International Journal of Psychosocial Rehabilitation, Vol. 25, Issue 1, 2021
ISSN: 1475-7192

Technological Innovations and their Impact on Pharmaceutical Industry: An Empirical Study of Medical Representatives

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Abstract

The pharmaceutical industry's unique company model and commercial operations have a notable impact on the process of delivering new drugs to patients, even though they are not widely comprehended outside of the industry. The likelihood of a new drug succeeding could be higher, and the process is very time-consuming, costly, and hazardous. After implementing international patent rules on January 1st, 2005, the Indian Pharmaceutical Industry saw a tremendous shift. India's indigenous pharmaceutical businesses have seen massive growth in R & D investment to remain competitive in the global pharmaceutical industry. India has very well researchers, a well-established computer industry, and technology for producing bulk pharmaceuticals and formulations, despite the country's limited pharmaceutical market and lack of financing for drug development initiatives. Following a discussion of the company's commercial realities and restrictions, along with its current issues, there follows an examination of some of the expected future commercial and technological advances in the company.

Keywords- Pharmaceutical Industry, Research, and development, Patent Laws, Patent reforms

Introduction

One of India's top science-based industries, the pharmaceutical sector has extensive capabilities in the problematic area of drug manufacturing and technology. The nation manufactures around 400 active compounds to produce pharmaceutical formulations (Active Pharmaceutical Ingredients). Also, the government has access to a large variety of pharmaceutical equipment. India's pharmaceutical market had a value of US$ 6.0 billion in 2004, accounting for 2% of the world market and placing it fourth in volume for the year and thirteenth in terms of value. The industry has had exceptional growth performance during the past ten years.

The pharmaceutical sector differs from what most people believe to be an industry in various ways. It is also a company that contradicts itself. For instance, despite the reality that the organization has undoubtedly contributed significantly to human wellbeing and pleasure as

well as the reduction in disorder and struggle for more than a generation, “According to polling data, it continues to make the list of least respected firms by the general public and is commonly connected unfavorably with the nuclear sector” (Tyagi, Mahajan & Nauriyal 2014). Despite being one of the most hazardous businesses to invest in, the general public thinks it ranks among the most rewarding industries. Despite their claims to be research-based firms, most individuals believe that big pharmaceutical corporations spend more on sales advertising than genuine Research. Notwithstanding the known risks and expenses connected with medicinal chemistry, many still believe that pharmaceuticals should be developed to satisfy all human aspirations and that once manufactured, they should be provided to every one according to need (Achilladelis & Antonakis, 2001).

It is commonly accepted that businesses in developing nations, like those in India, only sometimes Innovation in the meaning of doing R&D, which leads to introducing new goods and procedures. At best, they are introducing incremental innovations, known as adaptations of existing technologies to specific local conditions. These technologies may be unique to Indian enterprises, but they are not necessarily novel to the environment in which these firms are situated. As a result of this way of thinking, it has always been challenging to measure Innovation using traditional metrics like R&D expenditures, patent awards, and technology content of exports (Staropoli, 1998). Although this is generally true, there are several significant outliers when businesses independently develop new technology. The Indian pharmaceutical sector has proved to establish itself as one of the most inventive among the nation's industrial enterprises, despite the copycat reputation that is, correctly or unfairly, showered upon it. Due to years of reverse engineering, Indian pharmaceutical businesses have access to world-class medicinal chemistry expertise and far less expensive manufacturing infrastructure(De Carolis, 2003).

Literature Review

Becker & Lillemark (2006) studied and revealed that the pharmaceutical sector is still dealing with a variety of innovative issues, including low productivity, patent expiration, rising R&D expenditures, high compound attrition rates in Phase 2, high regulatory barriers, growing concern about adverse side effects, and more. However, the "problem of maturity" is a significant obstacle frequently disregarded. When a treatment is mature, it has already been proven effective against all the straightforward objectives. Because it is no longer patented, it cannot generate the significant profit margins necessary for long-term growth. It is getting

harder and harder to find innovative products that are effective enough to compete with current lines of goods, safe enough to resist regulatory scrutiny, economical to create, and cost-effective enough to meet reimbursement standards. Rather than indifference or pervasive innovation failure, these elements are primarily responsible for the depletion of enabled businesses. They then trigger waves of the merger, acquisition, strategic partner behavior, and ongoing organizational restructuring trials.

Jena, Et al. (2017) found that the 1970 Indian Patent Act placed a strong emphasis on method patents. Indian manufacturers benefited from this, as it turned out. They were permitted to retail the active components and drug products as soon as the project ended by changing the production process. Reverse engineering is a term used in science to describe this strategy, and Indians, over time, mastered it. This made laying the groundwork for a robust and incredibly compatible local pharmaceutical industry easier. The medications were sold relatively cheaply because of strict price control. India became the supplier of high-quality goods at reasonable prices as it has the most US FDA (United States Food & Drug Administration) authorized manufacturing facilities outside the US. As a result, the world, even the biggest and most controlled market in the USA, now has access to affordable medications.

