

Innovation Management for Pharmaceutical and Biopharmaceutical MSMEs in Market Disrupting Scenarios: A Literature Review

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ABSTRACT

This research explores innovation management strategies within the pharmaceutical and biopharmaceutical sectors, specifically comparing the responses of large corporations and Micro, Small, and Medium Enterprises (MSMEs) to the COVID-19 pandemic. While multibillion dollar firms successfully utilized radical innovation, "demand-pull" models, and flexible manufacturing platforms such as mRNA technology to rapidly develop lifesaving treatments, MSMEs faced significant survival challenges. The study highlights that MSMEs traditionally rely on "Open Innovation," which depends on external collaborations and knowledge sharing. However, global pandemic restrictions disrupted these external networks, exposing the vulnerabilities of such a dependent model. Through a review of technological "S-curves" and innovation windows, the paper argues that the existing reliance on external factors proved insufficient during market-disrupting scenarios. The researcher concludes that established theories of innovation management must evolve to help MSMEs internalize their technological processes. Ultimately, this paper aims to identify strategies that empower smaller enterprises to maintain innovative behavior and resilience when external support systems collapse.

Keywords: Innovation management strategies, Pharmaceutical and Biopharmaceutical MSMEs

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INTRODUCTION

The world has recently seen the COVID-19 pandemic which will have long lasting impacts on the world. The World Health Organisation declared the outbreak of a new Severe Respiratory Disease spreading rapidly across China and to other parts of the world and named it Severe Acute Respiratory Syndrome caused by a mutation of the virus belonging to the family of Coronaviruses and named it SARS-Cov-2. This severe disease was declared a pandemic as it was spreading like a wildfire across the globe and since it first started spreading in the year 2019, it was called as COVID-19.(Guererro and Pugh 2022) The pandemic disrupted normal life all across the world leading to 632,533,408 people infected with the virus and 65,92,320 people losing their lives to the pandemic as on 15th November, 2022 as per the World Health Organisation (WHO 2022). This was the 6th time in the past 15 years when WHO had declared a Public Health Emergency of International Importance. The earlier ones

being the H1N1 pandemic of 2009, the international poliovirus outbreak of 2014, the Ebola virus outbreak in Western Africa in the year 2014, the Zika Virus outbreak in the year 2016 and Ebola Virus outbreak in Congo in the year 2018 (PAHO 2021).

The world saw fantastic response from the pharmaceutical and the biopharmaceutical industry to the pandemic by way of development and roll out of the vaccines and specialized lines of medications like the monoclonal antibodies and their cocktails which not only saved millions of lives affected by the disease but also shielded people from getting seriously ill. This was possible only because of knowledge and experience that was acquired as a result of facing other epidemics which were declared as public health concerns. This helped in gaining the experience and increasing the level of preparedness to face such pandemics. The advancements in studies in microbiology and virology have significantly helped the scientific communities across the

globe to devise strategies in order to mitigate the risks caused by these microorganisms (Arora and Das 2020). The pace at which these vaccines and other lines of treatment were designed and developed is literally jaw dropping. It has challenged the paradigms of the science behind developing the traditional lines of treatment. (Defendi and da Silva 2021) This response majorly came from the bigger multibillion dollar companies which have resources to deploy and manage the technology and innovation process effectively.

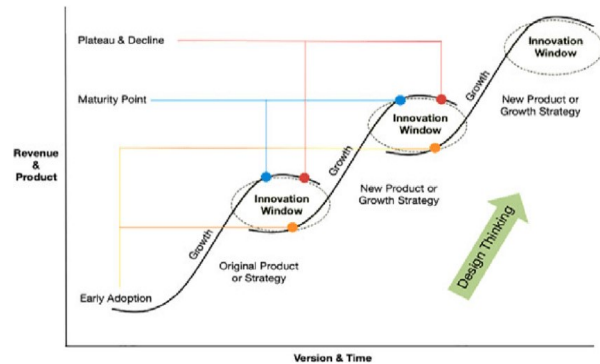
Moderna INC. developed the first candidate for the COVID-19 vaccine based on the mRNA technology. Moderna, while developing the mRNA technology platform, mentions that 'An mRNA can teach the body to make a specific protein that can help your immune system prevent or treat certain diseases'. Moderna believes that the mRNA teaches the body to make its own medicine (Moderna Inc 2020). Similarly, if we consider vaccine developed by Pfizer- BioNTech (BNT162b2), was approved by the USFDA after it demonstrated efficacy of more than 90% in preventing severe disease as compared to placebo. The vaccine is a mod-mRNA vaccine which manipulates the spike protein of the Covid-19 virus (Pfizer-BioNtech 2020). Exploiting further technical literature of various vaccines used for the treatment of COVID-19, it is evident that the technology and innovation has been effectively managed by these organisations.

