MBA - FT (2020-2022)

Summer Internship Project Report

Submitted by:

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Division C

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Submitted to	Prof. Punit Saurabh Prof, Tejas Shah

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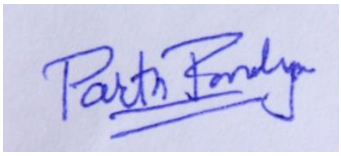
I would like to thank **Prof. Punit Saurabh**, my domain guide, and **Prof. Tejas Shah**, my faculty mentor for this project.

I would also like to thank all the members of the Placement Committee at the Institute of Management, Nirma University for this project and for helping me when needed.

Declaration

I, Parth Pandya, hereby declare that this project titled "Strategies adopted by Pharma Companies to stay sustainable in current COVID Context" is my original work, done under the guidance of domain guide Prof. Punit Saurabh and faculty mentor Prof. Tejas Shah.

I also declare that this project has neither been submitted to any other university nor been done by any other student for the award of degree, diploma, or any other title.



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Executive Summary

The pandemic has disrupted the normalcy of industries around the world and one of the main industries that had a huge say in how the world fights against the coronavirus pandemic is the pharmaceutical industry. As the manufacturers of products vital to the health of people during these, the industry had a huge burden to deal with. Not only was there an increased demand for medications to manage the patients affected by the virus, but also the urgency to develop a vaccine on a global scale to break the chain of the spreading pandemic. Pharmaceutical companies had to rethink many of their traditional strategies and adopt new ones to rise to these challenges. The most important one of these was to reduce the time take to develop the vaccine. Companies like Pfizer and Moderna had to use the help of real-world data, analytics, and artificial intelligence to speed up the process. In addition to this, companies had to focus on new ways such as digital and social media marketing to promote their products. The issue of the pharmaceutical companies' supply chain was also brought into focus early in the pandemic due to a shortage of raw materials and companies had to take measures to improve the efficiency of their operations. Many companies were also thinking of their opportunities in the post-pandemic world by acquiring innovative analytics firms and pharmaceutical companies working on promising molecules. Many of these adoptions will become permanent in the industry and there will also be an increased focus on issues like climate change, flexible work, and more involvement of patients and doctors in the development of new products.

This project has allowed me to learn about the workings of the pharmaceutical industry and the new trends which will be essential in the post-pandemic world. It will be crucial for management students like me who aspire to work in the industry to get acquainted with these strategies.

Introduction

As with many other industries, the Covid-19 pandemic had a significant impact on the pharmaceutical industry. There was a disproportionate increase in demand for certain products which the supply could not match due to restrictions of lockdown and unavailability of resources. On the other hand, there were problems of supply in non-covid products, slowdowns, and efficiency of operations. The objectives of this project are to analyze the impact of the pandemic on the pharmaceutical industry and the strategies adopted by the pharma companies to stay sustainable in the pandemic period. The project also sheds light on the trends which will dominate the pharmaceutical industry in the post-pandemic period.

Methodology

The approach to this project is has been qualitative with analysis of the secondary data available on the websites of the companies, research papers, survey reports by global consultant companies, and newspaper articles.

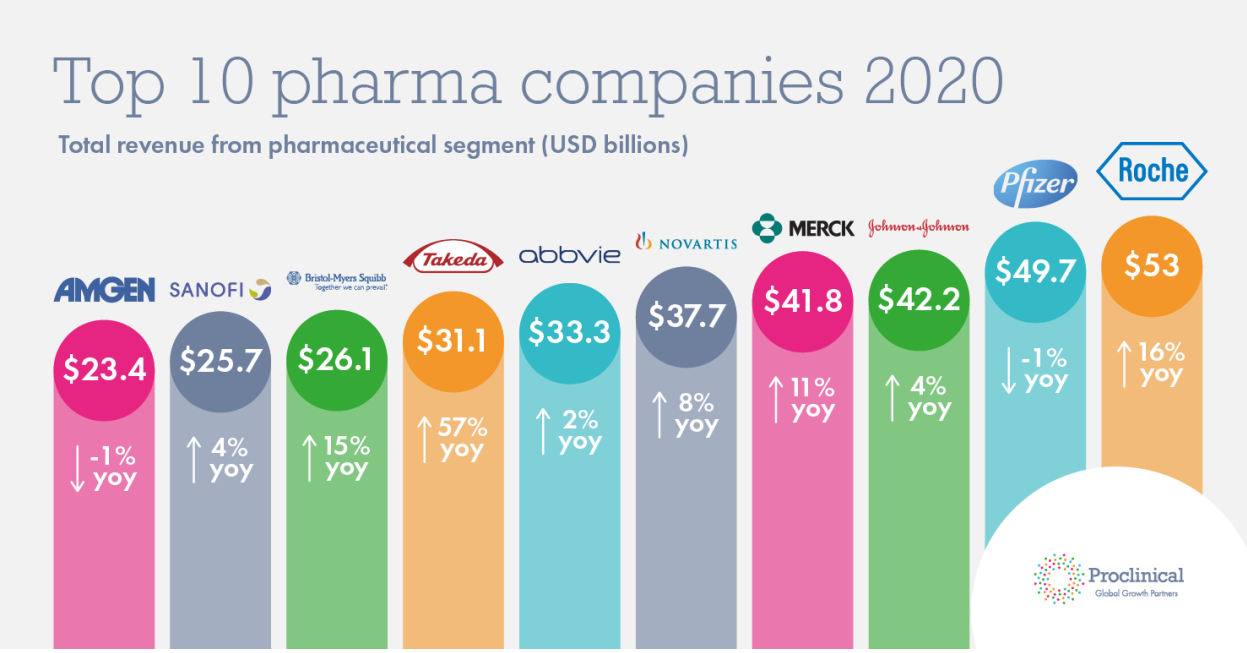
Context of Industry Problem

The pharmaceutical industry has had a unique way of operating which involved heavy investment into research and development for new products. These products required extensive clinical trials before getting approval from the regulatory bodies. Finally, the pharma companies would focus on the marketing of these products through contacting healthcare providers who have firsthand knowledge of what their patients need. In addition, companies also focus on television advertising in countries like the United States to target specific consumers. The manufacturing in the pharmaceutical companies is also globalized in nature.

The coronavirus pandemic disrupted many of these processes and forced the pharmaceutical companies to rethink their strategy to develop, manufacture and market their products. Many of these changes are projected to be permanent and will be adopted by companies in the industry to stay competitive and succeed.

Industry Overview

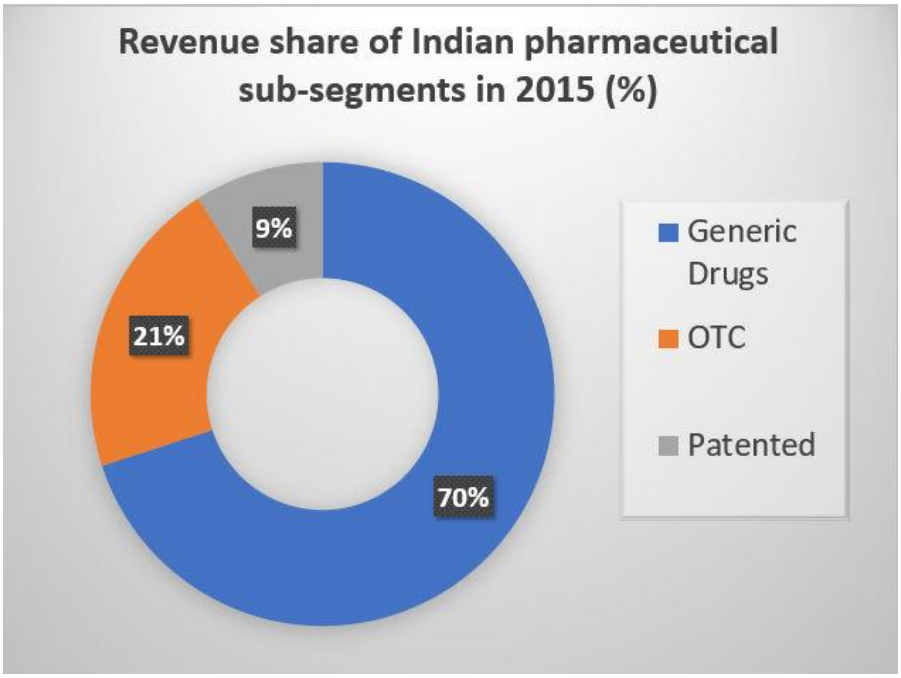
The Pharmaceutical Industry consists of firms dedicated to the production of pharmaceutical drugs and biological compounds used in the prevention, diagnosis, or treatment of various ailments and injuries. The production of these drugs and biologics is dependent on the acquisition of active pharmaceutical ingredients (API) and they are subject to various regulations concerned with patents, testing, efficacy, and safety of these products. The global pharmaceutical market experienced an increase since 2015 at a compounded annual growth rate (CAGR) of 6.7% to reach a value of US$ 1271.1 billion in 2019. Due to the impact of the Covid pandemic, the value reduced to US$ 1228.45 billion in 2020 and is expected to grow at a CAGR of 1.8% to reach a value of US$ 1250.24 billion. The major players in the pharmaceutical industry are Roche, Pfizer, Johnson & Johnson, Merck & Co, and Novartis.



