market is facing challenges. The research used both quantitative (numbers-based) and qualitative (experience-based) methods to understand the situation. Surveys were conducted among workers and business owners, and interviews were held to gather detailed insights. The study aimed to find out how widespread automation is in Bhiwandi's SSIs, which sectors it is affecting the most, and how it is changing the employment scenario. One key finding is that automation is being adopted in a gradual and uneven manner. Tasks that are repetitive like weaving, cutting, or dyeing are more likely to be automated. Business owners are switching to digital looms and modern machinery to remain competitive. While this has increased production and reduced costs, it has also reduced the need for many low-skilled jobs. Workers who used to rely on manual skills are now struggling, as they are not trained to operate or maintain new machines. This issue is especially serious for older workers and those who do not have a formal education. On the positive side, automation is also creating new jobs but for people with technical skills. There is growing demand for machine operators, software handlers, and technicians who can work with automated systems. Unfortunately, many existing workers are not prepared for these roles, and there are not enough training programs to help them make this transition. The response to automation is mixed. While business owners see it as a necessary step to survive in the market, many are also concerned about the social impact, especially the loss of jobs. A few have started reskilling programs for their workers, but such efforts need more support from the government and industry bodies. In conclusion, automation is both an opportunity and a challenge. If managed well with training, policy support, and inclusive planning it can lead to growth while protecting livelihoods.*

Keywords: Automation, Small-Scale Industries, Employment, Bhiwandi, Textile Industry, Workforce Reskilling, Industrial Growth, Job Displacement

I. INTRODUCTION

The advent and integration of automation technologies have brought transformative changes to industrial operations across the globe. By enhancing efficiency, improving product quality, and reducing operational costs, automation has become a cornerstone of modern manufacturing and production systems. This technological shift, while widely embraced by large-scale enterprises, is increasingly making its way into smaller industries, including those in developing countries like India. In particular, small-scale industries (SSIs) in India play a pivotal role in the national economy, acting as engines of employment generation and sources of livelihood for millions. They also contribute significantly to production outputs in various sectors and are instrumental in fostering grassroots entrepreneurship. Among the many regions in India where SSIs are prominent, Bhiwandi Taluka in the Thane District of Maharashtra stands out due to its rich history in textile manufacturing. Often referred to as the "Manchester of India" for its dense network of power looms, Bhiwandi has been a textile production hub for decades. The majority of its industries fall under the small-scale category, employing traditional methods of operation and offering employment to a large, semi-skilled labor force. These businesses have long relied on manual and semi-automated processes, which have shaped the socio-economic fabric of the region.

However, in recent years, the winds of change have begun to sweep through Bhiwandi, as automation technologies such as computer-controlled looms, robotic material handling systems, and digital monitoring start to make their presence felt. These innovations promise significant gains in productivity, reduced dependence on human labor, and improved consistency in product quality. For manufacturers under pressure to stay competitive, particularly in the face of global market demands and rising labor costs, automation presents an attractive solution. Yet, this transition is not without its consequences. The introduction of advanced machinery and automated systems in SSIs, especially in labor-intensive sectors like textiles, poses considerable challenges for the existing workforce. A large portion of Bhiwandi's labor pool comprises individuals with limited formal education or technical training, many of whom have worked in the same trade for decades. The shift toward automation risks rendering a sizable segment of this workforce obsolete unless there are concerted efforts to reskill and upskill them.

Furthermore, the cost of adopting automation can be prohibitively high for many small-scale industrialists. Unlike their larger counterparts, SSIs often operate on thin margins and face difficulties in accessing capital. This financial constraint means that only a subset of these businesses can afford to modernize, potentially creating a divide within the sector. Those who can adopt automation may scale quickly and capture a greater share of the market, while others struggle to survive, leading to uneven development and possible closures.

The local economy in Bhiwandi, which has long been dependent on the steady employment provided by the textile SSIs, could face disruption if automation is not managed carefully. Job displacement is a real concern, and the loss of income for numerous families may lead to broader socio-economic issues, including migration, reduced consumer spending, and increased pressure on urban infrastructure elsewhere. However, if implemented with foresight and planning, automation also offers an opportunity to transform the industrial landscape of Bhiwandi for the better.

For instance, automation can lead to the creation of new types of jobs such as machine operators, technicians, and IT support roles which may offer better pay and working conditions than traditional loom work. Training programs and skill development initiatives tailored to the needs of the new industrial environment can help workers transition smoothly and reduce the impact of job losses. Government support, in the form of subsidies, low-interest loans, and technical guidance, can also play a crucial role in helping SSIs upgrade their operations without displacing their workforce abruptly.

II. LITERATURE REVIEW

The discourse on automation's impact on employment is extensive and multifaceted. Studies indicate that automation can lead to job displacement, especially in labor-intensive industries, while simultaneously creating new roles that demand advanced skills. In the Indian context, reports suggest that automation could displace up to 60 million workers in the manufacturing sector by 2030, with the textile industry being notably affected. Conversely, automation enhances productivity, reduces operational costs, and improves product quality, offering competitive advantages to industries. The challenge lies in balancing these benefits with the socio-economic implications of workforce displacement.

