

Healthcare Management System

Prof. Balaji A. Chaugule, Saurabh Chavan, Nikhil Chavan, Rohit Shinde, Tamanna Mulani

Department of Information Technology
Zeal College of Engineering and Research, Pune, Maharashtra, India

***Abstract:** In order to deliver a material flow with an ideal cost and time usually, supply chain management becomes more crucial in the developing globe. To build a better network of suppliers for their end consumers, several industries concentrate on supply chain management optimization and qualifications. Supply chain management is important for the quality of the services provided and patient satisfaction, particularly in the healthcare industry, where it applies to both pharmaceutical items and hospital supplies. As a result, the relevance of supply chain management in healthcare is highlighted by numerous research. The purpose of this study is to present a review of the literature on supply chain management in the healthcare industry in order to provide context by highlighting significant examples and studies that run concurrently with the most recent research. Additionally, by examining research in the literature, this literature review will evaluate a perspective to comprehend how to manage a complicated supply chain in the healthcare sector.*

***Keywords:** Healthcare Supply Chain, Virtual Centralization, Vendor Managed Inventory, Learning.*

I. INTRODUCTION

Supply chain management (SCM) is a term used to describe a group of businesses that move products from suppliers, product assemblers, merchandisers, and transportation firms to the final consumer. A supply chain can also be defined as the flow of products, services, and information that begins with raw materials and ends with the end user. The research continues to highlight the growing significance of supply chain management. It can be challenging to create performance measurement criteria in a supply chain, which makes evaluating performance in supply chains, especially multi-vendor supply chains, challenging. Additionally, supply chain management fosters collaboration between regional and international businesses in order to manage interactions among all supply chain participants and to combine the excellence of management processes. Due to logistics, pharmaceutical products, and patient happiness, supply chain management is becoming more significant in the healthcare sector to provide higher quality services than in other industries.

Additionally, the healthcare industry has seen a tremendous amount of change. We Rapid over the past few years. Even though the methods and techniques have issues in industrial settings, many healthcare organizations are aware of the need of using a better methodology and method to implement their supply chain management plans. In both the public and private sectors, increasing supply chain management effectiveness is closely related to raising healthcare quality.

In this investigation, research about supply chain management in the healthcare industry published between 2000 and 2018 will be investigated. The study is divided into four main sections: introduction, literature review, analysis, and conclusion and discussion. The introduction provides background information and a brief introduction to supply chain management in healthcare. The literature review examines the topics and methods of supply chain management in healthcare.

II. LITERATURE SURVEY

Title: Case Studies in Healthcare Supply Chain Management

1. Cost- Cutting Strategy for Medical Suppliers

Authors: Kumar, Oldsmar, and Zhang (2008)

Published: 2008

Summary: The study explores a cost-cutting strategy for medical suppliers in Singapore. It emphasizes that while information technology (IT) initiatives may have high initial costs due to a lack of professionals, cost-effective approaches such as just-in-time (JIT) inventory management, reengineering, and outsourcing can be implemented.

2. Addressing Organizational Shortcomings in Patient

Authors: Mei boom, Schmidt-Bake, and Western

(2011)

Published: 2011

Summary: This study focuses on organizational shortcomings affecting patient care and suggests the use of Supply Chain Management principles to address them. It includes a literature review covering industrial healthcare processes. The study highlights the importance of integration, appropriate IT procedures, and efficient supplier lead times to improve patient care.

3. Cost and Effectiveness of RFID Systems in Healthcare Supply Chains

Authors: Kumar, Swanson, and Tran (2009)

Published: 2009

Summary: The study examines the cost and effectiveness of RFID systems in the healthcare supply chain. It states that while some cost-effective applications of RFID exist, the current RFID systems in use are generally too expensive. The study emphasizes that RFID devices have the potential to enhance the effectiveness and cost-efficiency of healthcare supply chains.