(*Source – Proclinical)*

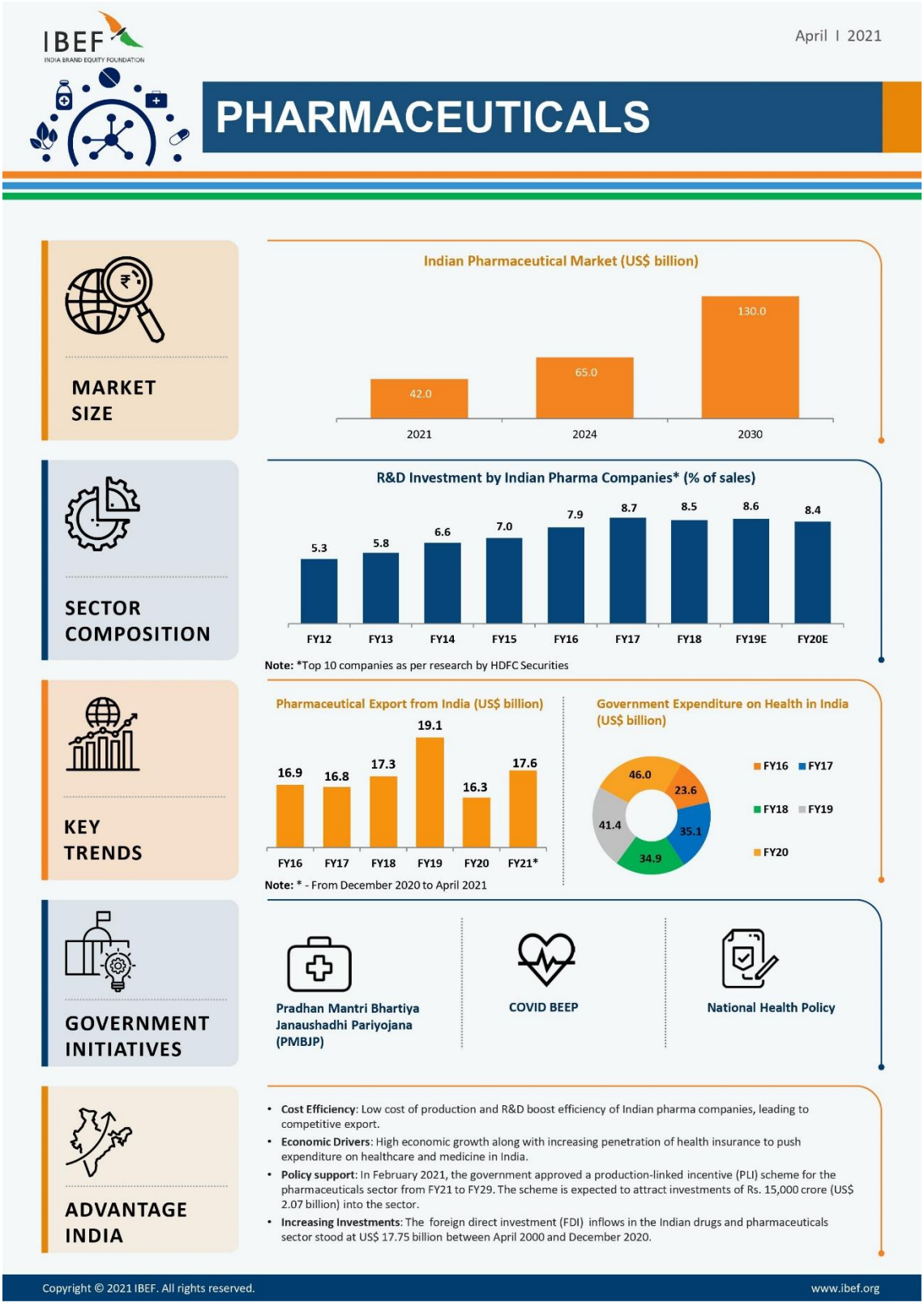
North America, accounting for 46% of the global pharmaceutical market in 2020, is the largest region in the world followed by the Asia Pacific, which accounted for 26% of the market. The increasing market growth and research in China, India, and Brazil have led to an increase in the market size of 6.9%, 11.1%, and 11.2% between 2014 to 2019.

Looking at the Indian Pharmaceutical Industry, it supplies up to 40% of all generic medications for the United States, 25% of generic medications for the United Kingdom, and over 50% of global demand for various vaccines. Indian Pharmaceutical market is expected to grow 3 times in the next decade and is expected to reach US$ 65 billion from US$ 24 billion in 2021. India is the largest provider of generic medications to the world with its products being exported to more than 200 countries, the United States being the largest market. It accounts for around 20% global export of generic medications in regards to volume and the export was US$ 22.15 billion in FY21. In addition, India provides the second-largest share of pharmaceutical and biotech workers to the world.



(Source – Pharma Knowledge Centre)

Looking at the global pharmaceutical industry, traditionally, the successful strategy has been betting on molecules after extensive research & development, heavily marketing the promising molecules and making them successful. But the Covid pandemic has had a significant impact on the pharmaceutical industry leading to several changes in thinking and strategies which may permanently reshape the industry in the post-pandemic future.

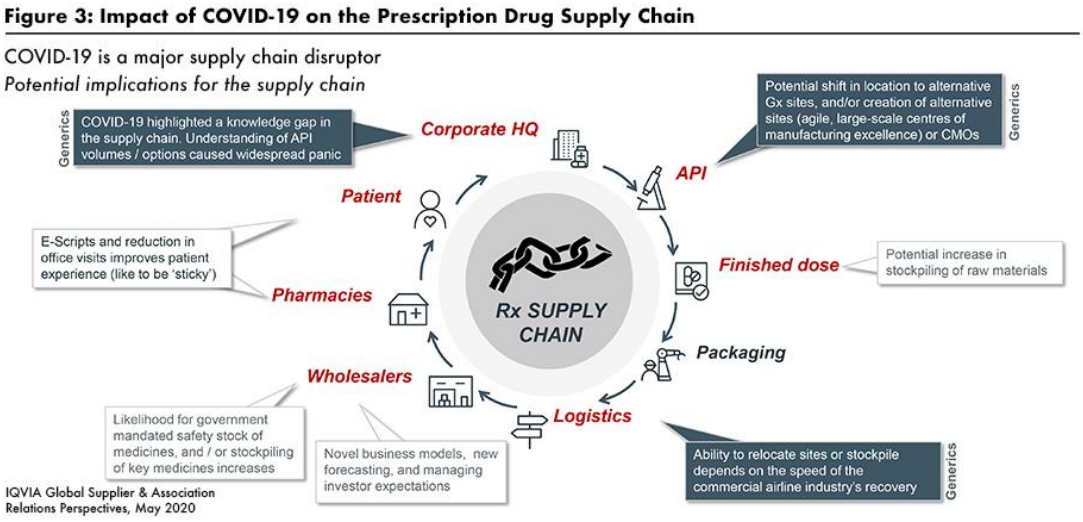


(Source – Indian Brand Equity Foundation)

Impact of Covid Pandemic on Pharmaceutical Industry

The Covid-19 pandemic affected the natural flow of the global pharmaceutical market due to multiple issues ranging from the availability of raw materials to the prices of the medications. Let us take a look at these issues:

- *Availability of raw materials* – The pharmaceutical industry is dependent on raw materials know as *Active Pharmaceutical Ingredients* (API) for their products. Mainly China, India, and a few Eastern European countries are the main suppliers of these materials leading to most of the world being dependent on them for medications. As per FDA in 2018, 31% of pharmaceutical ingredients and 24% of medications were imported from India while 13% of the generic and brand medication manufacturers are based out of China. But the pandemic and subsequent lockdowns in the countries have affected the availability of the API leading to the shooting up of prices of drugs. An example of this would be shooting up of Paracetamol prices from Rs. 300 per kg to Rs. 450 per kg. in India. The countries have also placed restrictions on the import of certain raw materials leading to scarcity of medications in the dependent countries.



