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# A Study on The Role of Artficials Intelligence In Managing Physical Distribution Of Medicines In Pharmaceutical Industry During Covid–19 Pandemic

**R. Abinaya**

*Fatima College (Autonomous), Madurai, Tamilnadu, India*
E-mail id: abinayaraju4@gmail.com

**Abstract.** Supply chain management of goods or service means the entire manufacturing flow, starting from the raw components procurement to providing finished product to the customer. It enhances the smooth flow of products in reaching the market and helps the customers to get an easy access to all the essential products like food, clothing and drugs at the right time and right place. Among all the basic amenities, it is drugs that demands the quick process of delivery. It is promoted by the pharmaceutical supply chain which assists in the manufacturing and meticulous delivery of medicines to patient. Physical distribution of medicine has become an impossible task in this pandemic which called for an immediate urge for the use of Artificial Intelligence (AI) in medicine distribution. Artificial Intelligence is the stimulation of human intelligence processes by machines, especially through computer systems. Use of AI in distribution of medicine proves to be more effective in this lockdown.

This paper explores the role of Artificial Intelligence in managing physical distribution of medicines in pharmaceutical industry. Effective physical distribution is an integral part of Supply Chain which is intensified with the use of AI. Specific applications of AI include expert systems, natural language processing, speech recognition and machine version. The usage of AI in physical distribution of drugs has increased the efficiency in the complete process of physical flow of medicines from the pharmacy to the patients and delivering the medicines at the right time. Thus, this paper gives a conceptual idea regarding how the functions of AI supports in managing physical distribution of medicine in pharmaceutical industry.

**Keywords:** Artificial Intelligence, Supply Chain, Pharmaceutical industry, Pandemic

## 1 INTRODUCTION

Supply chain management (SCM) is the optimization of a product's creation and flow from raw material sourcing to production, logistics and delivery to the final customer.

Supply chain management encompasses the integrated planning and execution of processes

required to manage the movement of materials, information and financial capital in activities that broadly include demand planning, sourcing, production, inventory management and storage, transportation or logistics and returning excess or defective products. Supply chain management relies on both business strategy, specialized software and collaboration to work.

The need of medicines has increased in this 21st century due to the wide spread of various diseases. Bothe the invention and distribution of medicines need more efficiency. The proper management of timely production and distribution of medicines to the needy people is very essential. The pharmaceutical industry has the major responsibly in the proper and timely management of physical distribution of medicines.

The wide spread of Corona Virus (Covid-19) created the demand of important medicines and its timely delivery not only for the Corona patients but also the patients suffering from chronic diseases such as kidney failure, blood pressure, diabetes, Asthma, Cancer etc.

The wide spread of Corona virus led to tight lock down all over the world. People were unable to travel anywhere and get important basic amenities like food, clothing and especially the medicines.

Patients faced so much of trouble due to the lock down to get medicines on time. The usage of Mobile apps and computer systems made the medicine distribution quite easy.

**LITERATURE REVIEW**

This paper will give an insight into the importance and benefits of artificial intelligence in the physical distribution of medicines during the covid-19 pandemic. The literature is focused on usage of Artificial intelligence in the physical supply of medicines and analyzing the new Artificial Intelligence technologies being used in pharmaceutical industry.

Shamas Pervaiz in his research paper titled “The role of Artificial intelligence in supply chain management” (year 2020) found that Artificial Intelligence has been developing in recent years. His study shows that the usage of artificial intelligence in supply chain management increased the efficiency in demand forecasting, reduction in operational cost, improvement in data collection and inventory process, strengthening logistic process etc. AI is helpful in the identification and solving of big problems in supply chain management.

Oliver Maassen in his research paper “Future medical Artificial intelligence application requirements and expectation of physicians in German University Hospitals” stated that most physicians expects that medicine’s future will be characterised by a combination of human and artificial intelligence. The AI application will substantially improve patient care in the future.

Dr. Bertalan Mesco in his study “A guide to Artificial Intelligence in healthcare” suggested that Artificial Intelligence in medical field will not replace the role of human power in medical filed but it will help us to find new medicines new treatment methods and new therapies through in pharma companies and hospitals in future.

## METHODOLOGY

The secondary data has been used for this study. The sources of secondary data used in this study are journals, research papers and newspapers related to supply chain management, Artificial Intelligence and corona pandemic situation.

## PHISICAL DISTRIBUTION OF MEDICINES

Physical distribution is the science of Business Logistics where by the proper amount of the right kind of product is made available at the place where demand for it exists. Physical distribution is key link between manufacturing and demand creation.

The physical distribution of medicines means the activities involved in the physical flow of medicines from the producer to the consumers. The medicines should reach the patients on right time.

