# DRUG PHARMACEUTICAL SECTOR WITH DIGITAL TRANSFORMATION

## Atul Bhardwaj[1]

[1]Wipro Technologies, Noida, India.

## ABSTRACT

Pharmaceutical Sector use digital transformation by introducing the digital technologies, by this sector change the model of the production and supply change process of the organization use in the field. By new innovation technique implementation and development digitalization provides new opportunities, Digitalization also gather data for the medicine use and monitoring the safe and efficiency data for the research and development use. Digitalization technology help to collect and process the data from various sources such as manufacturing machine, test labs. It allows to exchange the data between all the stakeholders (Distributors, patients and health professionals) which allow them to take the proper decision relating to therapy and follow-up. Digital service in the pharma sector improves the accessibility of the patient's health information time manner which help them to take proper care and improve quality of life. Some the digitalization technique like 3D barcode printing on the medicine, Drug reminder device, therapy management, prevention on counterfeit drug in the supply chain. In USA Introduction of the Verification Router Service solution prevent the entry of the counterfeit drug in the supply chain and stop consumption of the counterfeit drug which help patient to get proper medicine and improve life. Introduction of the electronic prescription and referrals help patients, Doctor, Hospitals to access the documents electronically and communicate effectively.

Digital transformation benefitted pharmaceuticals sector lots in every process of manufacturing and distribution, this article articulates the benefit of the digital transformation in the Pharma sector which led to patient life save, timely distribution and minimize the cost.

**Keywords:** Drug Traceability, Drug Counterfeit, Pharmaceutical Serialization, Supply chain, Track and Trace System, Cold Chain, Blockchain, Enterprise System.

## 1. INTRODUCTION

In the Pharmaceutical sector innovation are taking place continuously to provide the effective drug supply, reduce side effects. Innovations are based on nanotechnology, innovative drug supply system, manufacturing automation and scaling of production facilities, digitalization, and artificial intelligence use in the analysis the data [1,2]. Improve drug development and patient care in the pharmaceuticals sector got lots of the technique through Digital Innovation and New Technologies [3]. Sharing real time data electronically regarding the patient health between the stakeholders helped to take the decision about the care process of the patent by the respective stakeholders, by this care provides with proper need and based on preference of the patients. Digitization provides the better information and involvement of the patient for their improvement in the health and life [4]. Through the digitalization lots of mobile app and sensors help the patient to monitor the impact of the medicine in daily life and keep reminding them to take proper care in term of consumption of the medicine or taking the therapy. These mobile apps and sensors also share the respective data with the care provide for the safety and the effectiveness of the medical product. This data helps the care provider to check the response of the treatment or its adverse impact in time manner to act sooner [5].

The main objective of the article is to articulate the benefits of the digitalization in the pharmaceuticals industry. Digitalization use to prevent to introduce in the drug supply chain and reduce the use of counterfeit drugs (6). Through the digitalization pharma industry can provide the time base and effective pharmaceutical and health care which will help the patient for the lifesaving treatment and reduce the medicine cost.

## 2. TRACEABILITY OF THE DRUG PRODUCTS

In the pharmaceutical industry supply chain is an integral part of it and having maximum risk for consume the fake/ counterfeit drug as well. The Drug Supply Chain Security Act (DSCSA) has developed a step-by-step implementation plan to secure the supply chain of the drug over the years [7]. The development of an effective strategy for enterprise systems is dependent upon the development of acceptable functionality to meet key attributes of a drug traceability system [8]. As per law, it has been mandated that use of 2D matrix barcode for each individual medicine packet contain a unique product code and unique serial number being use to trace it [9]. The GS1 Data Matrix is a two-dimensional (2D) bar code that effectively allows the encoding and marking of more data in a smaller area and that

offers error detection and correction capabilities to improve bar code readability despite irregular packaging or physical damage to a label [10, 11]. Through the law it ensures that all the hierarchy aggregated to the highest level should be shared to the wholesaler and other supply chain partner to ensure the authentication of the drug. Manufacturer, Wholesaler, Distributor, repackage, dispenser need to ensure that all the data of with the hierarchy level should be transfer to the supply chain partner through electronic form only [12].

Counterfeit and illegal drug circulation in the supply chain can be stopped by Implementing digital track and tracing system of pharmaceutical drugs. In the Track and Trace process 2D data matrix barcode should be labelled on every saleable unit which has information about the Product code, Expiry date, Batch number and unique serial number. Due to high volume and higher profits, Pharma sector is soft target for the illegal drug dealer [13]. These dealers used their illegal network to consume the fake or counterfeit drug. This is direct impact on the patient life and treat to patient.