(Source – DCAT Value Chain Insights)

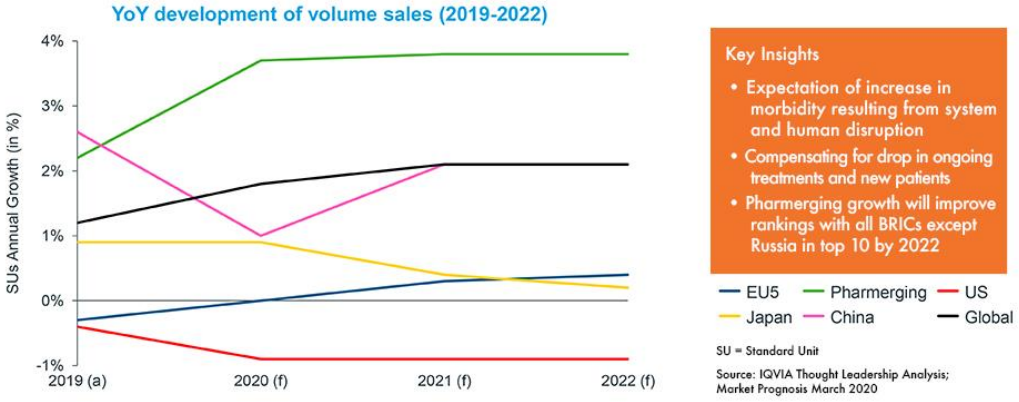
- *Impact on the supply chain* – In addition to the reduced availability of raw materials and finished products, the pharma supply chain is affected on other levels as well. As mentioned above, China and India are global leaders in Active Pharmaceutical Ingredients.

These API are manufactured in limited plants and the inventory is less. Thus, problems at any stage of the supply chain can lead to a shortage. The lockdowns around the world and travel restrictions led to the disruption of air travel-dependent logistics. Critical medications such as emergency medications, pain medications, and anesthetic agents were in short supply. One important example of this would be the shortages of medications like Remdesivir and anti-fungal medication Amphotericin B.

- *Increased Cost on New Drug Development* – Due to the Covid-19 pandemic, big pharma companies such as Pfizer, Bristol-Myers Squibb, and others have had to postpone clinical trials in order to focus on the coronavirus. As per the research of clinicaltrials.gov, between January 2020 to May 2020, 1099 trials were postponed and 2522 trials were suspended. Even before the pandemic, the cost of new product development was rising in the pharmaceutical industry and the return on investment on products was dropping.
- *Effect on Growth of the Industry* – The pandemic will affect the growth of the global pharmaceutical industry with the United States and European countries facing moderate growth due to the pressure of pricing. The governments of these countries will try to balance the cost during the pandemic while buyers will try for discounts in the pandemic. Another factor would be the loss of drug sales due reduction in the number of meetings between sales representatives and physicians. On the other hand, emerging pharmaceutical markets like Brazil, India, and Russia will see an increase in the growth of the pharmaceutical market.

Figure 4: Global Pharmaceutical Industry Growth Outlook

In volume terms the forecast is for a modest rise in growth till 2021 and then sustained



(Source – DCAT Value Chain Insights)

The Covid-19 pandemic seems like a positive for the pharmaceutical industry because of the increased demands for medications, vaccines, and medical products but the overall impact of the pandemic can be seen through short-term and long-term implications on the industry as a whole to see the impact.

Short-term impacts:

1. *Change in Demand* – One of the major changes which occurred in the pandemic was a change in demand for products due to panic buying and later due to increased demand due to rising hospitalization of patients because of Covid. The panic buying was related to both covid related products as well as medications related to chronic diseases due to fear of supply shortages.

   The increasing number of hospitalization of patients and their management led to increased demand and acute shortage of a range of medications globally. For example, prescription medications for pneumonia and supportive care such as dopamine, dobutamine, midazolam, fentanyl, propofol, azithromycin, and heparin were on the list of medications in shortage by the United States Food and Drug Administration (USFDA). This is in addition to medications like Hydroxychloroquine (HQC), which was thought to help in treating the novel coronavirus.

   With the deadly second wave in India, medications used in the treatment of the coronavirus such as Remdesivir, Favipiravir, Tocilizumab, and even multivitamins became scarce. Pharmaceutical companies like Cipla, which is one of India's top manufacturing companies and supplies an array of covid medications such as Favipiravir, Remdesivir, Azithromycin, and Tocilizumab, the latter being exclusively distributed by the company, had difficulty in their supply chains and meeting the demand. Another medication that was in short supply was Amphotericin B, an important treatment for Mucormycosis also known as "black fungus". The cases of this fungal infection became increasingly high in states such as Maharashtra in people recovering from the coronavirus infection. As per the Health Ministry, each patient required around 60-100 injections of the medication depending on the severity of the infection. Globally speaking, medicines used in hospitals for coronavirus patients had increased up to 700% since the beginning of the pandemic.

Panic Buying was another reason which created an induced demand leading to shortages of medications in the industry. An example would be the hoarding of Hydroxychloroquine by consumers due to it being a possible treatment for the coronavirus. This created an issue for the people suffering from rheumatoid arthritis and other chronic systemic diseases, for which the medication is used. Due to the hoarding, the regular users of this medication did not have access to it. According to studies in the USA, in addition to panic buying of covid medications, there was also an increased hoarding of pharmaceuticals used for other chronic diseases. As per the report, the induced demand was estimated to be up by 8.9% in March 2020. These included medications used in the treatment of disorders such as asthma, hypertension, type 2 diabetes, migraine, hypothyroidism, mental health disorders, and high cholesterol.

As mentioned above, one of the important causes of shortage supply was a scarcity of active pharmaceutical ingredients and a reduced supply of finished products. The subsequent price rise affected critical medications including antibiotics such as Amoxicillin, Clavulanate, Vancomycin, Meropenem, Gentamycin. Ceftriaxone, and Ciprofloxacin. India and China restricted the export of these products along with formulation and API to domestic consumption only. This resulted in the global price increase of medications to around 10-15% with some places having an increase of 50%.

2. *Change in Research & Development* – With the suspension and postponement of many ongoing clinical trials, the immediate focus of the pharmaceutical industry became the novel coronavirus. During the early stages of the pandemic around 53 vaccines and 113 medications were in the research and development stage around the world. In April last year, around 924 trials were going on regarding the treatment of the coronavirus. One of the major issues was that only 15% of studies were traditional research trials with double-blinding or randomization. Around 40% were not even randomized. Hydroxychloroquine was being touted as a possible treatment due to one of such trials. Pseudo-researchers were becoming a problem and the investments into the production of medication, which would later be proven as ineffective in the treatment of the coronavirus, would divert resources away from other projects and would become a burden for the pharmaceutical companies and the healthcare systems around the world.

Another important factor would be the ethical consideration of such treatments due to shortened and inadequate research methods.

3. *Change in communication and promotion in the healthcare system* – With lockdowns and social distancing protocols in effect around the world, the number of patients visiting physicians decreased. For example, the number of patient visits to clinics dropped by 70-80% in the United States. This also meant a reduction in the number of medical representatives of pharmaceutical companies visiting clinics and physicians for the promotion of their products. Many of the physician-patient interactions shifted from face-to-face meetings to virtual platforms and telemedicine communications. The marketing and promotion of healthcare products also followed and moved online.

