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A Review on Use of Big Data Analytics in Pharmaceutical Industry to Drive Business Value and Accelerate Innovation

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ABSTRACT: The pharmaceutical industry has always aimed at discovering, developing, marketing and producing pharmaceutical drugs so that it could be used as medication for the patients and hence the entire objective as a whole is to assure that the right kind of medication is produced and sent out in order to save lives and walk hand in hand with the healthcare industry. With the involvement of big data analytics, the pharmaceutical industry can definitely reach its pinnacle of achievement.

KEYWORDS: Big data, data analytics, pharmaceutical industry, predictive analysis, patients, healthcare industry.

I. INTRODUCTION

Pharmaceutical industries have always been relying on the experimental data in order to understand the efficiency of the medication and treatments. The introduction of data analytics is a way to improve the traditional methods of accessing and manipulating data and information. Its application in the pharmaceutical industry has made it all the more possible for scientists to share the research results to scientists all over the world. Information technology has paced up the process of making it possible to share and retrieve information and data from various sources from across the globe. We are now living in an era where there is an abundance of data and information which only makes it all the more difficult for a single person to analyze or work on. The solution to this problem is simply what the computer software industry calls as the "Big Data". Big data is really just tons and tons of data, the concepts of Big data are greater amounts of velocity, variety and volume of data. With the innovation and introduction of Big data and data analytics it is now possible for pharmaceutical industries and scientists all over the world to process the information in a way that it makes sense and also help generate analytical reports so as to take the right decisions. Right from drug discovery to sales and marketing to better understanding the healthcare issues of patients, Big data holds a considerable amount of potential for all the pharmaceutical companies who are willing to discover and implement its potential.

II. BIG DATA IN PHARMACEUTICAL INDUSTRY

From Fig. 1 we see that there are plenty of challenges and opportunities of big data in the pharmaceutical industry. In the coming future as predicted, the pharmaceutical industries will need to develop more efficient ways to process information and data and this is exactly where big data steps in.



Fig. 1. Graphical abstract of big data in pharmaceutical industry

III. SOME OF THE WAYS PHARMACEUTICAL INDUSTRIES CAN BENEFIT FROM BIG DATA

A. Use of predictive analysis for more efficient results

The Pharmaceutical industry can use the predictive analysis based on multiple factors like patient's lifestyle, diseases, genetics, medical claims etc. This kind of analysis would benefit largely as the potential threats which could lead to death of a patient would be monitored and checked for regularly. In this manner the drugs could be targeted to the required patients and hence achieve personalized care also patients will not be required to take unnecessary medications which prove to be pointless for the improvement of their condition.

B. Increase effectiveness of clinical trials

With the help of big data analysis effective and more efficient clinical trials can be conducted. The patients enrolled for these trials can go through certain requirement checks as per the data stored into the data stores and scientists or researchers can regularly monitor them all in real time. In the past humans have relied on factual methods to identify side effects of specific drug compounds but with the use of big data this can be predicted way before the clinical trial would begin. In this way companies could save on a lot of time, efforts, money and lives.

C. Monitoring patients

With the big data in place the pharmaceutical industries could easily and efficiently monitor and individual patients either by having them physically present at the monitoring location else having the patients wear/carry a device thus making it more flexible for both the scientists/researchers and the patients as they won't be required to be confined to a single location. Similar devices like the RFID chip and other technologies like Bluetooth used along with the ICD instruments are currently in use but has not reached its full potential. With big data and technology in place monitoring patients would reach its full potential.



Based on the analytical reports all the required developments could be made for the development of their medication or if necessary, find alternatives for the treatment by exploring more compounds for medication.

D. Targeting patients

Patients can be easily targeted using with the help of tracking and analyzing the gene description of patients. Details about the same could be stored into the databases and used efficiently for tracking, identifying and treating patients with similar genomes. It would highly benefit all who are a part of the treatment. Once the patients are targeted the right kind of medication could be developed and provided to the patients.

E. Collaborating with the industry

Big data can be used in pharmaceutical industry to work in unison with all the other industries involved like the data management companies and scientists, health insurance companies etc. The pharmaceutical industry can share information with the health insurance companies and all the related providers in their established network and thus lead to an increase in the pharmaceutical industries overall database which could be further used for clinical trials and predictive analysis. Scientists working outside the pharmaceutical industry could also submit all their researches to the respective pharmaceutical industry or simply store it on cloud to make accessing and retrieval of data far simpler for the entire pharmaceutical industry.

F. Commercial side of pharmaceutical industry

The pharmaceutical industries could largely benefit from big data analytics in the commercial area or the sales and marketing area of their companies. The commercial department could directly focus on the sales and marketing of their products. Predictive analysis could also be helpful to identify the geographical areas where the products have to reach or are required. Also, with the help of medical claims the necessary medications could be prepared and kept ready.

G. Management of customers

The pharmaceutical industry is just like any other industry trying to establish good relations with its own customers as well as press forward to grow in the market. This could easily be achieved by availing any CRM services and integrating it with big data would only enhance the entire process. With the help of similar software services, the pharmaceutical industry can easily connect with the customers and thus it could also help in following up with patients and other R&D records. Customer or patient satisfaction is the key in the pharmaceutical industry and by managing them efficiently the companies could provide personalized drugs, medication etc.

All the above points discussed are some of the possible ways big data could be used in the pharmaceutical industries in the coming future. Coming to the present situation of the pharmaceutical industry we see that implementing big data analytics for the entire industry is expensive and cost is the main factor resulting in slow acceptance and growth of big data analytics in the pharmaceutical industry. Another concern is the patient's privacy which also leads towards slow growth in sharing data as healthcare data are far more confidential than other general details and hence sharing such confidential details could pose as a problem.

To eliminate the above core obstacles the pharmaceutical industries could have proper terms and privacy policies as well as have a sound reputation by following all the government issued laws. The pharmaceutical industries could also start implementing big data analytics in specific departments initially and then as and when required grow to cover all the departments of the company this could help in managing the cost factor.

IV. CONCLUSION

As per studies the pharmaceutical industries market has been growing at the rate of 5.8% since 2017 and by the year 2021 it is estimated to reach a size of \$1,170 billion. Big data analytics can accelerate the overall performance of the pharmaceutical industries without the need for them to increase the cost of operations. Currently, the pharmaceutical industries are using big data analytics to analyze patient's medical information and monitor the performance and development of drugs in various phases of clinical trials. Big data analytics along with artificial intelligence would definitely be a breakthrough for the pharmaceutical industries in the coming future. The pharmaceutical industry would also largely benefit from big data analytics as long as they abide by the rules and regulations.



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