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Evaluation of Attributes Influencing the Inventions in the Field of Biotechnology

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Abstract:

In recent decade, the inventions association with technologies like biotechnology and genetics has surmounted. Biotechnology in an advanced upfront technologies that enables the investors to focus on brining sustainable development in the country. However, the factors like capital, resources and work force is a powerful factors that provides an influential candidate in country's economy. The innovations in biotechnology creates rapid wealth in the society via wide variety of applications. In this study, innovations in biotechnology is regarded as a serious factor that gets influenced by various other factors like government policies, research development polices and collaborative policies with corporates. The study reports the data collected from various respondents of biotechnology firms in India. Based on which, the hypothesis are framed and tested. The research shown significant impact of all the related factors with innovations activities and the implications are provided to advance the flaws associated with innovations.

Keywords: Evaluation, Attributes, Invention, Biotechnology

1. Introduction

Biotechnology, previously the domain of academic institutions, is finding increasing application in industry (Lalanne et al., 2021). In today's knowledge-based economy, biotechnology is considered an essential industry (Kang and Park, 2012). This is due to the fact that its ground-breaking discoveries will define the future of human life and well-being. Biotechnology has enormous potential, and numerous breakthroughs have already been made in the fields of healthcare, food, agriculture, and environmental production.

For the purposes of life science, and in particular the biotechnology industry, the application of science and technology to living organisms and their constituent parts, products and models can be defined as altering living or non-living materials in order to produce knowledge, goods, and services. Color-coded biotechnologies are one of several biotechnology classification schemes.

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Over the years, various ideas have been put forth for the colours that should be used to distinguish between the numerous biotechnological activities. There is a classification system that uses almost every colour in the rainbow, even jokingly, according to Kafarski (2012). Technologies like biotechnology, nanotechnology, and ICT are thought to be the most important drivers of the new knowledge economy. There is a need for a radical shift in the way we think due to global challenges like natural resource scarcity, climate change, population growth, pollution, and environmental disruption from the production of large quantities of hazardous waste and residue. Because of this, biotechnologies have risen to the top of the list of advanced technologies that countries are investing in now to achieve long-term sustainability in the twenty-first century. With the power of this knowledge, fundamental and gradual innovations can be created along with numerous wealth-generating applications for countries (Aghmiuni et al., 2020). Economic recovery, increased research funding, and government initiatives have all contributed to growth in the global biotechnology market in recent years (Barcelos et al., 2018).

2. Literature survey

The company's strategic decisions in biotechnology market cannot be typical, the market is only a "special case" (Aghmiuni et al., 2020). As a result of the research, There is a great deal of uncertainty in biotechnology, which can lead to the discontinuation of an entire product line or reduce the estimated market potential. A biotechnology product's lifecycle could also be prematurely terminated because of challenges stemming from market uncertainties. There is also a high risk of obsolescence in a market where innovations are introduced rapidly. And finally, there is a high risk of failure in a biotechnology product. Finally, because of these difficulties, estimating the prospective market size is challenging. In practise, this implies a wide range of different business models, but there isn't one successful model (Konde, 2009). For industrial firms, the notion that "being creative means surviving in a competitive climate" is perfectly valid. Life science R & D efforts, which are still seeking recognition and reward, power the sector. Biotech medications, vaccines, and diagnostics, for example, contribute to better health and a better quality of life in the healthcare industry. Biotech innovation minimises reliance on petroleum and fossil fuels in the energy and chemical sectors, which benefits the environment. New biotech products reduce our reliance on petroleum (Lokko et al., 2018). Furthermore, it should be made apparent that biotechnology and its advances are essential to modern industry's future (Osmakova et al., 2018).

The ability to innovate is critical for business success and profitability (Wahyuni and Sara, 2020). By utilising biotechnology innovation, the business might generate new knowledge and provide valuable services to customers. As a result of prior studies (Schwartz et al., 2011; Tung and Yu, 2016; Wahyuni and Sara, 2020; Wilson et al., 2014), five critical components of IP were identified.

A biotech company's ability to innovate and sustain a competitive advantage relies heavily on its ability to think creatively (Tung and Yu, 2016). You can create novelty and utility by using innovation.

The improvement of innovation performance is a major focus of innovation leadership. According to the findings of the study (Tung and Yu, 2016), leadership is one of the most important variables in inspiring employee designer thinking, and goal orientation may have an impact on the behavioural tactics people use to achieve their own personal creativity and innovation goals..

Legal protection for proprietary innovations is provided through patents, which are a valuable strategic resource (Renko et al., 2020). Because they protect enterprises from unfair competition and provide them exclusive power over the use and administration of the creation, they're desirable assets for biotechnology firms. Despite the fact that patents don't provide insight into biotechnology's consumer value, they are an important indicator of the field's uniqueness and protection.

It costs a lot of money to execute new ideas in the biotechnology business because of the extensive scientific research, the need to get intellectual rights, and the difficulty of getting new goods to market. To put it another way, funding for diverse operations within the scope of a bio-industrial production project is critical at every step of the project's execution. SWORD financing, business angel financing, and financing from specialist funds for risk financing are the most common forms of funding for innovative biotechnology initiatives.