Long-term impacts:

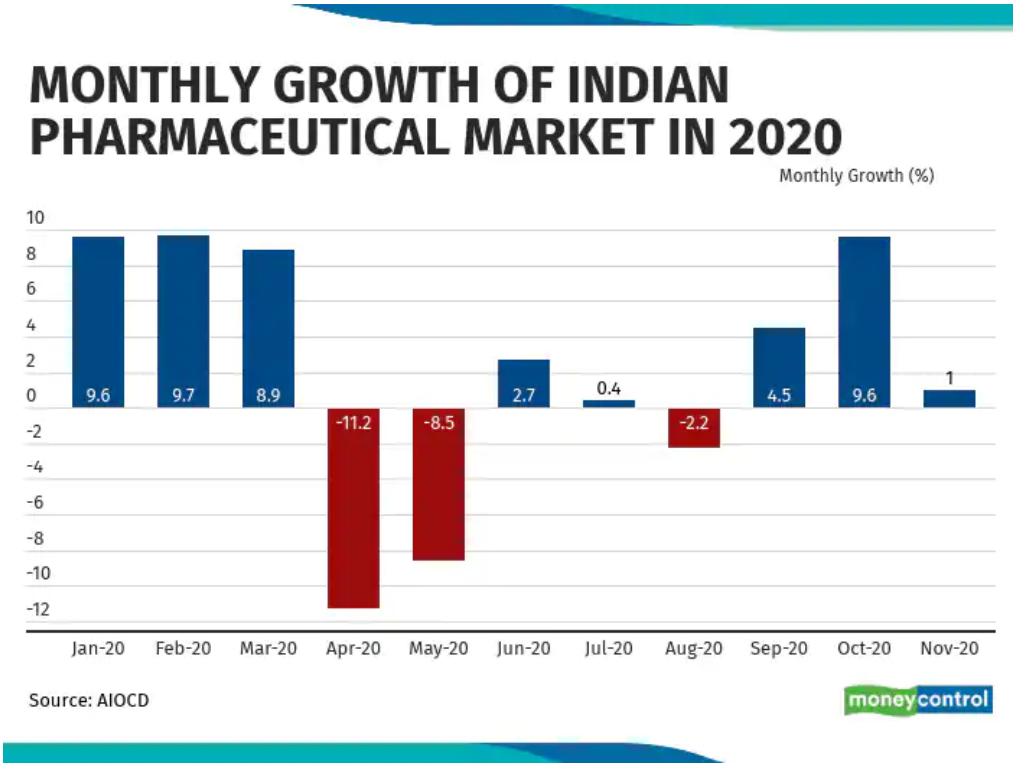
1. *Self-sufficiency in the pharmaceutical industry* – The dependency of the world for pharmaceuticals on India and China was reconsidered when the pandemic led to shortages of medications from export bans in these countries. This made governments of many dependent countries become self-sufficient in their pharmaceutical supply chains and implemented regulations to avoid shortages in the future. The European Union announced new guidelines in March 2020 regarding the foreign direct investment in the European Union healthcare market stating that foreign investments will be subject to an assessment of risk in order to avoid detrimental impact on the health of their citizens. Indian pharmaceutical industry is the third-largest in the world by volume but is heavily dependent on China for Active Pharmaceutical Ingredients. India's import of APIs from China amounts to 40-80% of its total production cost. In addition, it imports 90% of antibiotics from China. In order to reduce the dependency and boost local production, the Indian government was considering a 20-25% import duty on API. It also announced an incentive amounting to Rs. 10,000 crores for the production of critical drugs and APIs in India. Indian companies ready to set up plants to produce 41 pharmaceutical products which included 53 APIs would get incentives worth Rs. 10 crores. Other countries were also seeking to reduce reliance on China for APIs and pharmaceutical products. The United States wanted increased production of pharmaceutical products and ingredients in their own country. The

Trump administration handed a $354 million contract to a company called Phlow Corp. in order to meet this goal of self-reliance in pharmaceuticals.

2. *Delay in approval for non-covid pharmaceutical medications and products* – With the pharmaceutical companies completely focused on the novel coronavirus, mediations and products not related to the coronavirus took a back seat. The postponement or suspension of clinical trials, vaccines, new medications, and treatments that may be helpful in other ailments may be delayed for years and the effect of this might not be known. Resumption of the trials may also create a backlog for regulatory organizations such FDA in approval of drugs and vaccines.
3. *Issues with Ethics* - The issue of relaxing rules in regard to approval of vaccines and medications for the coronavirus is concerning. Before approval of vaccines and medicines, lengthy review processes are conducted by regulatory bodies, but the shortages of products and increased demand may force these organizations to change these procedures. These organizations may also have to reduce the number of inspections of pharmaceutical manufacturing plants. For example, due to the travel restrictions and social distancing protocols, the FDA suspended its field inspection processes of clinical research sites and pharmaceutical facilities. The agency said it will have to rely on records such as previous quality control documents, compliance history, and information of other regulatory agencies to check whether an inspection was required or a change in facilities or products was needed. Agencies also had to change certain rules because of shortages. For example, due to shortages, the FDA had to change the regulations to allow the usage of CDC-approved respirators for patients admitted to the hospital with coronavirus infection.

Impact on Indian Pharmaceutical Market

The Indian pharmaceutical market has high competition due to the number of companies but has a stable growth rate. But it was affected by the coronavirus pandemic and the subsequent lockdown in the country. Before the beginning of the pandemic in the country, the Indian pharmaceutical market was growing at a rate of 9% at the beginning of the year 2020. In the April-June quarter, the market had contracted to a growth rate of 6%. Such numbers were last seen during the implementation of GST in 2018. The main reason for the stunting of the growth rate was due to issues in supply such as unavailability of workers, shortage of raw materials and packaging, and disruption in distribution. Another reason on the demand side of the chain was the closure of Outpatient departments and the inability of medical representatives to market products to the physicians.



(Source – Money Control)

The reduction in sales of medications in acute conditions such as infections, gastrointestinal problems, fever, and pain is the cause of concern in the Indian pharmaceutical industry. The total growth rate in 2020 was down by 2.2 % and the market's moving annual turnover was Rs. 1.44 lakh crores. Indian companies such as Cipla and Glenmark have been outliers by

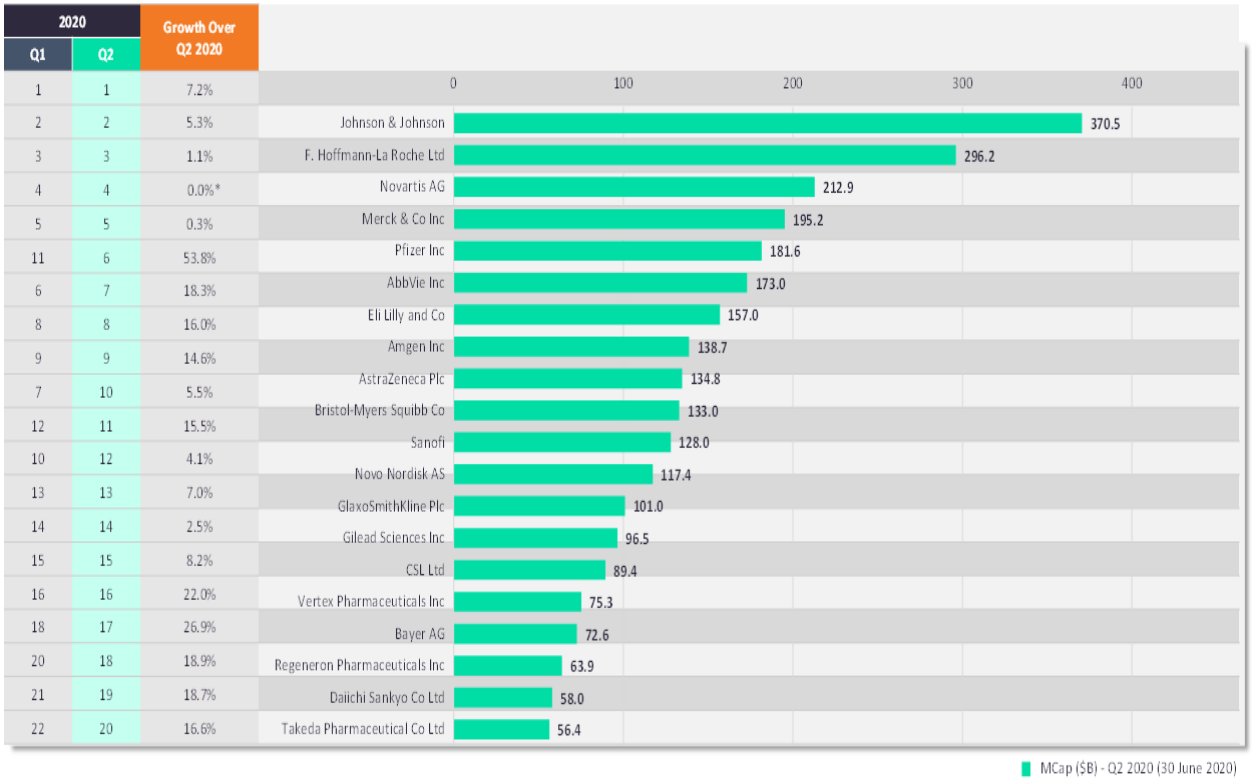
holding out well in the market, one of the reasons being the introduction of medications related to the coronavirus. The launches of medications used in the management of the coronavirus have led to price growth of around 4-5%.