In contrast to the success achieved by the large companies, the micro-small and medium sized companies or the MSMEs working in the pharmaceutical and biopharmaceutical fields struggled to survive due to various challenges ranging from issues arising out of disruptions in supply chain, managing finances, fragmented teams due to restrictions imposed due to the spread of COVID 19 practically all over the world to name a few (Sahoo and Ashwani 2020). The MSMEs were left behind in the race for achieving market success. Most of the researchers have worked mostly on the innovation strategies implemented by the large companies and have neglected the MSMEs. MSMEs are the largest job creators all over the world. So, it is imperative to study this sector as to why this sector lagged behind in developing the treatments for COVID 19 and to find out a possible solution for making the MSMEs more innovative in new product development. Another purpose of this study is to identify possible ways to enhance innovative behavior of MSMEs in market disrupting scenarios (Sahoo and Ashwani 2020).

PRELIMINARY LITERATURE REVIEW

Technological innovations are major drivers of success in many industries and pharmaceutical and

biopharmaceutical industries are no exceptions to this. Companies need to select the timing of these technological innovations depending upon the market demands of existing products. Such demands for products usually follow a 'S'- Curve as depicted in Figure 1. In the S-Curve, the bottom represents the entry of a new product in the market with relatively newer technology.



(Fig. 1: The Innovation S-Curve (Retrieved form))

As the time goes, the technology starts maturing and the market for the product starts growing and thus the company also grows. The top of the curve represents stagnancy achieved by the product which is followed by the decline in the market size. The second curve represents the rise of a new product in the market. The time between the decline of an existing technology and introducing the new technology in market is termed as the 'innovation window.' Thus, the cycle continues paving way for the growth of a technology driven company (Stefik and Stefik 2004).

This phenomenon can be best explained using the simple example of video cassette players. These players were launched in 1964 by Sony for home entertainment. This technology faced legal issues for copyright infringements. After the initial hiccups, the video cassette player industry experienced instant success and became a household necessity. Things started changing in the mid 90s when other technologies like the satellite TV and cable TV started dominating the home entertainment domain as it provided a lot of entertainment options to the viewers. Subsequently, in the early 2000s, DVDs started to take over the market of home entertainment. This was further disrupted in the 2010s by the DTH services. DTH services allowed the viewers to view high definition content. Covid disrupted this market as it led to the maturity of OTT platforms where viewers were offered curated content as per their needs (Stefik and Stefik 2004). Companies use various strategic approaches to manage the process of

innovation. These strategic approaches can either be radical or incremental in nature.

Radical innovation can range from diversifying into new business models which are different from the existing business or changing the nature of existing business through new product development. This process is considered a high risk process by a lot of big companies. Research also shows that it is very difficult to get management support in large companies with respect to radical innovation strategy. The management of most of the large companies usually prefer incremental innovation as radical innovation may challenge the technical capabilities of the teams, financial resources of the company and established markets for the companies (Mcdermott and O'Conner 2003). However, some researchers also believe that radical innovation is necessary to replace the products which have stagnated the markets for a long period (Kennedy et al 2017). Radical innovation in the pharmaceutical industry involves finding a new molecule for treatment of a particular disease. These types of innovations are usually protected by patents. These patents provide the companies with a chance to create market monopolies and decide pricing (Yin 2017).

Incremental innovation strategy involves innovating the existing process or product in small increments thus providing a better or updated version of the existing product. This term is also referred to as 'Ever-greening' by many especially when the product is close to the end of its Intellectual Property Rights protection. This is a preferred strategy for the large companies as it minimizes the risk of market failure or avoiding competition. This further helps in building the image of the company in the market and thus helping in creating sustainable business. Incremental innovation in the pharmaceutical industry involves changes made to existing products like recommending additional usage, formulating a medicine for paediatric patients, changing the packaging to make it child proof and creating a sustained release version to name a few (Yin 2017).

Literature suggests that the process of innovation in the pharmaceutical industry starts as a result of two main functions (a) The social requirements: These may be termed as the Demand Pull Model and (b) A process which starts with the review of technical literature followed by actual research which includes the phases of clinical trials and ends with production and finally consumption or in simple words, The Technology Push model. (Hara 2003).