4. Distribution Model for Hospital and Pharmacy

Supply Chains

Authors: Uchiyama and Priyank (2013)

Published: 2013

Summary: The study proposes a distribution model that combines the supply chains of hospitals and pharmacies. It aims to optimize inventory management by considering factors such as lead time, time and space availability, and customer service levels. The study provides a numerical example to determine an ideal proposal for lead time and available lot size. The model offers insights into improving efficiency in hospital and pharmacy supply chains.

5. Assessment of Pharmaceutical Supply Chains

Authors: Stannic, Harrington, and Sari (2017)

Published: 2017

Summary: This study assesses manufacturing and distribution models in pharmaceutical supply chains. It examines various aspects of pharmaceutical supply chains and identifies areas for improvement. The study explores ways to optimize these supply chains to enhance efficiency and effectiveness. These case studies delve into cost-cutting strategies, organizational shortcomings, the use of RFID systems, distribution models, and the assessment of healthcare supply chain management.

III. PROBLEM STATEMENT

To provide a framework for an online medical chain supplier portal. Lack of visibility and highly manual processes can lead to increased costs throughout the healthcare supply chain. Healthcare Supply Chain Management comprises several processes, involvement of different team members, movement of pharmaceutical drugs, medical devices, and other essential items. Suppliers work together in the entire supply chain process to deliver the best service to a patient by providing a framework for an online medical chain supplier portal.

IV. PROPOSED SYSTEM

The objective of our proposed healthcare management system is to create an efficient and effective supply chain for medical supplies by considering various parameters such as customer requirements, blood bank locations, and medical

storelocations. The system utilizes the N-closestneighborhood algorithm (NCN) to determine the suitability of medical supplies based on a vast dataset and user input. The focus of this paper is on the classification algorithm used in the system. The architecture of the system revolves around the supply chain, which encompasses all the procedures and actions involved in delivering goods or services to customers.

The supply chain can connect multiple medical facilities and blood banks, and interactions between suppliers and customers can occur at various points along the chain. Depending on the products and markets, the distribution system may involve a direct flow from the supplier to the client.

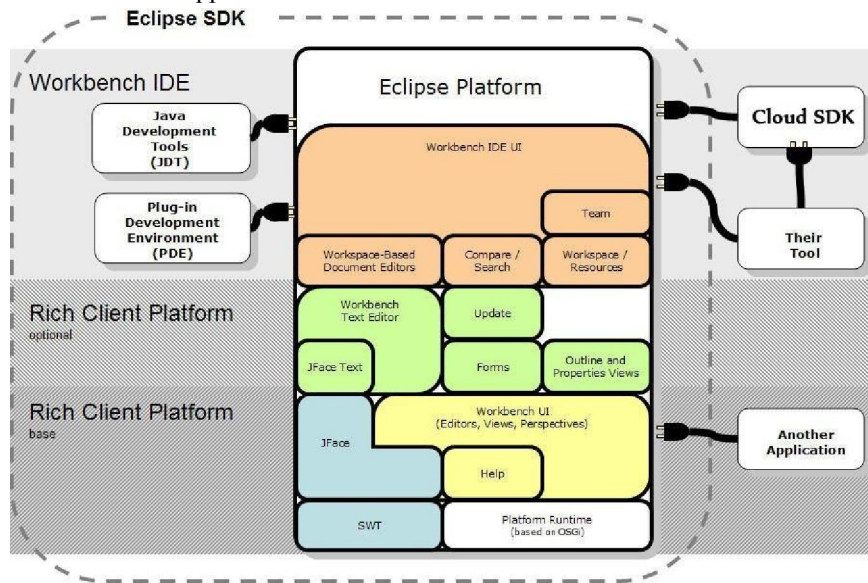


Fig: System Architecture

The healthcare management system captures and stores crucial information such as medical histories, tablet data, details of previous tablet sales, upcoming requirements, and customer preferences. It also maintains a record of the stock of tablets available in specific medical stores. By utilizing this system, customers can access their medical details and tablet stock information without the need to visit the store in person for every query. This eliminates the hassle for customers and enhances their overall experience.