The situation is expected to change in the second half of the year 2021 with the sales predicted to normalize with physicians returning to clinics and hospitals. The availability of covid vaccines will also add to this. The government of India is also taking steps to aid the pharmaceutical industry. The Union Cabinet amended the existing Foreign /direct Investment policy in order to allow up to 100 percent FDI for medical devices. Memorandum of Understanding was signed by six generic drug manufacturers with Hidalgo in Mexico to set up a large pharmaceutical cluster for logistics and production. The government also announced plans for digital health collaboration with the Netherlands. It also established a fund of Rs. 1 lakh crore to boost the manufacturing of pharmaceutical ingredients in the country by the year 2023. The Pharma Vision 2020 initiative was announced by the government to make India a global drug manufacturer and the reduction in approval times for the establishment of facilities in order to boost investment. Incentives linked to production worth Rs. 6940 crores were offered for incremental sales and plan to establish drug parks in order to boost sustainable cost competitiveness.

The number of patients with chronic diseases such as diabetes, hypertension, cancer, and depression is expected to rise in the country. Therefore, it is expected that sales of products related to these conditions are expected to pick up in the future. India is projected to become one of the top 10 counties in the world when it comes to spending on healthcare and medicine, the latter being expected to grow between 9-12% over the next few years.

Strategies Used by Pharmaceutical Companies during the Pandemic

The coronavirus pandemic affected the global markets around the world. The same was seen in the pharmaceutical industry but many companies thrived during the pandemic and their market capitalization increased during this period. The top 20 Biopharma companies in the world increased their market capitalization by an average of 10.2% in the Q2 of 2020 as compared to Q1 of 2020. This amounts to an aggregate of US$ 2.8 trillion.



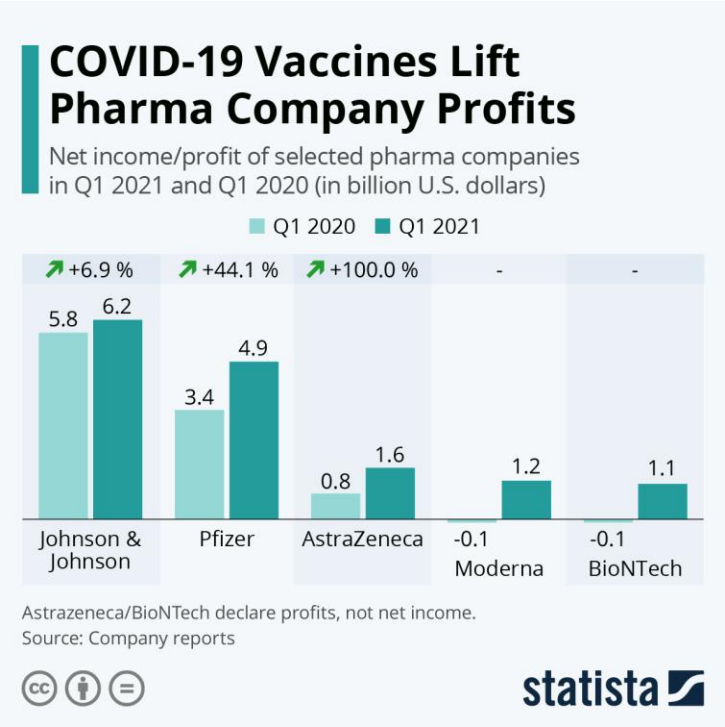
(Source – Pharmaceutical Technology)

Ten companies from the above list registered double-digit growth in the market capitalization. Johnson & Johnson, the global healthcare giant, had a market capitalization growth of 7.2% on a quarterly basis and maintained its top position. Pfizer experienced a year-on-year profit increase of 44%. In the Indian pharmaceutical market, Cipla and Glenmark were profitable during the pandemic. While the pandemic presented as an opportunity for the pharmaceutical

companies, heavyweight companies like Johnson & Johnson earn billions of dollars from a wide array of sources, the coronavirus-related products being one of them. Let us take a look at the strategies adopted by the pharmaceutical companies during the pandemic.

New Product Development

The biggest opportunity for the pharmaceutical companies was the focus on developing vaccines and drugs targeting the novel coronavirus. The first of which was the highlight of the pandemic. Vaccines are traditionally not as profitable as medications since as a product, vaccines are not used as frequently as medications. Many of the companies had been leaving the vaccine development and manufacturing business before the pandemic. In the United States, only the bigger companies such Pfizer, Merck, Johnson & Johnson, and Sanofi were in the vaccine manufacturing business in 2019. Therefore, the United States government had to provide an incentive worth the US $22 billion in form of the covid relief program to the big pharmaceutical companies to manufacture the vaccines.



(Source – Statista)

In the quest to develop a vaccine for the novel coronavirus, the pharmaceutical companies used a technology that was around but had not been used until now. Moderna was the first company to download the genetic code of the novel coronavirus and developed a new vaccine -*mRNA vaccine* with the help of the US National Institute of Allergy and Infectious Diseases and started a trial in March 2020 for this new vaccine. Pfizer teamed up with BioNTech SE, which had the mRNA vaccine technology similar to that of Moderna, to develop the vaccine. Other pharmaceutical companies like AstraZeneca and Johnson & Johnson followed by developing their own vaccines. AstraZeneca produced the Oxford University covid vaccine by partnering with the Serum Institute of India. Indian pharmaceutical company Zydus Cadila is also developing a plasma DNA vaccine for the coronavirus, currently called ZyCoV-D. Indian pharma companies also partnered with other global companies and institutes to develop the vaccine such as Dr. Reddy's pharmaceutical partnered to produce the Russian-made Sputnik V.

The vaccines in India were relatively reasonably priced – AstraZeneca and Serum Institute's Covishield at Rs. 780, Sputnik V at Rs. 1,145 and Bharat Biotech produced Covaxin at Rs. 1,410. By comparison, in the western world, the prices of vaccines were much higher. The vaccines brought in considerable profits for some big pharmaceutical companies. Pfizer earned US$ 3.5 billion revenue from its vaccine in the first three months of the year which was a quarter of the total revenue the company has. Given below are some of the major coronavirus vaccines and their expected sales in the year 2021.

Sr. No	***Name***	***Cost per dose***	***Orders***	***Expected Sales in 2021***
1.	Pfizer/BioNTech mRNA vaccine	The US $39 per dose in the United States and $30 in the European Union	Total of 780 million doses from US, EU, and lower-income nations.	Pfizer, based on its current deals expects $15 billion. It splits the profit margins and

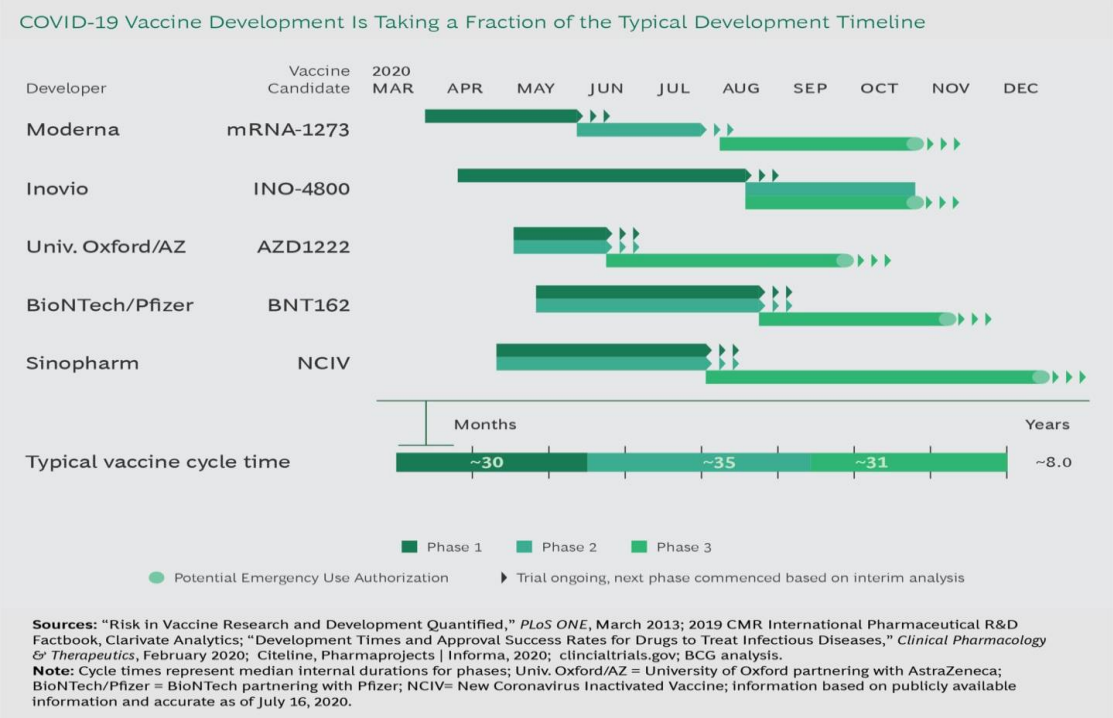
				costs with BioNTech.
2.	Moderna mRNA vaccine	The US $30 per dose in the United States and $36 in the European Union	US has ordered 300million doses, the UK 17million, the EU has ordered 310 million while Japan has ordered 50 million doses.	Moderna expects to earn $18.4 billion from sales in 2021.
3.	Johnson & Johnson Adenovirus vaccine	The single-dose covid vaccine costs $10 per dose.	The European Union has ordered 400 million doses while the US and UK have ordered 30 million doses. Lower-income nations have ordered around 500 million doses through the Covax program.	Johnson & Johnson expects around $ 10 billion in sales.
4.	AstraZeneca adenovirus vaccine	It charges US$ 4.30 – 10 and has decided on supplying vaccines on a not-for-profit basis.	Major orders are from the EU at 400million doses, the US at 300 million, the UK at 100 million, and Japan at 120 million doses.	The company has a target of 3 billion doses which could help go over $1.9 billion in sales this year.
5.	Sinovac inactivated virus vaccine	In some Chinese cities, the price is US$ 60 for two doses.	The Beijing company has orders from Chile, Brazil, the Philippines, Malaysia, and Singapore. Indonesia and Turkey have been using Sinovac in their vaccination campaigns.	A production target of 1 billion doses has been set this year by the company.

