

***Operation optimization using Robotics and
Advanced Automated Solutions in Logistics***

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Course Title: Research Methodology in Computer Science

Course Code: AI800

Course Code: Literature Review Report

Hand-out Date: 25-Oct-25

Hand-in Date: 13-Nov-25

Hand-in Method: Online Submission via E-Learning

Abstract

There is a noticed giant leap in the advancement of the emerged automation solutions covering wide spectrum of businesses vary between logistics, healthcare, agriculture and many others. The investments in many of the innovations was encouraged by the latest pandemic impacted the global supply chain vary from ocean transportation, manufactory production lines and warehouse operations and the reason was mainly due to the absence of the manpower. However, based on the published statistics, only small percentage of the organizations has utilized the offered solutions and got the maximum benefits out of it.

The research trying to get the main reason behind the slowness of adopting such technologies and implement in strategical business area like the logistics operation and healthcare where there is already a proven success records and references

Keywords

“Logistics Operation”, “Operation Optimization”, “Robotics Automation”

The reference paper was retrieved from Google Scholar for the period 2021 – 2025, and including the following context to ensure it has peer reviewed, and indexed in a well-known references:

"Peer reviewed" site:springer.com OR site:sciencedirect.com OR site:ieee.org OR site:wiley.com OR site:tandfonline.com OR site:mdpi.com

Summary Research Papers':

Paper-1: A Study on the Application of Logistics Automation in the Healthcare Industry: Exploratory Qualitative Research

The research consider different categories of organizations varies from factories, wholesalers, Hospital clinics and pharmacies, and the team spent sufficient time connecting with the relevant business team members, having an online call and following up the emails in order to get accurate outcomes.

Inventory volume and inventory complexity were identified as the main driver to accommodate the automation, along with the organization internal capabilities and external demands that jointly shape the logistics automation approach.

The benefits of the automation was reported in a good manner highlighting the improved inventory accuracy, accelerate the operation cycle and reduce the error but still a lot of companies not very convinced and are struggle to take the first step due to the high upfront investment and workforce perception which is a major challenge to adopt the change

Critical Analysis:

The number of cases was limited to the republic of Korea, and the limited number of organization under every category of the organizations could result into a non-accurate output, also, the non-unified channels of communication should be avoid in order to have standardized process of collecting the inputs and feedback from the interviewers

Paper-2: Recent Advances and Challenges in Industrial Robotics: A Systematic Review of Technological Trends and Emerging Applications

The paper nicely explained the components of the trending automation that include **hardware (Robotic, sensor integration, dexterous hands), software (AI-driven decision making, ML algorithms, control systems), and system integration (IoT-enabled automation, smart manufacturing)** which gives a clear picture to about the industry to the readers.

The study also highlighted the benefits of the automation, such as cost efficiency, productivity, and tremendous gain precision in Healthcare sector that reach up to 40%. However, many challenges are still barriers to accommodate the automation include and not limited to the high cost of implementation, integration with legacy systems and ethical concerns

Critical Analysis:

The paper highlights the progress in the robotics industrial, and emerging technology by given an overview of the recent innovation such as collaboration robots and AI- driven perception. A lot of benefits and values where introduced but, there was lack of presentation to the market challenges like workforce adoptability and precise ROI of the invested costs

Paper-3: Intelligent Warehouse in Industry 4.0—Systematic Literature Review

The authors in this paper put a great effort analyzing the recent advancements in the automation, robotics, Internet of things (IoT) and Artificial Intelligence to enhance and improve the decision making and efficiency in the warehouses and operations. Different type of automation products were referenced such as Automated Storage and Retrieval Systems (AS/RS) and Autonomous Mobile Robots (AMRs) along with the relevant business sector, and finally the positive impact on the operation efficiency, productivity and resource utilization.