Furthermore, the proposed system enables comparative analysis of different medical stores' suppliers' techniques and customer requirements. It allows for a comprehensive evaluation of suppliers' performance in meeting customer demands and ensures that the medical supplies are readily available when needed. In summary, our proposed healthcare management system aims to create an efficient supply chain for medical supplies by leveraging data analysis, customer preferences, and location-based algorithms. By implementing this system, we can enhance the overall healthcare experience for customers and improve the effectiveness of medical supply distribution.

V. IMPLEMENTATION

Hardware Configuration:

Processor: 2 gigahertz (GHz) or faster processor.
RAM: 4 gigabytes for 32-bit or 4 GB for 64bit.
Hard Disk Space: 16GB.

Software Configuration:

Operating System: Windows OS
Coding Language: JavaScript
Other Tools: HTML, CSS, Cloud Database

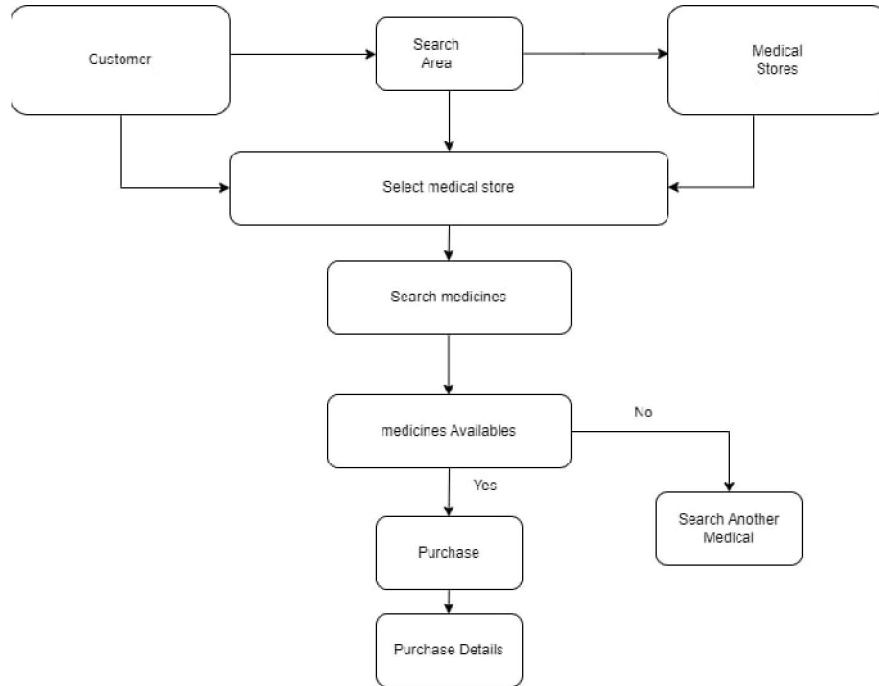