In addition to the vaccine, the pharmaceutical companies are focusing on developing medications both for the coronavirus and other ailments. Indian pharmaceutical companies Glenmark and Cipla registered double-digit profits in Q2FY21. Glenmark developed *Favipiravir*, also known as 'Fabiflu', for mild-to-moderate coronavirus infections which led to a rise in the company's overall sales by 32%. Cipla is collaborating with four other Indian pharmaceutical companies – Dr. Reddy's, Torrent Pharmaceuticals, Emcure Pharmaceuticals, and Sun Pharmaceuticals to study another oral anti-viral drug – *Molnupiravir* for the treatment of mild cases of coronavirus. The drug was developed by Merck and Ridgeback Biotherapeutics. Takeda Pharmaceuticals has developed an anti-covid immunoglobulin treatment which is in trials for people who are at a high risk of contracting the coronavirus infection. Gilead Sciences developed *Remdesivir,* an injectable anti-viral for hospitalized patients which moderate to severe infection. It was one of the first FDA-approved medications for the coronavirus. Cipla partnered with Gilead Sciences for providing Remdesivir in India. Remdesivir sales led to a 17% rise in the revenue for Gilead Sciences earning the US $873 million in the United States in the third quarter. Cipla also saw an increase of 14% in the income of operations, mainly from coronavirus-related prescriptions, in the September quarter of 2020. It observed a net profit of Rs. 665 crores.

While many new product development projects were centered around the coronavirus pandemic, pharmaceutical companies were working on developing new drugs and also introduced new medications which had a positive impact on their sales and profits. Johnson & Johnson's pharmaceutical division had an increase in revenue by 3.6% with the introduction of new prescription drugs – Balversa, Stelara, Invokana, and Spravato. Similarly, Roche observed an increase in year-on-year revenue by 11% due boost in sales from the introduction of new medications Hemlibra, Perjeta, Ocrevus, and Tecentriq. Sanofi announced the approval of Cablivi and Libtayo, treatments for thrombotic thrombocytopenic purpura and squamous cell carcinoma of the skin, respectively. AbbVie also got approval for its new products Skyrizi and Rinvoq for plaque psoriasis and rheumatoid arthritis. Therefore, while covid was the priority, many heavyweight pharmaceutical companies were also working on new products unrelated to covid and getting approvals for them to boost their revenues.

Data Analytics and Artificial Intelligence Implementation

Traditionally, the time taken for the development of new products in the pharmaceutical industry is long and resource-consuming. For instance, the time it takes in clinical trials from Phase1 till Phase 3 for anti-infectious drugs is 5.5 years, for vaccines, it is 7.5 years and for other medications, it is around 7 years. The cost of developing a new drug has risen over the years and is estimated to be around the US $2.6 billion. But the coronavirus pandemic and the urgent requirement for vaccines and drugs effective against this virus forced the pharmaceutical companies to shorten this product development and testing time frame. Many pharmaceutical companies have started using artificial intelligence and data analytics to hasten their drug development and clinical trials process. In addition, *Real World Data* (RWD) has also been incorporated in the development process, something which the regulating bodies were reluctant to use. But now, 95% of the pharma companies are using or will start using in 2021. RWD is becoming a core component with the randomized controlled trials making the process of clinical evidence generation more integrated. This covid accelerated use of RWD has made it possible for companies to test new vaccines and medications in weeks or months instead of years.



(Source – BCG)

The urgency to incorporate data and artificial intelligence into the working of the pharmaceutical companies during the pandemic can be observed in a survey conducted by NewVantage Partners, which included pharmaceutical companies like Pfizer, Glaxo Smith Kline, Merck, Sanofi Bristol-Myers Squibb, and others. The survey revealed that during the pandemic, 40.9% of healthcare and life sciences companies moved towards a data-driven organization and 57.1% of these companies felt that managing data has become a critical part of their organization. By comparison, only 17.9% of financial services firms had created data-driven organizations and 38.8% consider data management as critical. Pharmaceutical companies also made investments worth billions of dollars in data and artificial technology, evidence of which would be using these technologies to mine anonymized health records of patients to help in the development of new drugs.

One of the big examples in the pandemic of pharmaceutical companies using data analytics and artificial intelligence to aid in the development of new products and their clinical trials would be Pfizer. The company used AI and data analytics to conduct its clinical trials for the vaccine and make the distribution efficiency. Pfizer used *Smart Data Query* (SDQ), a machine learning tool, to analyze data at multiple points during the clinical trials and shortened the review time of the mRNA covid vaccine to just 22 hours. The pharmaceutical division of the company partnered with a software company selected after a hackathon between companies to specifically develop an artificial intelligence tool to clean clinical data. Pfizer's use of artificial intelligence and data analytics ended being the deciding factor in rolling out its vaccine earlier than the competitors.

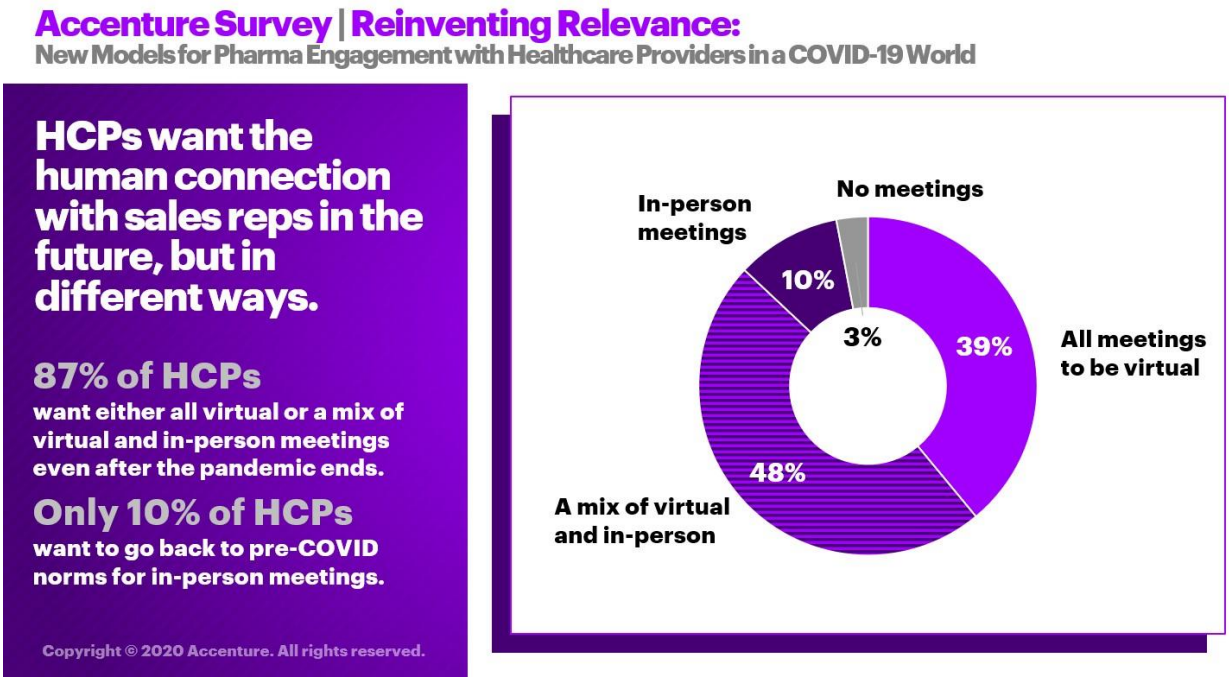
Other pharmaceutical companies have also started using data analytics and other technologies to aid in the development of new products as well as distribution. The scientists at Moderna use Amazon Redshift AWS data warehousing to analyze the results from multiple projects. It also uses artificial intelligence to provide breakthroughs in predictive analytics. In March 2021, Moderna also announced partnering with IBM to use blockchain, hybrid cloud, and AI to improve the covid vaccine management. The aim of this collaboration is to provide real-time tracking of vaccines and improve the efficiency of the vaccine supply chain. Johnson & Johnson is using data analytics to track the cases across the world and forecast hotspots for potential sites for vaccine trials known as *event-based trials.* In addition to this, the company is using data analytics to mine global patient registries to learn about people more susceptible to coronavirus infection and prioritize them for the vaccine. Pharmaceutical companies see these technologies as essential to their future and are