Gokarneshan, N. (2023, April) This article by Gokarneshan offers an in-depth review of the integration of robotics within the Indian textile industry. It examines various robotic applications, such as automated material handling, robotic sewing, and quality inspection systems, highlighting their impact on production efficiency and product quality. The paper also discusses the challenges faced by small-scale industries (SSIs) in adopting these technologies, including high initial costs and the need for skilled labor. Gokarneshan emphasizes the importance of strategic planning and government support to facilitate the smooth transition towards automation in the textile sector.

Jain, M., Shetty, R., & Sharma, R. (2018, February) In this study, Jain, Shetty, and Sharma explore the adoption of automation technologies in Indian manufacturing, with a particular focus on small-scale industries. The authors analyze factors influencing automation decisions, such as cost considerations, technological readiness, and labor market dynamics. Through surveys and interviews with industry stakeholders, the paper identifies barriers to automation adoption, including limited access to capital and resistance to change among workers. The study provides recommendations for policy interventions and training programs to support the automation journey of SSIs in India.

Rao, R. (2022, April) This article delves into the concept of Industry 4.0 and its transformative effects on the Indian textile industry. The paper discusses the integration of cyber-physical systems, the Internet of Things (IoT), and big data analytics in textile manufacturing processes. Rao highlights case studies of Indian textile firms that have successfully implemented Industry 4.0 technologies, resulting in enhanced production capabilities and competitiveness in global markets. The article also addresses the challenges faced by SSIs in embracing these advanced technologies, such as infrastructural limitations and the need for a skilled workforce.

Vaidya, P. (2023, April) This article provides a comprehensive overview of the evolution of automation in the Indian textile industry. The paper traces the historical development of automation technologies, from the introduction of power looms to the current adoption of automated cutting and stitching systems. Vaidya examines the benefits of automation, including increased productivity and reduced labor costs, while also acknowledging the challenges faced by SSIs, such as the high cost of technology and the need for workforce retraining. The article concludes with a discussion on the future prospects of automation in the Indian textile sector, emphasizing the need for strategic planning and collaboration among industry stakeholders.

III. RESEARCH METHODOLOGY

This study employs a mixed-methods approach, combining quantitative data analysis with qualitative insights. Surveys and interviews were conducted with stakeholders in Bhiwandi's SSIs, including business owners, employees, and industry experts. Secondary data from industry reports, government publications, and previous research were also analyzed to contextualize findings. The focus was on assessing the extent of automation adoption, changes in employment patterns, and the perceptions of stakeholders regarding automation's impact.

OBJECTIVES OF THE STUDY
- To evaluate the extent of automation adoption in SSIs within Bhiwandi Taluka.
- To analyze the impact of automation on employment levels and job roles.
- To understand the perceptions of stakeholders regarding automation.
- To identify strategies for mitigating negative employment impacts.

LIMITATIONS OF THE STUDY
- The study is geographically limited to **Bhiwandi Taluka**, which restricts the **generalizability** of the results to other regions or industrial hubs.
- Some **stakeholders (workers and business owners)** were **reluctant to share information**, affecting the comprehensiveness of data collection.
- The **rapid pace of technological advancement** in automation means the findings offer only a **snapshot in time** and may not fully reflect future trends or long-term impacts.

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- Limited access to **real-time industry data** and reliance on self-reported information may have introduced **bias or inaccuracies**.
- **Training and education levels** of respondents varied, possibly influencing their understanding and perceptions of automation.

Budget and time constraints limited the **sample size**, which may affect the robustness of the conclusions.

SCOPE OF THE STUDY

The research focuses on SSIs in Bhiwandi's textile sector, examining the current state of automation, its impact on employment, and potential strategies for workforce adaptation. Insights gained aim to inform policy recommendations and practical interventions applicable to similar industrial regions.

IV. DATA ANALYSIS

Extent of Automation Adoption

Surveys indicate that approximately 40% of SSIs in Bhiwandi have integrated some form of automation, primarily in weaving and dyeing processes. The transition from traditional power looms to automatic looms is a notable trend, driven by the need for increased efficiency and competitiveness.

Impact on Employment Levels and Job Roles

The adoption of automation has led to a reduction in demand for manual labor, particularly among low-skilled workers. Conversely, there is an increased demand for technicians and operators skilled in managing automated systems. This shift has resulted in job displacement for some workers, while others have transitioned to new roles requiring upskilling.

Stakeholder Perceptions

Interviews reveal mixed perceptions among stakeholders. Business owners acknowledge the necessity of automation for survival in a competitive market but express concerns about the socio-economic impact on the community. Workers exhibit apprehension regarding job security but recognize the potential for skill development and higher wages associated with technical roles.

V. FINDINGS

Automation adoption in Bhiwandi's SSIs is moderate, with a significant shift towards automatic looms.

There is a clear impact on employment, with a decline in low-skilled jobs and a rise in demand for technically skilled workers.

Stakeholders have ambivalent views, balancing the benefits of automation with concerns about job displacement.

There is a pressing need for workforce reskilling programs to facilitate the transition and mitigate negative employment impacts.

VI. CONCLUSIONS

The integration of automation in Bhiwandi's SSIs presents both opportunities and challenges. While it enhances productivity and product quality, it also necessitates a reevaluation of workforce strategies to address job displacement. Proactive measures, including targeted reskilling programs and supportive policies, are essential to ensure that the benefits of automation are equitably distributed, fostering sustainable industrial growth and social stability.

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