Role of Academia in (Open) Innovations – Through Covid Lens

Achyut Khire*

Nano Therapeutics Pvt Ltd, Plot no. D54/2, Hojiwala Industrial Estate, Road no 23, Sachin Palsana Highway, Sachin,, Surat - 394 230, Gujarat, India

Abstract

The concept of open innovation is a relatively recent approach to managing and understanding the innovation process. Institutions excel in early discovery and development, but the vast majority of them lack the skills necessary for product development and the execution of the steps necessary to carry a product through phase two and phase three clinical trials and onto the market. The Covid-19 pandemic has required businesses across practically all sectors to innovate in some capacity as a result. The present article is covering the area of innovation management and the subject comprising the academic role in open innovation system and/or R & D partnerships. In conclusion, this review article briefly illustrates the role academic institutions can play in coming up with innovations in situations of pandemics.

Keywords: Open innovation, Covid-19, Vaccine, University, Commercialization

Introduction

Open innovation is defined as the use of purposeful inflows and outflows of knowledge to accelerate internal innovation and extend the markets for external application of innovation, accordingly. Open Innovation, a new paradigm for controlling and comprehending innovation processes, has been one of the most hotly contested subjects. Open innovations are practiced since 1960's and has since then ben responsible for developing mindsets that are open to sharing and receiving information [1, 2]. However, their utilization was very limited to academic institutes and government agencies only. Later, large MNC's accelerates its use towards their business expansions into niche areas or products and now a days, it becomes a buzzword for everyone in STEM field. Currently open innovations for R&D activities are conducted at the international level for knowledge sharing.

Such open innovations recently resurfaced to combat Covid pandemic [3]. The importance of the open innovation paradigm in boosting the capacity of pharmaceutical companies in underdeveloped countries to develop generic versions of vaccines against Covid-19 [4].

**Corresponding Author:*
Dr. Achyut Khire
achyut.khire@nano-therapeutics.net

Although all the institutes were practicing them independently but because of understanding the importance of the same, everyone were able to use it to deliver a final product i.e., vaccine. The phylogenetic tree of genetic sequences has been recorded in a specific database which made available in public domain, the mRNA technology platform was licensed from academia to small industry and then larger size industries came into the role play for upscaling the manufacture, distribution process. This entire process happens within a short period i.e., 1.5-2.0 years. In addition, proven its value towards working in a niche area or area of urgent attention.

The idea of open innovation is something that can be viewed (**Figure 1**) as a powerful strategy for addressing issues that are present in society [5]. In reality, OI can help increase knowledge and resource levels, boosting the possibility of developing novel solutions with favorable social effects [6]. In this context, it's important to comprehend how businesses might grow and involve a variety of stakeholders in their participation.

This article's goal is to establish a connection between two pertinent study areas. The literature on OI that addresses great challenges and the most recent studies on the use of data that is almost real-time to support analysis on the creation of Covid-19 vaccines .