Pharmaceutical manufacturers manage the distribution of drug products from the point of production to the drug wholesalers and in some instances, directly to retain pharmacy chains, specialty pharmacies, hospital chains as well as to some health plans.

The pharmaceutical industry is using the cutting-edge technologies to help deliver safe and reliable drugs to market. It is proved that pharmaceutical companies getting the drugs and vaccines to market faster than ever before.

## CORONA VIRUS DISEASE (COVID-19)

Corona virus disease (covid -19) is an infectious disease caused by the SARS-CoV-2 Virus. It can cause illness such as the common cold, severe acute respiratory syndrome (SARS) and Middle east respiratory syndrome (MERS)

## ARTIFICIAL INTELLIGENCE

Artificial intelligence is a wide-ranging branch of computer science concerned with building smart machines capable of performing tasks that typically require human intelligence.

## PRE- PANDEMIC ERA

Pre-pandemic era is a period with unerupted communication, transportation, stable economic development, international trade and money supply etc. people were able to get their important basic amenities like food, clothing and medicines without delay on right time.

## IMPORTANCE OF PHYSICAL DISTRIBUTION OF MEDICINES DURING PANDEMIC

The efficient system of physical distribution of medicines is very essential during the pandemic. The proper management of medicine distribution is necessary for saving the life of Corona patients, the patients suffering from chronic diseases need medicines at the proper time.

The pregnant women and children need timely distribution of medicines.

The unexpected accidents and other illness of people need timely distribution of medicines.

**HURDLES IN PHYSICAL DISTRIBUTION DURING PANDEMIC**

The tight lock down during the pandemic period interrupted the free supply of medicines to the patients. The emergency situation of patients and their health were not able to met due to the unavailability of medicines.

**ARTIFICIAL INTELLIGENCE AS A SAVIOR AID IN PHYSICAL DISTRIBUTION OF MEDICINES**

Many companies are already on their way towards digital transformation across various industries that face supply chain management challenges.

The pharmaceutical industry also adopted the usage of Artificial Intelligence in physical distribution of medicines. Companies in various ways are applying AI in pharma to gain a competitive advantage. Slowly but steadily, the pharma sector is also becoming the next testing ground for companies looking to use AI to help digitalize and boost their global supply chains.

The pharmaceutical distribution software are as follows

**Blue Link ERP**

Blue Link ERP is Blue Link's flagship product – an integrated inventory and accounting ERP software package built primarily for small and medium distributors and wholesalers. Blue Link ERP software is available as a cloud-based (hosted) or on-premises solution.

Inventory and accounting make up Blue Link's core robust functionality for wholesale and distribution, with specialized functionality such as: landed cost tracking, lot tracking, eCommerce integration and import & export functionality.

**Pharmaserv**

Pharmaserv is an on-premises pharmacy management solution from McKesson. This system helps manage pharmacy operations, medication dispensing, and patient clinical services.

**Pharma Suite**

Pharma Suite, by Softronix, is a pharmaceutical distribution software. This solution provides a stable, error free solution for pharmacies and medication manufacturers. By using this pharmaceutical distribution software, your business can handle almost all aspects of business including batch wise inventory, recoveries, finance, mobile based real time invoicing, rout wise supplies and much more.

Pharma Suite is the most comprehensive product with over 20 years of experience at more than 400 businesses across the country.

**Smart Pharma Distribution Software**

Smart Pharma Distribution Software by Digival Smart Pharma Distribution Software by Digival Solutions is an outstanding distribution management system which combines the features of inventory management software with accounting application. This software is efficient, managing Sales, Purchase, Reorder, Income, Expenses, Inventory, Pricing, Reports, etc. This software is particularly designed for pharmaceutical distributors, stockists, C&F, and C&A agencies.

Use real-time data to analyses past performances, then shortcomings to improve revenue and profit. al Solutions is an outstanding distribution management system which combines the features of inventory management software with accounting application. This software is efficient, managing Sales, Purchase, Reorder, Income, Expenses, Inventory, Pricing, Reports, etc. This software is particularly designed for pharmaceutical distributors, stockists, C&F, and C&A agencies.

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**Pharmaceutical Distribution Software**

Pharmaceutical distribution software is designed to ease the movement of regulated medications and controlled substances along the supply chain. Unlike generic distribution systems, pharmaceutical software takes these regulations into account in order to keep distributors compliant during the packaging and shipping process.

As a type of healthcare supply chain software, this solution specifically optimizes the distribution of medication from the manufacturer to the suppliers then to the pharmacies and healthcare centres responsible for prescribing them to patients. Using this management software keeps the pharmaceutical industry compliant with ever-changing controlled substance and drug custody laws.