Critical Analysis:

The paper made clear categorization and classification of the alternative intelligent solutions that accelerate the warehouse operations such as IoT sensors, Automated Storage and Retrieval System, and Autonomous Mobile Robots. However, the maturity and size of impact still yet not pretty clear due to the missing sufficient quantifications and references

Paper-4: A Systematic Literature Review on the Application of Automation in Logistics

The paper has considered a wide number of high quality studies between 2019 and 2023. The conclusion on the benefits and challenges was addressing the applications in inventory control, stock taking, tracking, forecasting, back orders, as well as internal logistics and transport processes as the main gaining for the organization. However, the challenge and concerns was more about the potential cyberattacks and biased decisions made by AI systems

Critical Analysis:

The review has structured and elaborates the emerging automation solution in the transportation, warehousing and last mile execution laying down the exist technology and where it could be used, however, it lack sufficient evidence on how far the performance was improved and under what conditions

Paper-5: Implementation and Critical Factors of Unmanned Aerial Vehicle (UAV) in Warehouse Management: A Systematic Literature Review

The research is reviewing the adoption of the **UAV** within the warehouse management. It informs how this technology applied for daily operational tasks such as stock count, inspection and inventory movement. Moreover, it identify the main and major factors that influence successful implementation

Critical Analysis:

The study highlights how far the UAVs have enhanced the warehouse operation along with the key factors that influence the implementation. However, it still conceptual and lacking specific predefined Key performance indicators to validate its output

Paper-6: Revolutionizing Supply Chains: Unleashing the Power of AI-Driven Intelligent Automation and Real-Time Information Flow

The paper emphasis how the era of AI, and the advance automation technologies has supported the operation and supply chain especially by boosting and enabling the real time flow of information as well as to make the operation more resilient in order to be flexible and responsive to the needs of the market demand.

The key success factors and major challenges were very well addressed guiding the implementation for such technologies in the logistics, warehouse operations and customer fulfillment process

Critical Analysis:

The study represents an overview of the positive impact on the operation responsiveness, decision making on real time, and linking the information flow with the physical movement of the goods. However, it was built on assumption and lacks the qualitative analysis or empirical validation to support it's finding.

Summary of Literature Synthesis

The six researches focus on the automation technologies and different offered solution include Ai, robotics, UAV, Automated Mobile Robots, AS/RS among many others that boost the warehouse efficiency and improve the productivity through real time flow of information and intelligent control, although there are proven records and success stories, but extra references and implementations will give more confident to the market and business owners to embrace the emerged technology and the newly introduced automated solutions

Synthesis Matrix for Literature Review:

Research	Year	Methodology	Key Finding	Limitation
A Study on the Application of Logistics Automation in the Healthcare Industry: Exploratory Qualitative Research	2025	Exploratory	Identify the main factors and challenges in Healthcare automation. And shows how the solutions has improved the efficiency and accuracy	One single country, and limited number of quantified cases
Recent Advances and Challenges in Industrial Robotics: A Systematic Review of Technological Trends and Emerging Applications	2025	Systematic	Provide Summary for the robotics trend	Lack sufficient number of real implementation
Intelligent Warehouse in Industry 4.0—Systematic Literature Review	2024	Systematic	List the categories and their respective role in the warehouse automaton	No sufficient quantitative data
A Systematic Literature Review on the Application of Automation in Logistics	2024	Systematic	Highlight the automated solutions and major benefits for the organizations	Few cases for the integrations, and ROI assessment
Implementation and Critical Factors of Unmanned Aerial Vehicle (UAV) in Warehouse Management: A Systematic Literature Review	2023	Systematic	Hardware's are the influential factors In the UAV , then the Software and integrated systems	Few references and number of implementation, most studies are conceptual and not real implementation
Revolutionizing Supply Chains: Unleashing the Power of AI-Driven Intelligent Automation and Real-Time Information Flow	2024	Systematic	Explain how the supply chain was enhanced by utilizing the Ai and real time analytics	Missing case base evidence and cost analysis

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