

# Comparative Analysis of Big Data Computing in Industry 4.0 and Industry 5.0: An Experimental Study

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**Abstract.** A comparison of the use of big data computing in Industry 4.0 and Industry 5.0 was carried out utilizing data collected from the actual world for the purpose of this research. The findings suggest that there has been a 2% drop in the number of faulty items produced in Industry 5.0, coupled with a 1% decrease in the amount of energy used in highly automated companies. According to the findings of the quality control, fault Type B accounts for around 65 percent of the overall defects in Industry 4.0. The results highlight the benefits of Industry 5.0, which capitalizes on human-machine cooperation, data-driven processes, and customized products and services. These insights help to contribute to manufacturing processes that are more efficient, more sustainable, and more quality-driven. Big data computing, Industry 4.0 and 5.0, quality control, and energy efficiency are some of the keywords to look for.

**Keywords.** Big data computing, Industry 4.0 and Industry 5.0, quality control, and energy efficiency are some of the keywords here.

## 1 INTRODUCTION

The arrival of the Fourth Industrial Revolution, also known as Industry 4.0, brought about revolutionary shifts in the ways in which industrial operations are carried out. Industry 4.0 is distinguished by the incorporation of digital technology, decision-making that is driven by data, and greater automation. Industry 5.0, on the other hand, is a progression that places an emphasis on human-machine cooperation, individualized production, and highly adaptable manufacturing systems [1]–[4]. The landscape of manufacturing has been completely transformed by both Industry 4.0 and Industry 5.0, each of which represents a different technological paradigm. These revolutions have led to substantial breakthroughs in big data computing, which plays a vital role in optimizing industrial processes, boosting efficiency, and maintaining product quality [5]–[9]. These developments have been brought about as a direct result of these transformations. The convergence of Industry 4.0 and Industry 5.0 with the processing of large amounts of data has significant repercussions for the manufacturing industry. Because to Industry 4.0's emphasis on connection, the integration of sensors, and data analytics, manufacturers are now able to gather, analyze, and make use of enormous volumes of data in order to enhance both their operational efficiency and the quality of their products [10]–[14]. However, when Industry 5.0 emerges as the next phase of industrial development, it adds new components, such as collaborative robots, augmented reality, and

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## **Table of Contents Comparative Study Of Big Data Computing And Storage Tools**

1. Understanding the eBook Comparative Study Of Big Data Computing And Storage Tools
  - The Rise of Digital Reading Comparative Study Of Big Data Computing And Storage Tools
  - Advantages of eBooks Over Traditional Books
2. Identifying Comparative Study Of Big Data Computing And Storage Tools
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an Comparative Study Of Big Data Computing And Storage Tools

- User-Friendly Interface
- 4. Exploring eBook Recommendations from Comparative Study Of Big Data Computing And Storage Tools
  - Personalized Recommendations
  - Comparative Study Of Big Data Computing And Storage Tools User Reviews and Ratings
  - Comparative Study Of Big Data Computing And Storage Tools and Bestseller Lists
- 5. Accessing Comparative Study Of Big Data Computing And Storage Tools Free and Paid eBooks
  - Comparative Study Of Big Data Computing And Storage Tools Public Domain eBooks
  - Comparative Study Of Big Data Computing And Storage Tools eBook Subscription Services
  - Comparative Study Of Big Data Computing And Storage Tools Budget-Friendly Options
- 6. Navigating Comparative Study Of Big Data Computing And Storage Tools eBook Formats
  - ePub, PDF, MOBI, and More
  - Comparative Study Of Big Data Computing And Storage Tools Compatibility with Devices
  - Comparative Study Of Big Data Computing And Storage Tools Enhanced eBook Features
- 7. Enhancing Your Reading Experience
  - Adjustable Fonts and Text Sizes of Comparative Study Of Big Data Computing And Storage Tools
  - Highlighting and Note-Taking Comparative Study Of Big Data Computing And Storage Tools
  - Interactive Elements Comparative Study Of Big Data Computing And Storage Tools
- 8. Staying Engaged with Comparative Study Of Big Data Computing And Storage Tools
  - Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers Comparative Study Of Big Data Computing And Storage Tools
- 9. Balancing eBooks and Physical Books Comparative Study Of Big Data Computing And Storage Tools
  - Benefits of a Digital Library
  - Creating a Diverse Reading Collection Comparative Study Of Big Data Computing And Storage Tools
- 10. Overcoming Reading Challenges
  - Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
- 11. Cultivating a Reading Routine Comparative Study Of Big Data Computing And Storage Tools
  - Setting Reading Goals Comparative Study Of Big Data Computing And Storage Tools

- Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Comparative Study Of Big Data Computing And Storage Tools
  - Fact-Checking eBook Content of Comparative Study Of Big Data Computing And Storage Tools
  - Distinguishing Credible Sources
- 13. Promoting Lifelong Learning
  - Utilizing eBooks for Skill Development
  - Exploring Educational eBooks
- 14. Embracing eBook Trends
  - Integration of Multimedia Elements
  - Interactive and Gamified eBooks

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