**AROGYA SETHU APP**

Arogya Sethu is an Indian COVID-19 contact tracing, syndromic mapping and self- assessment, primarily a mobile app, developed by the National Informatics Centre under the Ministry of Electronics digital service under the Ministry of Electronics and Information Technology.

**FUTURE OF AI IN SUPPLY CHAIN MANAGEMENT IN PHARMACEUTICAL INDUSTRY**

There are 2 distinct types of AI solutions that facilitate pharmaceutical Supply Chain Management:

- **Augmentation-** Assisting technology to workforce, boosting efficiency, reducing human error.
- **Automation-** AI has no human intervention and works completely autonomously.

Assuring drug efficacy, patient identity and chain of custody integrated with supply chain agility is where the true value of AI lies for the drug industry.

**Examples of AI Implementation**

- **Data Robot –** It is an AI platform powered by open-source algorithms that are able to model automation by using historical drug delivery data.

- **OptumRx-** It uses AI/ML to manage data collected from healthcare setting to reduce number of shortages or excess inventory of drugs.

**BENEFITS OF AI IN PHARMACEUTICAL SUPPLY CHAIN**

**Forecasting Demand**: AI-based software helps in analysing big data related to diseases and drugs consumption to drive patterns and forecast demand.

**Fake Drug Detection**: Serialization of drugs coupled with AI/ML capabilities helps in tracking drugs around the globe and detecting fake drugs. This imposes safety of consumers.

**Supply Chain Optimization**: AI/ML tools improve collaboration between manufacturer/supplier and retailer for demand-driven SCM.

**SCM- COVID-19:**

As the world markets are facing lockdowns, pharmaceutical industry is required to step up the efforts to manage the supply chain for providing consumers with required drugs. COVID-19 has resulted in disruptions in supply chain in following ways:

- **Supply Disruption-** Impact on supply of raw materials or products sourced from areas heavily impacted with COVID-19.

- **Demand Shocks-** With implementation of lockdowns due to deepening of pandemic crisis, consumers are stocking up the required drugs leading to systemic demand shocks.

AI can be used to power solutions for managing these disruptions in following ways:

- **Chatbots:** Chatbots can be used for operational procurements such as speaking to suppliers during trivial conversations, setting & sending actions to suppliers regarding

compliance material, placing purchase orders, researching & answering internal questions, receiving/filing/documenting invoices, etc.

- **ML For Supply Chain Planning:** It could help the SCP professionals in providing best solutions based upon intelligent algorithms and machine-to-machine analysis of big data. This facilitates optimized delivery of goods while balancing supply & demand.
- **Autonomous Vehicles for Logistics & Shipping:** Incorporation of AI for developing autonomous vehicles for logistics & shipping will result in faster & more accurate shipping, reducing lead time & transportation expenses, reducing labour costs, facilitating environmental friendly operations, etc.
- **NLP For Data Cleansing & Building Data Robustness:** Natural Language Processing deciphers large amounts of foreign language data in streamlined manner. It drops the language barrier to build supplier data sets and streamline auditing/ compliance actions.

## SUGGESSIONS FOR THE USAGE OF ARTIFICIAL INTELLIGENCE IN PHYSICAL DISTRIBUTION OF MEDICINES

The usage of artificial intelligence in medicine distribution increases the efficiency, thus the pharmaceutical industry can increase the usage of computer system, mobile apps, online ordering of medicines etc. It will save the time and increases the efficiency. More AI technologies can be developed to help the physical distribution of medicines to the customers.

## REFERENCE


[1] Irfan Ahmed, Homerton University Hospital NHS foundation Trust, Artificial intelligence in medicine: Current trend and future Possibilities, Article in British Journal of General Practice, March 2018, DOI: 10.3399/BJGP 18X695213.

[2] SVETLANA IBRIC, ZORICA DJURIC, JELENA PAROJCIC, JELENA PETROVIC, Institute of pharmaceutical technology, faculty of pharmacy Belgrade Serbia, REVIEW PAPER, Chemical Industry and Chemical Engineering Quarterly 15(4) 227-236(2009), DOI: 10.2298/CICEQ09042271.

[3] Shamas Pervaiz, The Role of Artificial Intelligence in Supply chain Management, VAASAN AMMAKORKEAKOULU – University of Applied Science – International Business, 2020.

[4] Rupa Dash, Mark McMurtry, University of Central Arkansas, Carl Reman, University of San Diego, Upendra K. Kar, University of Pittsburgh Application of Artificial Intelligence in Automation of Supply Chain Management, University of Pittsburgh, Journal of Strategic Innovations and Sustainability Vol.14(3) 2019 43.