Figure 1: Activity Diagram

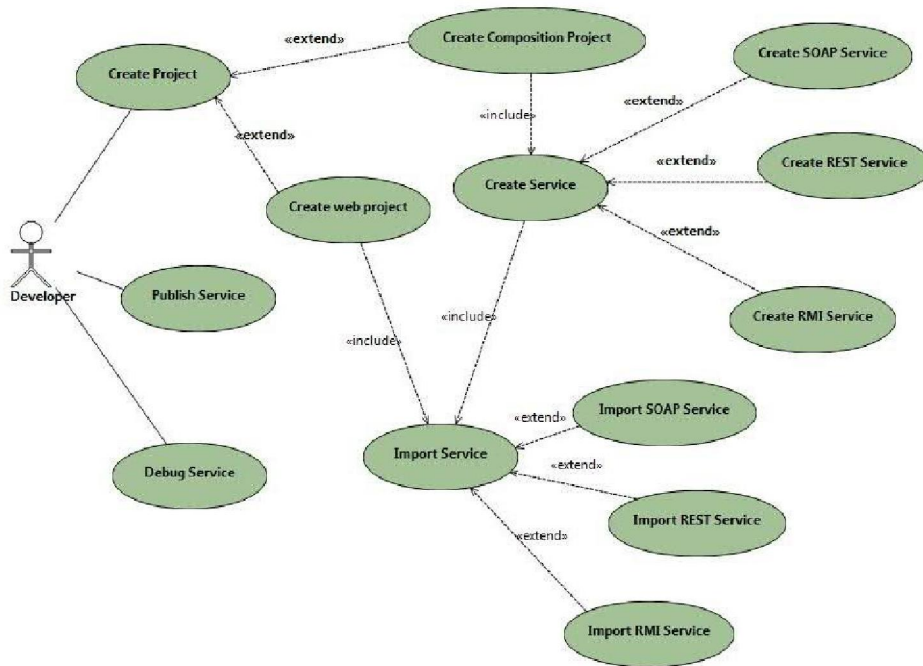


Figure 2: Use Case Diagram

VI. RESULTS

In our experimental study of the healthcare supply chain management system, we have successfully implemented a comprehensive solution that addresses the challenges and complexities of delivering goods and services to consumers in the healthcare industry. The supply chain encompasses a network of blood banks, medical facilities, and customers, creating a dynamic environment with various supplier-customer interactions.

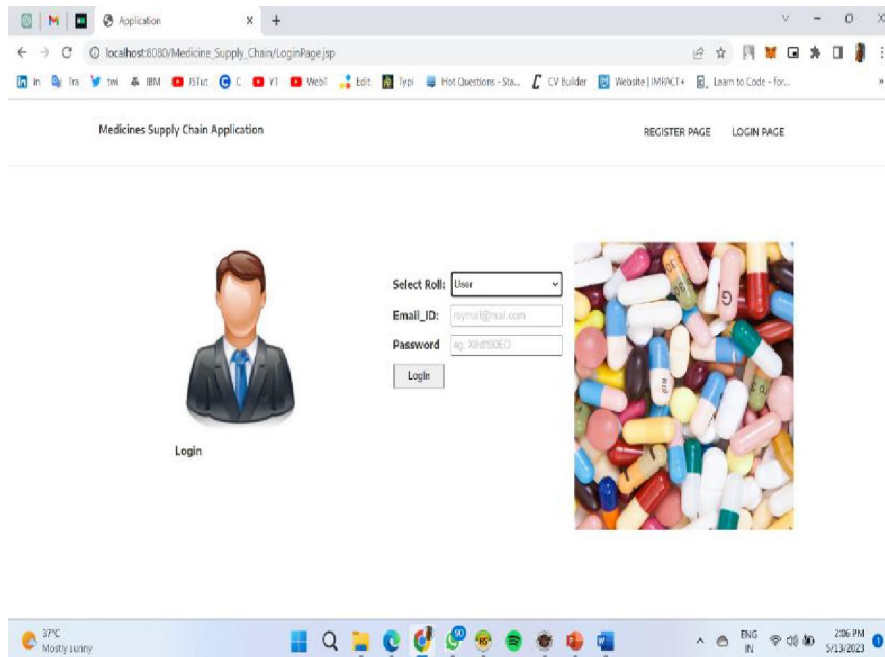


Fig 1: User, Admin, and Distributor Login Page

To provide a user-friendly experience, we have developed a web-based interface using modern web technologies. This interface serves as the primary platform for user's, administrators, and distributors to access and manage the healthcare management system. It enables seamless communication and collaboration, facilitating efficient handling of the entire supply chain.