The Demand pull strategy of innovation, as the name suggests, is a strategy implemented by companies, when there is a specific societal need for the development of technology. Such innovations are driven by the

competencies of the companies for innovation so as to develop specific technologies in meeting out the specific societal requirements (Stefano et al 2012). Situation like COVID-19 pandemic was an ideal situation in implementing the demand pull model of innovation. It can also be said that the Demand Pull model is implemented considering the market demand (Chidamber and Kon 2014).

The Technology push strategy of innovation, as the name suggests, is implemented by the companies as a result of radical innovation done by them either by developing a new product altogether or creating a new technology for the market. The main objective of implementing this strategy is to create demand in the market. Unlike the Demand pull, where the products are developed as per the demands from the market, technology push depends upon creating demand in the market (Schilling 2016).

Another strategy used by large companies is the Flexible Manufacturing process or FMP as it is famously known. The strategy emerged as of great importance for the companies so as to remain competitive in the globalised world. The market competition is growing globally for nearly all the manufactured products. Under such competitive scenario, companies always look for tools which help them achieve wide market segmentation. Flexible manufacturing allows companies to segment products using same manufacturing line or technology platform (Hossain and Kauranen 2016). The best example to explain this would be the COVID 19 vaccine developed by companies like Moderna and Pfizer. Both the companies utilised the platforms developed by them for treatment of other diseases for production of COVID 19 vaccine. In case of Moderna, the company believes that the mRNA technology is future of medicine and is the modern approach to medicine. The company also claims that mRNA medicines can be designed and formulated rapidly and that is the main reason why the COVID 19 vaccine was created so quickly (Moderna 2022).

When MSMEs are concerned, Open Innovation is the prime source for driving the business success. This open innovation usually comes from the factors that are external to the organisation. These factors can be but are not limited to collaboration between various professionals, knowledge groups, research driven institutes, managements of various MSMEs etc. The concept of open innovation was first proposed by a North American professor and defined it as "the use of internal and external flows of knowledge to accelerate internal innovation and expand markets for external use of that innovation" (Solrate-Montufar et al 2021). MSMEs rely on open innovations primarily because of lack resources. These resources can be financial or human resources.

Since these are Micro, Small and Medium enterprises, they lack the financial resources when compared to larger organisations. Same is the case with human resources as well. For MSMEs, the turnover rate for human resources is fast as compared to larger organisations. This makes the MSMEs dependent upon external factors to innovate (Lee et al 2010). When the Pandemic struck in the year 2020, the MSMEs in pharmaceutical and biopharmaceutical industries were left clueless and could not come forward and succeed.

DISCUSSION

From the preliminary review of the above literature, it can be said that the development process of Covid 19 vaccine was result of a combination of various theories of technology and innovation management. These theories are essentially Radical Innovation where in a totally new product was developed by the large companies as a result of Demand pull from the society for the need of a new technology for treatment of Covid 19. Flexible Manufacturing System like the mRNA platform, as in the case of Moderna vaccine, helped in a speedy rollout of the vaccine. This was also possible because of the experience gathered by these large companies over the period of time.

In case of MSMEs, the major reliance for innovation is primarily on the external factors. These factors can be various external tie-ups like knowledge sharing, joint research, marketing networks for new innovations or any other open sources of innovation. During the pandemic, most of the countries across the world were locked down due to the COVID related restrictions. All the factors driving the open innovation processes within MSMEs were disrupted. Under such disrupting scenarios and very limited knowledge about the virus, MSMEs found it difficult to utilise these Open Innovation Processes. It can also be said that the theory of Open Innovation turned out to be of limited utility for the MSMEs. This makes it mandatory to establish new theories of Technology and Innovation management which will empower MSMEs to perform better in market disrupting scenarios like the COVID-19 pandemic.

CONCLUSION

The pandemic which started in China in the year 2019 disrupted the entire world. With large number of people getting affected all over the world, large Pharmaceutical and Biopharmaceutical Companies took efforts to develop and roll out effective vaccines in order to fight the virus and helped in saving billions of lives. While the large organisations could capitalise on the situation due to well established technology and innovation management process, MSMEs struggled to survive. The

struggle for survival was driven by dependence on external factors for managing the innovation process. In order to respond to the challenging situations, MSMEs must try and internalise the technology and innovation management process. This study aims at finding out and establishing strategies for helping the MSMEs in internalising the entire process of Technology and Innovation Management.

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