## 3. ENTERPRISE SYSTEM FOR COMBATING ANTI-DRUG COUNTERFEIT

Enterprise system also using the anti-counterfeit technology with the high level of the safety, establish standards challenge in reapply and remove, automatic authentication real time authentication and application (14). In the pharmaceutical sector, currently wide range of technologies available which has it pros and cons, these technologies are very helpful to stop the counterfeiting of the drug. Packaging process in the pharma sector if the very critical process in which all the drug saving drug got packaged with correct information on the package. Use of the anti-temper device on the packages determine its integrity and provide us the information about the package open or temper during the supply chain, Use of the anti-temper device make sure supply chain partner is receiving the product in the same condition as it was packaged by the packager [15]. Currently the anti-tempering device giving real time notification or alert customer if there is any tempering has happened [16]. Authentication features can be embedded either on the dose or on packaging of the drugs [17].

## 4. INFORMATION SHARING

In the Pharma sector, exchange the data of the manufacturing with the lots of the partners through the Information and communication technologies. Digital technology uses multiple process to store the data in the big data server and with help of systematic process it will exchange the data. Currently organization are using lots of way to exchange the data like EDI (Electronic data interchange), Data Analytics (Big Data Lake), Internet of Thing (IoT). Consumers getting accessibility to buy the critical medicine from genuine source, Healthcare industry getting benefitted by the evolution of the technology and increase globalization about that. [18] This information sharing with the multi partner make the business authentication and it reduce the error for the future process, Same time it will increase the transparency among all the partners in the distribution change of the drug [19]. Data collection with the integration and analyzation of the information help to supply chain team to take the decision for the distributing the drug to their partners. There accurate analysis of the data helps the organization to ensure low-cost distribution and keep its competitive advantage [20]. By Sharing lots of information such as orders, sales forecast, Inventory help organization for their production schedule and making drug as cost effective [21]. Benefit of the information sharing make sure building stable and reliable relationship with the Manufacturer, Distributor, Wholesaler, Retailer and Consumer. So, Supply chain members work effectively via information sharing to achieve the common goal to produce and distribute low-cost drug without compromise the quality of the drug [22, 23]. Pre-define procedure, simple instruction, and proper training on these processes. Currently healthcare industry shares the information through internet based for the precision medicine, Delivery of the healthcare information with telecare and mass customization of medicines required effective integration and information coordination [24]. Sharing the information through the digitalization make sure information deliver time base to make sure development of the drug or enterprise will not hinder due to waiting of the information from the partner [25]. Sharing the market demand, delivery cycle avoid the overstock, scrap drug due to expiration, re-packaging, it will help to lower supply cost and elevate the consumer satisfaction [26]. Lots of the studies showing information sharing critical role in the drug supply chain but same time in the health care industry due to its unique data secrecy and more privacy, this process had lots of validation and check. Due to privacy issue and potential risk of the sharing information with some other source, Drug Organization taking conservative approach and discussing for the advantage and disadvantage for the data sharing extents.

## 5. DIGITAL TRANSFORMATION

Digital technologies transform the enterprise by integrating the process mapped and optimize the processes, Digital transform represent all the changes made by the digital technologies in a enterprise. Digital transform is key factor for the success of an enterprise. Digital transforms help the organization by aligning the better supply chain, Marketing

strategies, analyse consumer behaviour [27, 28]. Currently pharma organization looking for digital transformation as a driving factor for the success for the business. Digital transforms provide the flexibilities to the organization to explore more and improve the product life cycle and keep working on the new ideas for the future innovation [29, 30]. Main success factor in the pharmaceutical industry with the Digital transform are Reduce Production cost by introduce robotics Artificial intelligence, big data analysis, Drug safety process by successful traceability of the product, reduce product cost [31]. Through the digital technologies we can integrate all the processes in the organization to improve operation performance, business process and sharing the data with the business partners [32]. Food and drug industry leveraging the anti-counterfeiting technologies like fluorescence artifacts, security threads, special printing [33]. Market for the online medicine with online consultation, Purchase, Payment and track the delivery of the medicine done by e-commerce with the use of the digital transform. By the e-commerce customer can get the medicine as their convenient, cost effective and efficiently [34, 35]. As pharmaceutical market is now more competitive, Digital transform giving the edge to the organization for their creating greater profit margins, deliver the drug at low cost, improve the supply chain. By the Digital transform, Pharma industry turn in the more competitive way and consumer is getting the product at low cost and better quality.

## 6. CONCLUSION

The study about the digital transformation in the pharma industry confirm that there is positive impact of the digital transform on the pharmaceutical manufacturing and supply chain. Lots of studies show that supply chain improves to much more extent by using the digital transformation. Through the finding it suggest that with use of Internet of thing (IoT), big data lake, blockchain and other technologies pharmaceuticals organization accelerate the business in the competitive market with low cost of supply chain and maintain the quality of the drug. Results also clearly demonstrate that use of the digital technologies with traceability of the drug help the consumer to get the genuine medicine and it significantly reduce the injection of the fake drug in the supply chain. It also shows the as health care sector is working on the direction of implement the regulation of the stringent drug safety which had direct impact on consumers life and health.

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