heavily investing in them to future-proof their organizations. Novartis sees combining the clinical data results with patient data as a part of their operations. Novartis CEO Vas Narasimhan also described his company as a "data science organization". Merck has invested $ 40 million in clinical data analytics company TriNetX while Roviant Sciences has invested $40.5 million in health data set collector Datavant.

The pandemic has been an opportunity for pharmaceutical industries to harness the power of technologies like data analytics and artificial intelligence to reduce the time for clinical trials, improving the efficiency of developing vaccines and drugs, forecasting, and marketing.

Digital Marketing

The coronavirus pandemic has led to a change in how pharma companies market their products and interact with healthcare providers and patients. The lockdowns around and social distancing protocols have led to a reduction in the number of physical visits the medical representatives can make to hospitals and clinics. Another factor was the increasing reliance on the internet during this period. These have pushed pharmaceutical companies into the digital world to engage with healthcare providers and potential customers. According to a survey conducted by Accenture across six different countries – Japan, China, Germany, France, the United Kingdom, and the United States, 65% of the medical sales representative meetings were held online during the pandemic. Before the coronavirus, 64% of such meetings happened in person. 43% of healthcare providers have also restricted the physical meetings with medical sales representatives and 44% believe these restrictions will remain for a considerable time. But healthcare providers interested in knowing about all the new treatments and 61% feel they have been interacting even more during the pandemic as compared to before. It was found that healthcare providers want that pharmaceutical companies to understand the needs of the patients and the doctors.



(Source – Accenture)

During the pandemic, pharmaceutical companies have increasingly started investing in digital marketing. According to a report by eMarketer, US pharmaceutical companies spent around $9.53 billion on digital marketing in 2020, targeting all the groups including patients and doctors. In comparison to 2019, that is a 14.2% increase, and the forecast for the year 2021 is around $11.25 billion which amounts to an 18% increase in digital marketing spend. As per a global survey report by EY, digital promotion channels make up for around 60% of all the communication between the pharmaceutical companies and the healthcare providers and it is expected that there will be a 30% reduction in the number of pharmaceutical reps in the next two years.

Social media has become an important channel of communication for pharma companies as they increasingly used this channel for marketing. Ogilvy Health said that "social media has become the shopfront of the pharmaceutical industry to engage with patients and healthcare providers". Pharma companies are also being more creative with their campaigns to engage customers. For example, AbbVie started an awareness company for patients regarding Glaucoma titled 'My Glaucoma, My Design', where people were encouraged to share their stories on how they manage disease along with photos and stories on their Facebook page. They also roped in Von Miller, an American Football player who suffered from glaucoma.

Pharma companies are using unbranded campaigns to include patients to be a part of their product development and listen to their views in order to increase the trust in their companies. Patient distrust of pharma companies can be observed in a survey from GlobalData in 2019, where only 36% of respondents trusted social media posts from pharmaceutical companies. Pharma companies have taken the opportunity the pandemic presented to provide patients with reliable and specific information about their healthcare problems which they were being deprived of due to lockdowns and lack of appointments with their healthcare providers. These steps became even more important in the context of the coronavirus vaccines, especially in the western world where mistrust of vaccines, in general, is high. As per a survey by Pharmafield, out of 1022 people, 54% felt they will not take the new covid vaccine till a testing period of one year has been completed. Pharma companies felt that this general mistrust made the unbranded campaigns to inform the people and gain the trust of doctors and patients even more important to distribute vaccines and medication.

Pharma companies, in order to understand their customers better, targeted specific demographics through social media. GlaxoSmithKline changed their unbranded campaign “Brought to you by Vaccines” after learning the elderly consumers used Pandora and Facebook. Gilead has a PrEP Hub platform for information on HIV. It also has resources on monitoring health, telemedicine information, and prescription delivery assistance. The platform was used by patients during the pandemic to monitor their own health. Pharmaceutical companies used online platforms and unbranded campaigns on social media platforms to keep patients and doctors informed and, in the process, increasing the confidence and trust among their consumers.

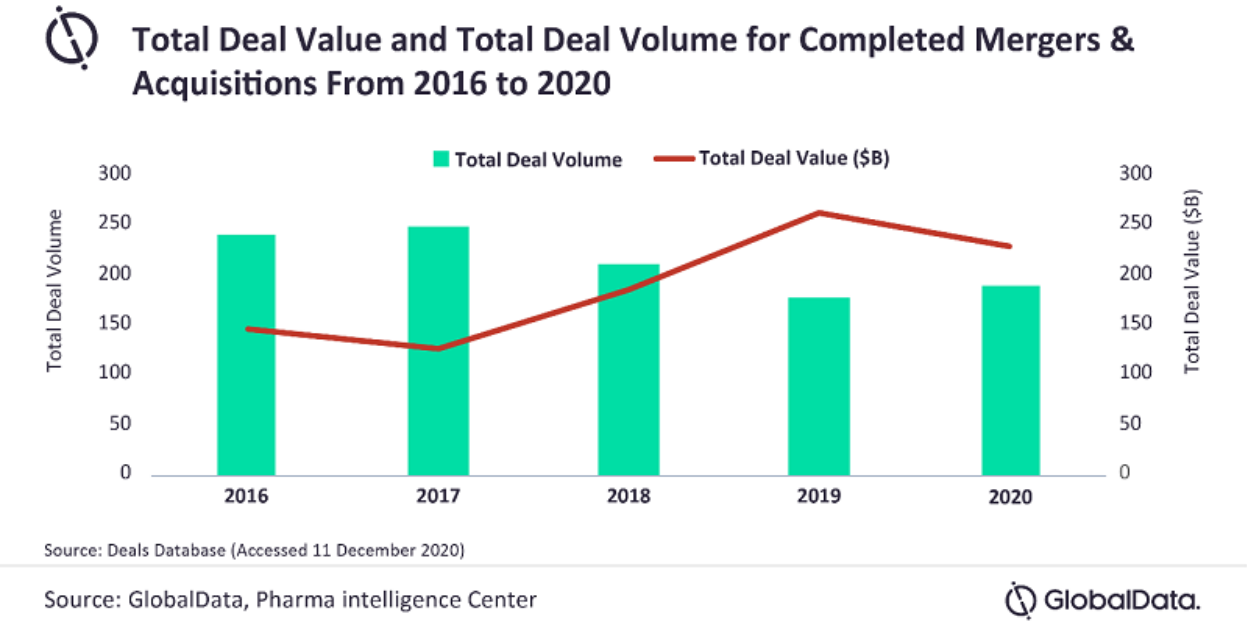
Mergers and Acquisitions

Pharmaceutical companies are dependent on research and development to continuously find newer products or improve the existing ones. Therefore, innovation is a core part of their strategy to remain ahead of the competition. The pandemic added an urgency to increase the speed of the way pharma companies operate in order to stay ahead, in addition to supporting the response to the COVID-19 pandemic. The pandemic has also brought in a shift across the industry regarding costs, research & development, digitization, regulation, and affordability of products. Mergers and acquisitions have long been an important strategy in the pharmaceutical industry to stay ahead of the competition and increase the value of their company. Here are the reasons why mergers and acquisitions remain a core strategy for pharma companies:

- *Assuring Innovation* – Pharma industry has an uneven way of innovation where, for a big drug to be a successful launch, smaller processes and compounds must synchronize. Therefore, it becomes essential for pharmaceutical companies to acquire smaller firms both in and outside of the industry. This will ensure that they gain new technologies and talent to steer clear of their competition.
- *Realignment of their Product Portfolio* – Pharmaceutical companies deal with the management of products that have in development for years and if these succeed, also the patents for these products. Therefore, the constant refinement and management of the portfolios of their product become critical. Pandemic has made this even more essential due to uncertainty, therefore realignment of portfolios remains a key reason for mergers and acquisition.
- *Economies of Scale* – Pharmaceutical products are expensive to manufacture and market due to which there is constant pressure to reduce costs and achieve efficiency in production. For this reason, mergers and acquisitions remain a good strategy to achieve operational and financial advantages.