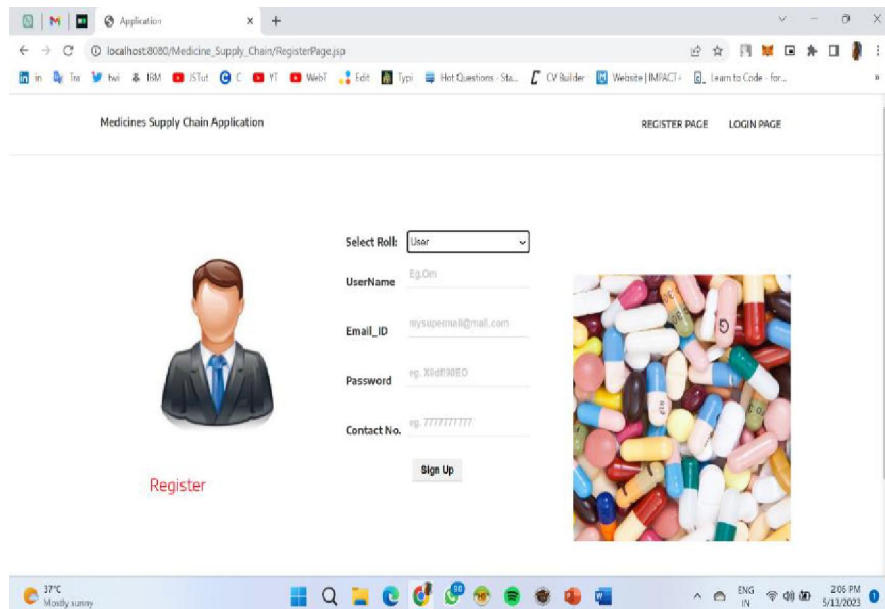


Fig 2: User and Distributor Registration Page

One of the significant achievements of our system is the reduction of costs. By optimizing processes and improving supply chain efficiency, we have been able to minimize expenses associated with healthcare products and services. This cost reduction contributes to overall affordability and accessibility for consumers.