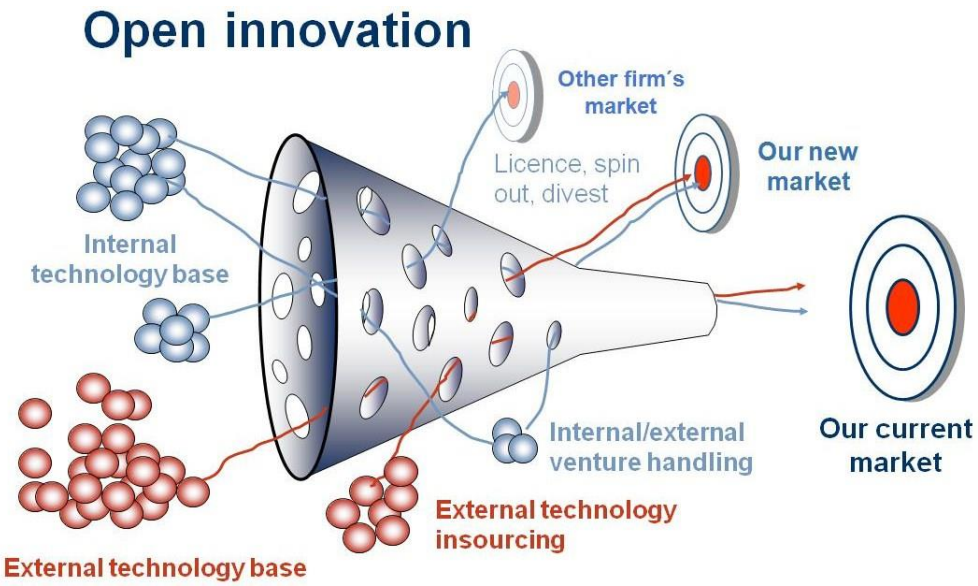

Figure 1. Illustration of Open innovation

Role played by University in product development

This entire sequence highlights the criticality of choosing the right academic partner for innovations as well as right commercial partner for upscaling the technology. Both the factors go hand in hand for a successful launch of radical technology for benefit of mankind. The role played by an individual organization can be referred in the following matrix. Table 1 highlights the role played by universities in product development.

Two simple examples of explaining above table are the commercialization of M RNA Technology as well as commercialization of Oxford AstraZeneca vaccine.

Commercializing m-RNA Technologies

Let us look at the first example of commercializing m-RNA Technologies. Katlin Kariko is a Hungarian American scientist working on m-RNA technology since her graduation through postdoc time. To pursue her dream of making m-RNA technology platform useful for combating life threatening diseases, she moved from Hungary to University of Pennsylvania (UPenn) and then after numerous ups and downs of her academic career.

She founded startups and licensed technologies i.e., Moderna and BioNTech. Both are commonly known now for spearheading covid 19 vaccines through m-RNA technology. These m-RNA acts like digital tape recorders which copies instructions from DNA to ribosomes to make desired proteins. Hence calling this technology as software of life won't be an exaggerating phrase. With this they turned human body into medicine making machines.

After five years of trying and failing, Karikó was finally successful in commercializing their discovery by licensing their technology to a relatively unknown German business called BioNTech [7]. In her role at BioNTech, Karikó has been instrumental in the creation of the Covid-19 vaccination. In 2013, she accepted a job offer to become Senior Vice President of BioNTech after UPenn declined to reinstate her in the teaching position from which she had been sacked in 1995. This happened after she was demoted by UPenn in 1995.

Institutions excel in early discovery and development, but the vast majority of them lack the skills necessary for product development and the execution of the steps necessary to carry a product through phase two and phase three clinical trials and onto the market.

Table 1. Role played by University in product development

Type of partner	Role played				
	Knowledge generation	Education & Training	Pilots and demonstrations	Product / Service development	Sales, Marketing, User Support
University	***	***	*	**	-
Research Center	***	*	*	**	-
SME	**	-	**	***	**
Large entity	**	-	**	***	**
Public body	-	**	**		
Freelance	**	**	*	*	**
User / Consumer	-	-	**	*	***
Not for profit	*	*	**	-	*

*** Highly Significant ($P \leq 0.001$) ** Significant ($P \leq 0.01$) * Significant ($P \leq 0.05$)

Universities do not want to pay for that because it can get quite pricey. It is difficult to get money from venture capitalists who are prepared to take on these kinds of risks and expenses in exchange for fair profits. Consequently, one of the most effective strategies for delivering innovation is to look for finance from other sources, such as venture capital firms who are prepared to assume the associated risks and expenses in exchange for suitable benefits.

Oxford - Astra Zeneca vaccine case

Now let us look at a second case study of Oxford - Astra Zeneca vaccine case. It underscores the importance of publicly financed academia as well as private money, which are increasingly the driving forces behind scientific discovery, often to the advantage of patients as well as shareholders. Professor of Vaccinology Sarah Gilbert been working on producing vaccines utilizing viral vector "platform technology," [8]. This technology may be thought of as a vehicle that is modified to transport genetic information from a specific disease in order to elicit an immune response.

Simultaneously Oxford has a highly rewarding structure where they encourage scientist to maximize and monetize benefits of academic innovation. It has been agreed that if COVID-19 is classified as a pandemic, AstraZeneca will make and distribute the vaccine on a non-profit basis. Smallest change in this condition in future is going to benefit professor, institute, and range of investors including Google ventures. Before Covid, Professor Gilbert and Professor Adrian Hill, the head of the Jenner Institute, formed Vaccitech, a non-profit spin-off company, which held the rights to create and manufacture the vaccine [9].