While the pandemic had an impact on the pharmaceutical industry, mergers and acquisitions had increased by 17% in the first half of the year 2020. By December 2020, the total deal value of

mergers and acquisitions in the year 2020 stood at US$ 262 billion making the year the second highest in terms of the deal value of mergers and acquisitions in the industry in the last five years.



(Source – GlobalData)

As per, Madeline Roche, a pharma analyst at GlobalData, the pharma companies, especially the big ones are acquiring innovative biotechnology companies as a source of development and innovation and reduce the internal costs of investment in research and development. PwC estimated that the pharmaceutical industry had capital worth the US $1.47 trillion which could be used towards mergers and acquisitions. Given below are the biggest mergers and acquisitions in the pharmaceutical industry during the year 2020.

AstraZeneca / Alexion Pharmaceuticals	AstraZeneca acquired the rare diseases company Alexion in a $39 billion deal and expects the company to grow by 9% per year till 2023. While rare diseases are the company's expertise, it is expected that the company will complement AstraZeneca in the lucrative fields of immunology and oncology.

Gilead Sciences / Immunomedics	Immunomedics was acquired for $21 billion mainly for the newly approved cancer drug Trodelvy which shows Gilead Sciences' eagerness to capitalize on the oncology opportunity.
Bristol Myers Squibb / MyoKardia	Cardiac medication remains an important area for pharma companies. Bristol Myers Squibb collaborated with MyoKardia for their cardiac medication mavacamten with expected sales of the drug to reach $2 billion around the world by 2026.
Johnson & Johnson / Momenta Pharmaceuticals	Johnson & Johnson acquired Momenta for $6.5 billion for autoimmune medication nipocalimab which it expects to have sales worth $1 billion.
Gilead Sciences/ Forty-Seven	Another acquisition that shows Gilead Sciences' intent for immunology-oncology opportunities. It acquired Forty-Seven for $4.9 billion.
Sanofi/ Principia Biopharma	Sanofi acquired Principia for $3.68 billion due to a potential multiple sclerosis medication that both the companies feel may have broader application.
Merck & Co./VelosBio	Merck acquiring VelosBio, a company that was working on antibody-drug conjugate filed drugs. VelosBio is one of the few companies which has been working on a medication active against multiple cancer types.
Bayer / Asklepios BioPharmaceutical	Bayer acquired Asklepios for $2 billion upfront in order to enter the promising field of adeno-associated virus gene therapy, something which Asklepios has a lot of experience in.

Mergers and Acquisitions have been a core strategy and growth driver for the companies in the pharmaceutical industry and the pandemic has boosted the merger and acquisition activity leading to a rise in the market capitalization of big pharma companies at a time when the research and development of companies have been affected and sales have been hindered.

Rethinking Operations

The pharmaceutical industry has a globalized supply chain with different processes taking place in different parts of the world. The procurement of raw materials takes place in one country, the combination of different products to form the drug takes place in another and the distribution takes place in a third country. This globalization has the advantage of better prices for different components as well the access to drugs which are critical. But there are weaknesses in this globalized supply chain, for example, the world being dependent on the active pharmaceutical ingredients (API) in China and India. The coronavirus pandemic exposed this weakness when earlier in the pandemic, these countries decided to restrict the export of the materials leading to shortages of drugs.

Pharmaceutical companies have had to change the way they handle their supply chain and incorporate technological innovation in order to overcome the covid crisis. One of the tools pharma companies have deployed is tracking freight containers. In addition, transportation management systems with a temperature monitoring system for the vaccine distribution process. Some of the other tools deployed by pharma companies to aid in the supply chain were internet of things, automation, and cloud technologies. Taking Johnson & Johnson as an example, the company used mathematical models for its supply chain in order to know what changes were required. It also used *Risk Simulation Technology* which kept track of the requirement of raw materials enabling the company to order the exact amount and not under or over order materials. The company also used shipment tracking with end-to-end visibility which utilized GPS for knowing where their shipments are in real-time. Johnson & Johnson also used Google Glass technology to overcome the restrictions of lockdown, allowing its employees to virtually work together, see exactly what was going on at manufacturing sites, and coordinate while being at remote locations.

Pharmaceutical Industry Trends in the Post-COVID World

The pandemic forced the pharmaceutical industry to rethink its strategies while some of the changes may be temporary, many of them will be permanent in the industry and will be decisive for companies to succeed in the post-pandemic world.

- *Analytics and Technology* – The adoption of analytics tools and technologies such as artificial intelligence was crucial for some pharmaceutical companies in the fight against the coronavirus. It helped reduce the time of product development and clinical trials, helped in improving the efficiency of the supply chain, and allowed careful resource management and reduce costs. Pharmaceutical executives do not see this trend changing. In a survey by Bain, 61% of them feel that big data and analytics will be crucial to the pharmaceutical industry in the future.

  Analytics will also be important in engaging patients and healthcare providers. Data lakes and predictive analytics will play an important role in understanding their preferences. Robotic automation will also be adopted by pharmaceutical companies in manufacturing.

(Source – Bain)

- *More patient involvement and better communication channels* – In the pandemic, the pharmaceutical companies used unbranded campaigns on social media to gain the trust of healthcare providers and patients. Companies have also facilitated virtual patient-physician interactions through telemedicine on their platforms. Such engagement with healthcare providers and doctors will increase in the future. Innovative are even developing and enabling at-home injections and infusion for patients who are not able to visit their doctors. More patient involvement and better communication will be important for pharma companies for designing new products and their marketing.
- *Personalized marketing* – The pandemic led pharmaceutical companies to invest more in digital marketing. Social media engagement and virtual meetings between sales representatives and healthcare providers for product promotion became the new normal. Many healthcare providers also seem to prefer virtual meets to know more about new treatments and were seen to be interacting more with companies during the pandemic. More personalized marketing of products with feedback from healthcare providers and patients which is integrated into the next product development will be important in the future. This will reduce the development cycle of new products and make marketing easier.
- *Work from home* – Some pharma companies seamlessly moved their employee coordination and work environment to virtual platforms using technologies like Google Glass. Even, the meeting of healthcare providers with the sales representatives has moved online with the former seeming to prefer this approach to the physical meetings. 74% of pharma companies also intend to make working remotely a permanent option in order to attract talent to their organizations. This will lead to better conduction of clinical trials, diversity in employment, and flexible work-life balance.
- *Focus on sustainability and reducing environmental impact* – Climate change is an increasingly growing concern for all industries and pharmaceutical companies are increasingly aligning their organizational goals with that of reducing the impact on the environment. Novartis has changed almost all of its European operations to use renewable energy for electricity to reduce greenhouse emissions. Roche, which was ranked the best pharmaceutical company in the world on the Dow Jones Sustainability Index, has focused on reducing energy consumption, waste, and water consumption. In addition to innovation and growth, it has focused on key issues such as gender equality within the company and

being ethically sound. Pfizer signed a sustainability bond worth $1.25 billion in March 2020 to invest more in supporting vulnerable communities and environmental sustainability. AstraZeneca uses a materiality strategy focused on 16 areas which focus mainly on ethics, healthcare access, and protection of the environment. It can be seen that sustainability and reducing the impact pharmaceutical companies have on the environment will be extremely important for organizational strategies in the industry.

Learnings from the Project

As a management student aspiring to go into the healthcare sciences industry, the project greatly helped me understand the workings of the industry. The strategies which the pharmaceutical companies adopted during the pandemic gave me an insight into the skills which will be required to go into the industry in the post-pandemic world. I understood that skills such as data analytics will be crucial for managers employed in the pharmaceutical industry. Digital marketing and feedback from patients and doctors during the development of new products will also be important. Issues such as adopting processes to reduce the impact on the environment and better work-life balance will areas of focus in the pharmaceutical companies.

Overall, I gained valuable knowledge regarding the strategies pharmaceutical companies used to overcome the problems which presented themselves in the pandemic and also stay sustainable during the time.

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