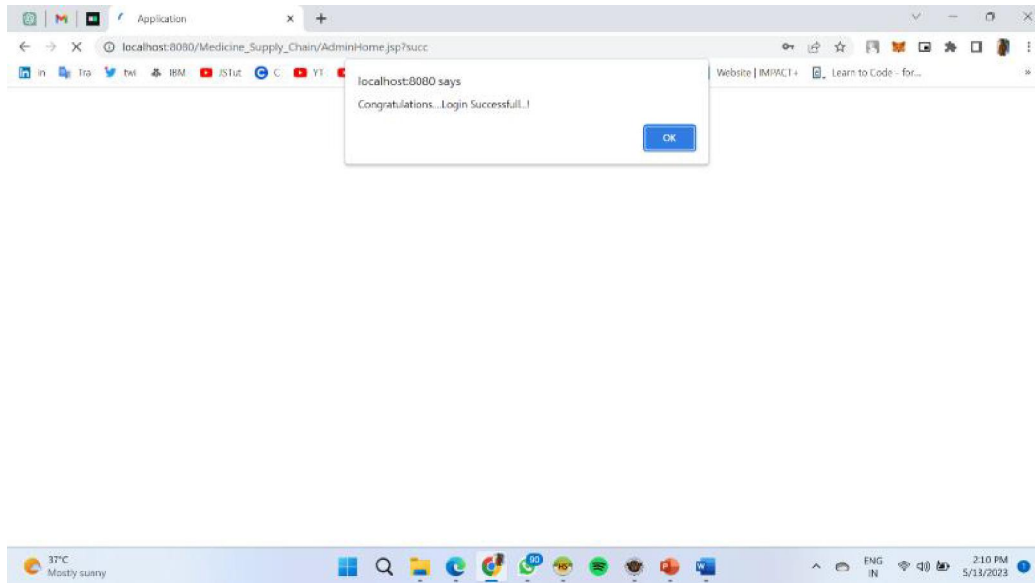


Fig 3: Login Successful

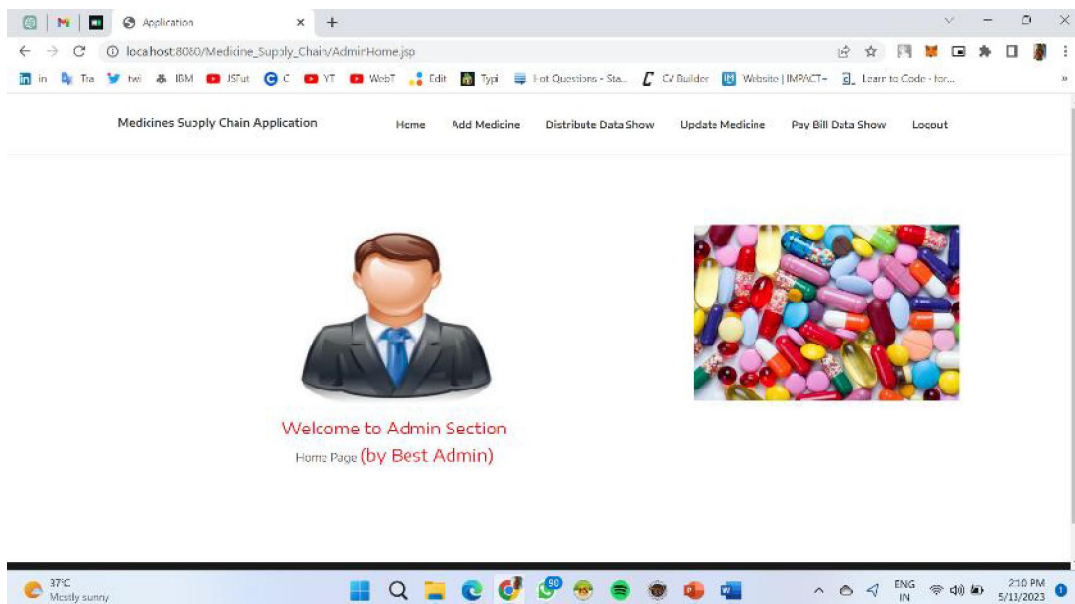


Fig 4: User dashboard

Furthermore, our system enhances supply chain efficiency, ensuring that medicines and other medical supplies are available when needed. Regular checks are conducted to monitor the expiry of medicines, especially in cases where manual entries are involved. By always maintaining an adequate supply of medicines, we improve patient care and avoid stockouts.

Clear and transparent communication is a key advantage of our system. It provides visibility into the entire supply chain, enabling stakeholders to track the movement of goods and services. Effective communication and collaboration among healthcare supply chain participants, including customers, suppliers, and distributors, are facilitated, resulting in improved coordination and operational efficiency.

