


Chapter 4

Robotics and Manufacturing: Implications for Economic Growth in the Future

Rashid Hashmi

 <https://orcid.org/0009-0006-3232-0705>

Sharda University, India

ABSTRACT

Manufacturing is the world's oldest and largest industry. Manufacturing has lapsed in investment when it comes to research and development, and robotics is an upcoming thrust area. The author of this book chapter discusses how strategic investments in education, innovation, and inclusive policies will determine whether society can harness robotics effectively for sustainable economic growth and prosperity. Robotics has resulted in significant increases in manufacturing productivity and efficiency, which have reduced operational costs and production errors. As automation changes employment dynamics, it contributes to economic growth, but it also requires substantial workforce adaptations and retraining. Robotics has dramatically improved the speed at which a product is manufactured and delivered to the consumer, which has resulted in lower costs and higher quality products. Technology is creating specialized technical roles; however, it also disrupts traditional employment, requiring workers who have been retrained to acquire a number of new skills.

DOI: 10.4018/979-8-3373-1082-4.ch004

INTRODUCTION

Advances in robotics now enable rapid and automated configuration of manufacturing cells, significantly enhancing operational flexibility and efficiency (Asif et al., 2025). Robotics significantly enhances manufacturing productivity and efficiency by reducing operational errors and optimizing robotic functions through machine learning (Arimoto, Kawamura, & Miyazaki, 1984). Recent innovations in robotics have led to vision-guided adaptive gripping systems, significantly optimizing automated garment manufacturing processes (Choi et al., 2025). Comparing the manufacturing industry of the olden days with the other industries of the time, manufacturing enjoyed a very high level of technological development for its historical period. Research in automatic control has significantly advanced robotics and manufacturing automation, driving industrial innovation toward a more sustainable future (Rupenyan & Balta, 2024). Robots' control loops can be greatly simplified by incorporating active-learning frameworks that incorporate feedback-driven exploration (Taylor et al., 2021). In reflections on how technology affects national development, it is emphasized that context-sensitive robotics strategies are needed which align innovation with broader societal objectives (Tiwari et al., 2025). Drawing a parallel with medical sciences, even in sports trauma and knee surgery as compared to conventional tools and patient-specific instrumentation, navigation- and robotic-assisted techniques improved alignment in total knee arthroplasty, while clinical outcomes remained the same (Lei et al., 2022).

AI-enhanced manufacturing robotics has transformed industrial applications by introducing cutting-edge technological trends that significantly boost production efficiency (Adebayo et al., 2024). Robotics advancements have significantly benefitted from artificial intelligence approaches, enhancing autonomous decision-making and operational intelligence in manufacturing settings (Brooks, 1986). Recent technological trends in robotics have notably reshaped manufacturing practices, enabling enhanced productivity, precision, and operational flexibility (De San Bernabe et al., 2024). There are many old civilizations that have built structures that have been able to withstand the test of time for many thousands of years, such as pyramids, acropolis, aqueducts, cathedrals, and so on. Their standard normal building procedures included innovative processes and elements that are still being used today as part of the standard normal building procedures. Industrial robotics has driven substantial advancements in manufacturing processes, enhancing efficiency, consistency, and operational productivity across industries (Snyder, 1985). Collaborative robots (cobots) have significantly transformed manufacturing by enhancing human-robot interactions, opening numerous opportunities for future industrial developments (Liu et al., 2024). Artificial intelligence-driven robotics has significantly advanced the food industry, enhancing productivity, precision, and quality in food processing and

20 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/chapter/robotics-and-manufacturing/385661

Related Content

Flammability Index of Nigeria Agro Waste Processed With Polymer and Gum Arabic Hybridized Flame Retardants for Building Applications

Timine Suoware (2022). *Advanced Manufacturing Techniques for Engineering and Engineered Materials* (pp. 260-277).

www.irma-international.org/chapter/flammability-index-of-nigeria-agro-waste-processed-with-polymer-and-gum-arabic-hybridized-flame-retardants-for-building-applications/297282

Blockchain for Supply Chain Transparency in Manufacturing

Yoshitha Marpina, Prathyusha Pedarlaand Gayathri Juluri (2024). *Futuristic Technology for Sustainable Manufacturing* (pp. 75-90).

www.irma-international.org/chapter/blockchain-for-supply-chain-transparency-in-manufacturing/350506

Surface Modification Techniques for Improving the Material Performance

Thanigaivelan R., Saravanan K. G. and Makesh M. (2022). *Advanced Manufacturing Techniques for Engineering and Engineered Materials* (pp. 1-19).

www.irma-international.org/chapter/surface-modification-techniques-for-improving-the-material-performance/297267

Carbon Pricing Meets Offsets: How CO2 Prices and Voluntary Carbon Credits Shape Green Investment in Manufacturing

Silvio Andrae (2026). *The Impact of Carbon Pricing on Green Investment in Manufacturing* (pp. 11-38).

www.irma-international.org/chapter/carbon-pricing-meets-offsets/399927

Fleet Management System Using IoT and GPS With Fuel Monitoring

Karuturi Sri Mani Krishna, R. Rajeshand B. Surendra (2027). *GIS Applications for Enhancing Sustainable Operational Performance of Manufacturing Industries* (pp. 99-134).

www.irma-international.org/chapter/fleet-management-system-using-iot-and-gps-with-fuel-monitoring/413546