

A Glimpse of Industry 4.0 in the Pharmaceutical Industry

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Abstract

The pharmaceutical business is an indicator of the nation's expanding economy. This is just a reflection of Industry 4.0 in the pharmaceutical industry which is based on human judgment and decision-making. Pharm 4.0 is an architecture for altering online advertising tactics for the distinct environment of pharmaceutical production. In reality, this architecture brings more connectedness, improved efficiency, streamlined compliance, and the capacity to use production data to address issues as they arise. I critically examine how artificial intelligence, big data, and forecasting models contribute to the improvement of the manufacturing process of medicine in this research.

The worldwide web, artificial intelligence, robots, and sophisticated computers are beginning to pose a threat to the conventional techniques, practices, and business models utilized for the manufacture of pharmaceuticals, which is driving further advancement in pharmaceutical manufacturing technology. Digital transformation and machine learning are giving many outputs to pharmaceutical industries. The use of such innovations has an opportunity to significantly improve the industrial manufacturing of medications in terms of flexibility, efficiency, and quality. The way these technologies are used to move from data collecting to Industry 4.0's trademark technological maturity will determine how the next phase of pharmaceutical manufacturing develops. The pharmaceutical business uses cloud platforms to store, manage, and process massive amounts of data produced by diverse systems. To assist Pharma 4.0 objectives, cloud computing offers scalability, flexibility, and accessibility. In general, Pharma 4.0 predicts a data-driven, digitally connected pharmaceutical sector that may provide safer, more efficient, and personalised medications while streamlining operations in the supply chain and manufacturing facilities. The sector may enhance patient outcomes, cut costs, and react more quickly to market demands by utilising cutting-edge technologies. Pharma 4.0 is a new hope for drugs manufacturers which is future or fate of new pharma world.

Keywords: *Industry 4.0, pharmaceutical, human judgment, pharma 4.*

Introduction:

The Indian drug industry is sixty decades old. It has been full of up and down, starting with Bengal Chemical and being founded by PC Ray. Generic medicines are affordable versions of branded drugs that are introduced once the patent acquired by the drug manufacturer expires. These drugs are dispensed either by brand or salt name (Dr. Sujit Paul, 2022). Due to excessive prices, almost 60% of Indians are unable to afford their regular medication regimen. The marketing and branding of generic molecules are what drive up pricing. Online pharmacy emerged along with the development of technology. The upshot of recent developments in industrial procedures and their automation is the Fourth Industrial Revolution, also referred to as Industry 4.0. Branded pharmaceutical chains were developed with significant investment, and they now entirely dominate the retail industry. Due to the decline in revenue, several long-established pharmacist stores eventually closed due to debt. (Vaishnavi Gupta, 2022). The power of electricity, early electronic machinery, and assembly lines with preset controls that included rudimentary automation and process controls that gave businesses the capacity to specify fundamental process parameters enabled the second industrial revolution (Et.al Arden, 2021).

With the increasing number of generic medications on the market, ongoing manufacturing is the only practical way to meet the demands for good drug quality, extending the short drug lifespan and lowering the high cost of large-scale production.

The pharmaceutical business is moving closer to using continuous production and other business 4.0 technologies. The pharmaceutical business is currently on the path of catching up to other sectors like petrochemical or semi-conductor, thanks to FDA's support (Hiren Shah, 2022).

Importance of Industry 4.0 in the Pharma Industry:

Industry 4.0 in the domain of Operation management helps the root cause of the analysis of the situation. Operation managers work with data to improve the productivity of the manufacturing of the pharma industry with new tools and equipment.

Smart Optimization: Industry 4.0 makes it possible for pharmaceutical companies to employ smart manufacturing procedures. Pharmaceutical firms can optimize production processes, increase productivity, and decrease end-product waste through the use of linked devices, sensors, and data analytics. resolution.