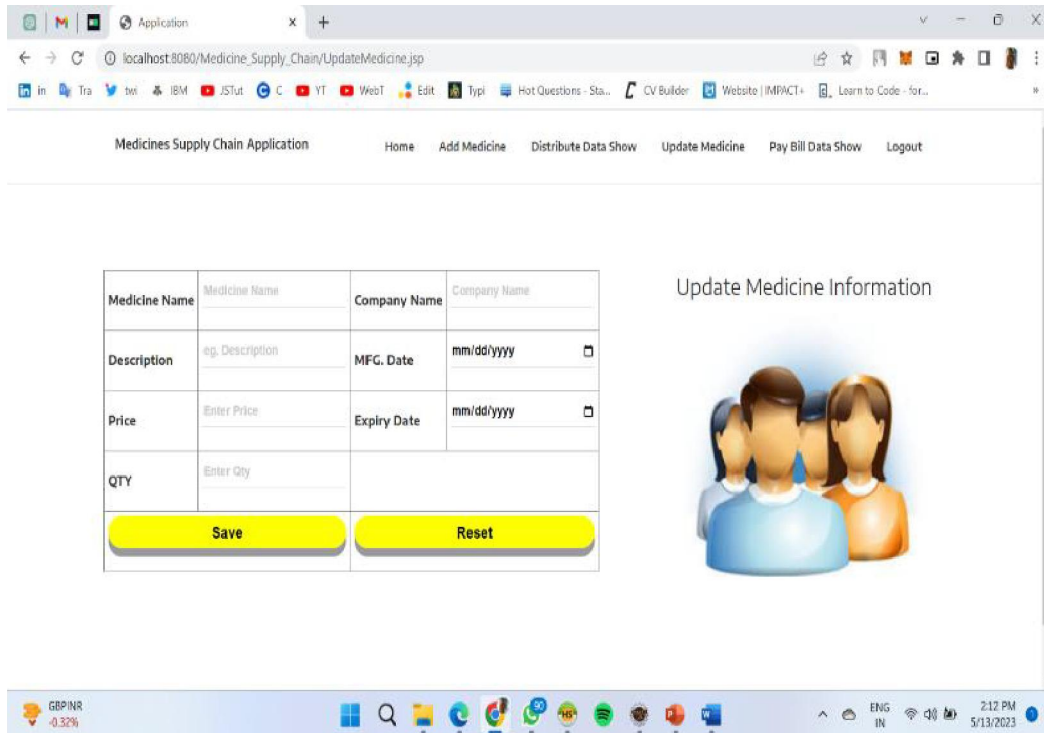


Fig 5: Update Medicine information

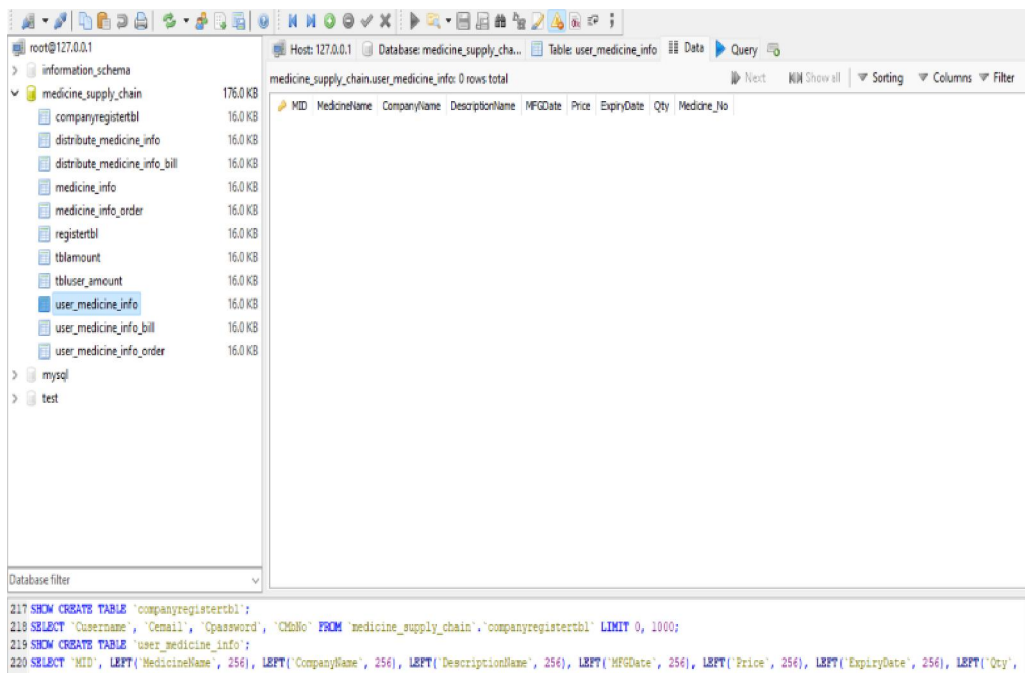


Fig 6: Save database on AWS

In conclusion, our experimental results demonstrate the successful implementation of a healthcare supply chain management system. The system effectively handles the complexities of the supply chain, ensuring cost reduction, increased efficiency, and improved communication. Users, administrators, and distributors can navigate the system seamlessly, leading to better healthcare outcomes for consumers.

VII. CONCLUSION

It is not an easy topic to understand the structure of supply chain management for the healthcare business, but its importance is growing. This study looked at 43 publications regarding pharmaceutical and hospital supply chain management from the literature, which contains many studies on supply chain management in the healthcare sector. First, there is a significant gap regarding publications in the literature due to the lack of mathematical modelling. Almost 15% of the papers analyzed did not include any supply chain management mathematical modelling. In terms of operations research, models may aid in the optimization of inventory, costs, and other operational issues. Consider evaluating pharmaceutical or hospital SCM as another classification for the supply chain emphasis area. Hospital studies are more thorough than pharmaceutical SCM papers.