The university received a fifty percent share of the rights as part of the agreement. The university has a largest venture capital vehicle i.e., Oxford Science Innovation (OSI) which raised more than GBP 600 million since 2016. This OSI is major shareholder in Vaccitech along with other investors namely Google ventures, Wellcome trust and Fosun. Covid pandemic eventually demand global vaccination program with billions of doses and for this opportunity university and Vaccitech started negotiating with larger partners to handle commercial and manufacturing process. At this juncture AstraZeneca comes into the picture. According to data that were originally informed by the Wall Street Journal, AstraZeneca paid a charge of $10 million (£7.4 million), and the company has agreed to pay an additional $80 million (£59.4 million) in

"milestone payments." Once Covid will not remain pandemic, AstraZeneca will also take profits and 6% of royalties will go to university and out of that Vaccitech will get 24% pie.

This is different from "subcontracting" where certain tasks are followed with comprehensive instructions [10]. In the open activity, both sides agree that there is uncertainty and that the risks are higher [11]. Open activity occurs when the dominant firm in the field gives its partners the autonomy and freedom to come up with original solutions to poorly defined research problems.

This scenario also contrasts from instances in which a small and medium enterprise (SME) is the company initiating the OI activity with outside partners (SME). For instance, resource-based theory claims that SMEs need R&D collaboration with major firms despite the dangers of technology secrets being stolen.

Strong Intellectual Property Policies (IPP) are essential for ensuring the protection of their own vital technologies. It is crucial to draw attention to the well-known paradox of openness, which states that while openness is frequently necessary for the invention of innovations, protection is also necessary for their commercialization.

Conclusion

Open innovation is a new paradigm for regulating and comprehending innovation processes, with the goal of locating a more accurate method of navigation, being more precise, and finding a more precise approach to navigate. In the end, this will lead to the great brains being inspired. The paradox of openness requires openness for innovation, yet protection for commercialization. It is important to develop collaborations that are having cost-effective activities and time-effective methods aimed at high-quality outcomes. For the reason that of the urgency of the COVID-19 pandemic, commercial and public organizations must work together to obtain worldwide knowledge on this infection, enabling speedier response and speeding the scientific world's impact on mitigating this pandemic.

Conflict of Interest

The authors declare no conflict of interest.

Disclaimer

The views, thoughts and opinions expressed in this review belong solely to the authors, and not necessarily to the author’s employer, organization, committee or other group or individual.

References

1. Chiaroni, D., Chiesa, V., & Frattini, F. (2011). The Open Innovation Journey: How firms dynamically implement the emerging innovation management paradigm. Technovation, 31(1), 34-43.

2. Dános, Valér, and Csaba Szabó. "The development of science is uninterrupted." Belügyi Szemle 69.1. ksz. (2021): 158-165.

3. Chesbrough, Henry. "To recover faster from Covid-19, open up: Managerial implications from an open innovation perspective." Industrial Marketing Management 88 (2020): 410-413.

4. Liu, Zheng, Yongjiang Shi, and Bo Yang. "Open Innovation in Times of Crisis: An Overview of the Healthcare Sector in Response to the COVID-19 Pandemic." Journal of Open Innovation: Technology, Market, and Complexity 8.1 (2022): 21.

5. Temiz, S., & Broo, D. G. (2020). Open innovation initiatives to tackle COVID-19 crises: Imposter open innovation and openness in data. IEEE Engineering Management Review, 48(4), 46-54.

6. Ala, M., Kaur, K., & Wadhwa, D. (2022). The Relevance of Open Innovation for the Generic

Pharmaceutical Industry in Developing Countries: Open Innovation to Address Vaccine Divide. In Impact of Open Innovation on the World Economy (pp. 27-51). IGI Global.

7. https://www.wired.co.uk/article/mrna-coronavirus-vaccine-pfizer-biontech

8. Lane, R. (2020). Sarah Gilbert: carving a path towards a COVID-19 vaccine. The lancet, 395(10232), 1247.

9. https://news.sky.com/story/covid-19-the-multi-billion-pound-business-of-the-oxford-vaccine-12134833

10. González-Díaz, M., Arruñada, B., & Fernández, A. (2000). Causes of subcontracting: evidence from panel data on construction firms. Journal of Economic Behavior & Organization, 42(2), 167-187.

11. Barchi, M., & Greco, M. (2018). Negotiation in open innovation: A literature review. Group Decision and Negotiation, 27(3), 343-374.