Shah et al. (2014) found that Innovation is among the most critical elements in economic rivalry. Nevertheless, the invention does not only happen by accident. In-depth descriptions of technology trajectories, paradigms, innovation routes, and extended waves of innovation models are available in the established literature. The literature claims that skills, experience, and technological know-how build through time, whether at the basis of businesses or nations and that Innovation is an evolutionary process. This means businesses cannot just pick and choose technology from the outside. However, it is grounded on a particular set of absorptive and inventive capacities intrinsic to the structure of technology-oriented enterprises or change-generating resources (context). Furthermore, understanding the development of an industry in which the crucial actors (mostly businesses and the government) are immersed and active requires consideration of temporal and contextual elements. For instance, a country's or a specific industry's infrastructure, rules, and societal needs can be unfavorable to Innovation (Cardinal, 2001).

Janodia et al. (2009) revealed that companies claiming that strong patent law would be harmful were further questioned about the issues they believed would limit the sector's development. The competition from MNCs was mentioned as the primary cause. Reverse engineering would

no longer be an issue if product patents existed since Indian generic producers would compete with foreign corporations. The likelihood of a rise in patent lawsuit suits was another consideration. However, as noted by the company members, monopoly, the increase in drug prices, and the existence of small- and medium-sized businesses were other variables that directly affected product patents' use. As the generics sector served as the backbone of the Indian economy, the transition to a system of product patents does not appear to be seamless. Transforming a method patent into a product patent is fraught with difficulties.

Abrol, Prajapati & Singh (2011) found that The analysis of the key learning, competence-building, and innovation-making processes that domestic and international pharmaceutical firms contribute to focuses on the ways that channels of contact have been established and interrelatedness and linkages have been strengthened among the various domains of healthcare service activities. The sort of contribution that oversees R&D, technology acquisition, and foreign direct investment (FDI) made by international firms to the challenge of executing the operations at hand is demonstrated. The role performed by the government's drug development efforts in realigning its government network of development occurs is critically reviewed from the perspective of their commitment to the status of new product development. Our innovations metrics are particularly concerned with the development stage of the outcomes of R&D business investment by local and foreign pharmaceuticals enterprises operating outside India, as well as their method of illness treatment.

Chaturvedi & Chataway (2006) revealed that From such an Indian perspective, the lack of intellectual property rights allowed for the development of a strong domestic industry (IPR). The TRIPs agreement, which was just signed, overturns the patent regime that has been in place since the 1970s. Reorienting oneself for R&D-based Innovation is necessary for businesses that have previously established expertise and capacities in reverse engineering-based R&D to survive and compete in a regulatory and open market. For the Indian pharmaceuticals, this has important ramifications. In addition to upsetting corporate balance sheets and revenues made from exports of less priced copies of copyrighted medications, it is projected that access to cutting-edge knowledge and technology would become even more difficult under the tougher patent regime.

Schuhmacher et al. (2013) studied and examined that The creation of pharmaceuticals patents in India, according to leaders in the industry and their supporters in the Indian government, would push up prices for essential medications without producing any positive benefits in the

form of increased Innovation and Research and development, either on the part of domestic firms and through multinational firms shifting R&D to India. Indian government representatives harshly criticised TRIP as a result of these worries. These worries have been repeated in a number of recent academic articles, which estimate the possible welfare losses impacting present and future consumers, especially in nations like India, through the higher medication prices a stronger patent regime would bring, utilising theory and/or empirics.

Objective: To find the technological innovations and their impact on pharmaceutical industry

Methodology: This study is descriptive in nature in which the data were obtained from the 170 respondents who focus on event management in India. The major business area covered in the study was fashion and event management companies. A checklist question was used to analyse and interpret the data. In a checklist question respondents choose "Yes" or "No" for all the questions.

Data Analysis and Interpretations:

Table 1 Technological Innovations and their Impact on Pharmaceutical Industry

SL No.	Technological Innovations and their Impact on Pharmaceutical Industry	Yes	% Yes	No	% No	Total
1	Artificial intelligence benefits pharmaceutical industry by allowing data analysis and data forecasting	152	89.41	18	10.59	170
2	Digital therapeutics treat patients with the help of evidence based digital devices and software	143	84.12	27	15.88	170
3	Cloud technology helps in more efficient working by allowing storage of huge patient's data	156	91.76	14	8.24	170
4	Big data helps in developing personalized medicines by studying genomic data	160	94.12	10	5.88	170
5	Digital training helps in providing the knowledge of latest technology to pharmaceutical workers	149	87.65	21	12.35	170

6	Precision medicine helps in preventing diseases by studying the lifestyle and genes of patients	161	94.71	9	5.29	170
7	Blockchain technology helps in efficient production and distribution of medicines	145	85.29	25	14.71	170
8	Advance analytics helps pharmacists in making accurate conclusions about the effectiveness of drugs	159	93.53	11	6.47	170