In order to raise the effectiveness and lower the costs of the healthcare supply chain, studies about pharmaceutical SCM and hospital SCM may increase in proportion to the importance of the medical sector and hospital operations. Finally, there are not many studies about how supply chain management is evaluated in conjunction with industry 4.0 applications in healthcare systems to adapt to the most recent issues. Furthermore, the integration of supply chain management with Industry 4.0 applications in healthcare systems remains an underexplored area. Understanding how supply chain management can adapt to the latest advancements in technology and automation can lead to enhanced efficiency and better patient outcomes.

Overall, the study highlights the need for continued research and innovation in healthcare supply chain management. By addressing the identified gaps and leveraging emerging technologies, healthcare organizations can achieve more effective and cost-efficient supply chain operations, ultimately benefiting patients and the healthcare industry.

VIII. ACKNOWLEDGEMENT

We would like to thank the Department of Information Technology, Zeal College of Engineering and Research for the constant support in the field of Research and Development. We are indebted to our mentor, Prof. Balaji A. Chaugule, who helped in the preparation of this project, for his hearty support, suggestions, and invaluable advice throughout our project work.

REFERENCES

- [1] Londe, La, Bernard, J., Masters, James M.: Emerging logistics strategies: blueprints for the next century. *Int. J. Phys. Distrib. Logistics Manag.* 24(7), 35–47 (1994).
- [2] Baltacioglu, T., Ada, E., Kaplan, M.D., Yurt And, O., Cem Kaplan, Y.: A new framework for service supply chains. *Serv. Ind. J.* 27(2), 105–124 (2007).
- [3] Giunipero, L.C., Brand, R.R.: Purchasing's role in supply chain management. *International Journal. Logistics Manag.* 7(1), 29–38 (1996).
- [4] Hervani, A.A., Helms, M.M., Sarkis, J.: Performance measurement for green supply chain management. *Benchmarking Int. J.* 12(4), 330–353 (2005).
- [5] Lambert, D.M., Cooper, M.C.: Issues in supply chain management. *Ind. Mark. Manage.* 29(1), 65–83 (2000).
- [6] De Vries, J., Huijsman, R.: Supply chain management in health services: an overview. *Supply Chain Manag. Int. J.* 16(3), 159–165 (2011).
- [7] Kumar, A., Ozdamar, L., Ning Zhang, C.: Supply chain redesign in the healthcare industry of Singapore. *Supply Chain Manag. Int. J.* 13(2), 95–103 (2000).
- [8] Meijboom, B., Schmidt-Bakx, S., Westert, G.: Supply chain management practices for improving patient-oriented care. *Supply Chain Manag. Int. J.* 16(3), 166–175 (2011).
- [9] Kumar, S., Swanson, E., Tran, T.: RFID in the healthcare supply chain: usage and application. *Int. J. Health Care Qual. Assur.* 22(1), 67–81 (2009).
- [10] Attaran, M.: Critical success factors and challenges of implementing RFID in supply chain management. *J. Supply Chain Oper. Manage.* 10(1), 144–167 (2012).
- [11] Uthayakumar, R., Priyan, S.: Pharmaceutical supply chain and inventory management strategies: Optimization for a pharmaceutical company and a hospital. *Oper. Res. HealthCare* 2(3), 52–64 (2013).

- [12] Settanni, E., Harrington, T.S., Srai, J.S.: Pharmaceutical supply chain models: a synthesis from a system view of operations research. *Oper. Res. Perspect.* 4, 74–95 (2017).
- [13] Aronsson, H., Abrahamsson, M., Spens, K.: Developing lean and agile health care supply chains. *Supply Chain Manage. Int. J.* 16(3), 176–183 (2011).
- [14] Shah, R., Goldstein, S.M., Unger, B.T., Henry, T.D.: Explaining anomalous high performance in a health care supply chain. *Decis. Sci.* 39(4), 759–789 (2000).
- [15] Sinha, K.K., Kohnke, E.J.: Health care supply chain design: toward linking the development and delivery of care globally. *Decis. Sci.* 40(2), 197–212 (2009).