Predictive maintenance: Pharmaceutical firms may collect and analyze substantial amounts of data from a variety of sources, including production lines, quality control systems, and supply networks, thanks to Industry 4.0 technologies. Algorithms for advanced analytics and machine learning can find trends, streamline procedures, and enhance decision-making. To identify possible equipment breakdowns and reduce downtime, predictive maintenance can be used.

Supply Chain Optimisation: The pharmaceutical business can manage its supply chains more effectively owing to Business 4.0. Internet and connected technologies can offer real-time visibility into logistics, demand trends, and inventory levels. As a result, waste is reduced, and the supply chain's overall reactivity and agility are improved. Whether a medicine is branded or generic, the perception of the patient is crucial. People were not as aware of drugs at the beginning of time, but in the age of information technology, it is challenging to enforce anything that deviates from the norm.

Industry 4.0 digital transformation strategy in the Pharma industry:

Big pharma companies are using various types of digital transformational strategies with the invention of machine learning, data analytics, and AI. Meanwhile, many hospitality sectors are struggling with digital transformation. Investors invest huge amounts in the digitalization of the company and it is a very challenging task.

The last five years were very crucial for the implementation of Industry 4.0 in pharmaceutical companies. The digitally equipped pharma companies ought to adopt this strategy, similar to data and analytics, AI, and ML, and the variety of technology providers on the market, and this will be a great success in the world of medicine. The improvement of labor efficiency, as well as the calibre of services and goods, is greatly aided by technological advances in the sphere of pharmaceutical industries across the world.

The importance of quality assurance in the hotel industry is a key indicator of the effectiveness of operation management in pharmaceutical companies. Delivering customer promises and making an effort to establish a positive rapport with consumers are the goals of any pharma company. Quality assurance is the key to success in the pharma industry. In the area of pharma companies, Industry 4.0 lessens the strain of manual labor, which has been replaced by automation.

Industry 4.0 technology can help pharmaceutical firms comply with regulatory standards in the area of regulatory compliance. The audit and inspection processes are made easier by automated data collecting, processing, and record-keeping. Blockchain technology, for example, can improve the traceability, transparency, and security of the pharmaceutical supply chain.

Discussion

Although, people are using the internet and gaining knowledge about medicine But still a lack of scientific temperament in the people. In Pharm 4.0 high level of transparency, adaptivity and digitization has been included. It is the journey from industry 4.0 to pharma 4.0. The Industry 4.0 brings new challenges and opportunities for pharma company, This distorts competition in the market. Also, drug makers market their products through doctors rather than directly to consumers (Gireesh Chandra Prasad, 2022). While Industry 4.0 has been referred to as a new industrial revolution, the adoption of Pharma 4.0TM will probably reflect a transition where extremely complicated offerings and cycle encounter digitalization and automation.

Recommendation:

Pharmaceutical companies should focus on digitization.

Pricing strategy should be less in comparison to other conventional companies.

Modern pharmaceutical industries may include supply chain management process in full digital maturity.

The alignment of Govt and pharma companies is must to bring awareness in the technological process and proper trainings of pharma employees who are working in manufacturing department of drugs industry.

The Pharmaceutical industry must implement the error free services which is based on six sigma with the help of AI and ML.

Conclusion:

The pharma industries have been suffering from the issue of technology.

To reach a certain level of information, digital, operational, and cyber maturity, smaller service providers in the pharma industry must possess certain capabilities including operation management and digitalization strategic planning expertise. With access to various data types such as customer, marketing, and transaction-related data, the pharma industry has the advantage of applying data analysis in its hotel operations. They can utilize a range of data analytics tools, including diagnostic, prescriptive, descriptive, and predictive analysis techniques. These tools enable them to gain insights into different aspects of their business and make informed decisions based on the data. All things considered, Industry 4.0 has the potential to transform the pharmaceutical sector by enhancing productivity, quality, and innovation. Pharmaceutical businesses can reorganize their operations, quicken the discovery of new drugs, and provide patients with better healthcare options by utilizing cutting-edge technologies.

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