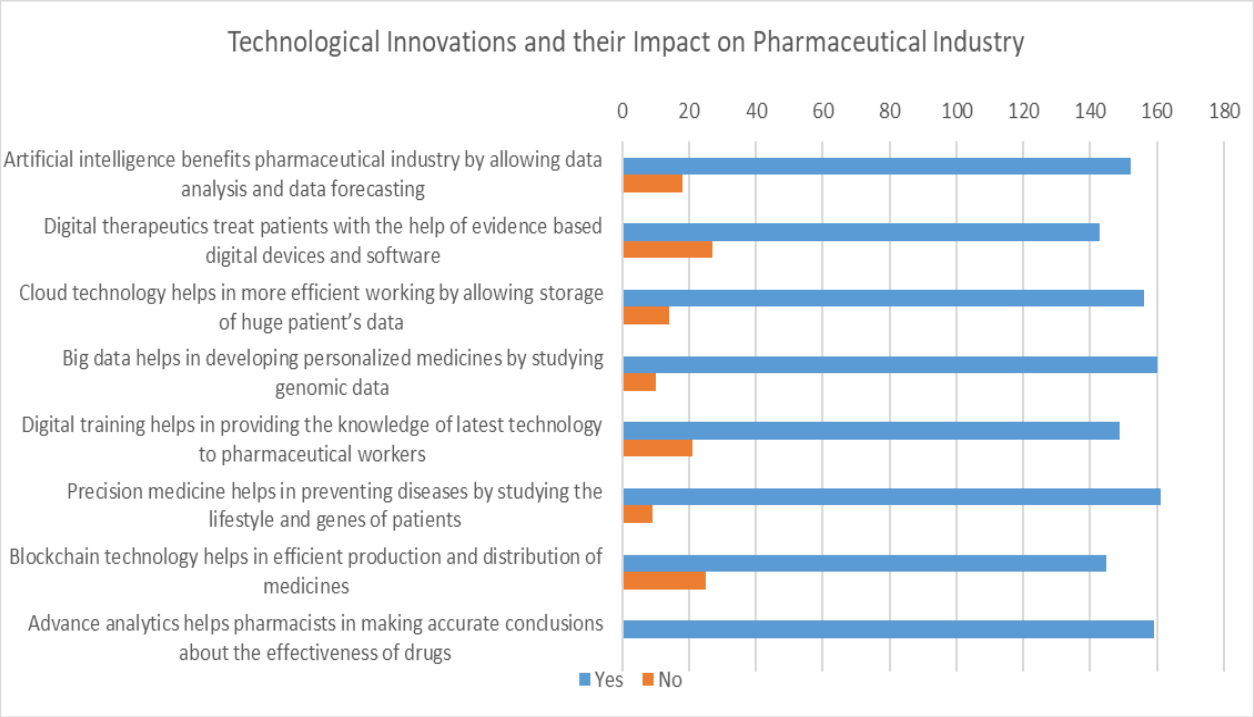

Figure 1 Technological Innovations and their Impact on Pharmaceutical Industry

Table and Figure 1 show the technological innovations and their impact on pharmaceutical industry. It was found that around 94.7% respondents accept that precision medicine helps in preventing diseases by studying the lifestyle and genes of patients, big data helps in developing personalized medicines by studying genomic data (94.1%), advance analytics helps pharmacists in making accurate conclusions about the effectiveness of drugs (93.5%), cloud technology helps in more efficient working by allowing storage of huge patient's data (91.7%), artificial intelligence benefits pharmaceutical industry by allowing data analysis and data forecasting (89.4%), digital training helps in providing the knowledge of latest technology to

pharmaceutical workers (87.6%), blockchain technology helps in efficient production and distribution of medicines (85.2%) and digital therapeutics treat patients with the help of evidence based digital devices and software (84.1%).

Conclusion

There is a chance that the pharmaceutical multinational firms will continue to exist in their current incarnation and pursue the same monoclonal antibody blockbuster innovation strategies. If this occurs, it will likely involve more waves of sizable transactions, the resultant disruption of resource, and R&D rationalisations. The demand for less expensive medications, regulatory changes that encourage drug development for specialised patient populations and niche markets, and a declining public perception of the industry as a result of increased product recalls are all undermining the innovation model. These challenges are in addition to the problem of maturity. Simply said, true blockbuster items are getting harder to find.

It is generally known that the previous patent system allowed the pharmaceutical sector to develop its domestic technological capacity. Some of the corporations have gained enough knowledge from being able to reverse engineer well-known pharmaceutical items to work on the creation of NCEs under a product patent system that complies with TRIPS. Nevertheless, none of the businesses does Research on the underfunded illnesses. In conclusion, the TRIPS responsive patent regime does not appear to have reduced the pharmaceutical and healthcare industry's ability for Innovation; rather, both their academic investment and patenting have increased.

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