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In the biotechnology business, forming alliances to pool resources is a common strategy for spurring innovation. Through these inter-organizational networks, scientific knowledge, new technologies, specialised information, and equipment can be shared and learned from (Saravanan V et al., 2016; Sumathi A et al., 2015; K. Sakthisudhan et al., 2021; Y. Harold Robinson et al., 2021; Saravanan V et al., 2015; Saravanan V et al., 2012. Biotechnology SMEs are at the centre of a network of upstream and downstream companies in the innovation process. Intermediaries between upstream partners such as research institutions and downstream partners such as well-established companies with marketing and financial capabilities, they offer value to the chain. In addition, they play a dual function in knowledge transformation and commercialization, which they do well (Kang and Park, 2012).

For a broader perspective, partnerships indicate that ideas and funds are shared more quickly and risks are decreased, as well as the possibility of windfall rewards (Gilding et al., 2020). Strategic alliances and clusters that have influenced the biotechnology ecosystem are typical instances of how to establish strategic partnerships in relation to value chain growth (Wilson et al., 2014). Since bio-industrial companies generate jobs, income, and budget revenue, the leading innovation countries also gain from working relationships between businesses and research centres. Macroeconomically, the bioindustry's hopes are that they will continue to play an increasingly important role in global economic growth going forward. In biotechnological advances, it is important to keep in mind that the widely used model technique and introduction would not work (Vladikov and Radeva, 2016).

3. Methodology

The preliminary study findings from the first large-scale research project devoted to the biotechnology industry innovative performance. At this point, you have done the following tasks:

- Identifying study objectives and challenges
- Formulating hypotheses;
- Conducting a review of the literature
- Consultation with specialists in the field
- Data collection and analysis for secondary purposes
- Develop an innovation model based on a conceptual model.

According to the findings, such a preliminary investigation is critical and determinative for the success of the main study and subsequent pilot testing (Smith et al., 2015). Most notably, it could provide necessary details on how to accurately define a research topic and work with an appropriate methodological approach to the research process.

According to the authors, such a preliminary investigation is critical and determinative for the success of following pilot testing and the conduct of the primary study. Therefore, this study takes their views into account (Smith et al., 2015). Notably, it could provide necessary details about properly defining the issue of interest and developing an appropriate research process. The current study's primary goal is to assess India's status with regard to innovative bio-based industry development.

The following are the research hypotheses:

1) For the years 2015-2020, innovation in biotechnology firms is at a low level.
2) The characteristics whose effect and strength characterize the innovation performance of biotechnology businesses may be found to improve the performance.

The following categories of statistical indicators are necessary to meet the research's objectives: The costs of developing biotechnology innovations.Because of the limits of the innovation approach, this study does not follow the classification of innovations but proposes a new classification of biotechnology sectors.

In the first place, some industries in the classification of inventions are difficult to classify as biotechnology industries and are so classed broadly. It is better to include biotechnology R&D in innovation because innovation suggests research and development in the physical, engineering and biological sciences are classified as industries in biotechnology.

Innovation makes advantage of ambiguous classifications for the biotechnology industry's several subfields. A good example is the combination of agricultural feedstock and chemicals, which should be separated. In the third place, innovation excludes the biology field, which is critical to the biotechnology industry.

This article defines biotechnology as the use of biological systems, live organisms, or their derivatives to enhance the value of materials and organisms in order to achieve long-term sustainability. This article provides a biotechnology fields classification: biological, agricultural, chemical, medical, and R&D in biotechnology as given in Table 1.

Table 1: Biotechnology Industries in India

Innovation Field	Industries
R&D	R&D in Biotechnology
Medical and Manufacturing	Dental Equipment and Supplies
	Electromedical and Electrotherapeutic Apparatus
	In-Vitro Diagnostic Substance
	Irradiation Apparatus
	Medical Laboratories
	Medicinal and Botanical
	Pharmaceutical Preparation
	Surgical and Medical Instrument
	Surgical Appliance and Supplies
Manufacturing in chemical	Basic Organic Chemical
	Cellulosic Organic Fiber
	Cyclic Crude
	Ethyl Alcohol
	Gum and Wood Chemical
	Noncellulosic Organic Fiber
	Pigment
	Synthetic Organic Dye
Agriculture	Fats and Oils Refining and Blending
	Flour Milling
	Malt Manufacturing
	Rice Milling
	Soybean and Oilseed Processing
	Wet Corn Milling
	Fats and Oils Refining and Blending
Agriculture Manufacturing	Agricultural Chemical
	Fertilizer
	Nitrogenous Fertilizer
	Pesticide
	Phosphatic Fertilizer
Biology	Biological Product
	Biomass Power Generation
	Manufacturing

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Biotechnology industries are characterised by the presence of enterprises in geographically close clusters near the source of information, i.e. biotechnology-focused institutions and research institutes. Most previous research has used the Location indicator to estimate an industry cluster or the impact of industries on areas.

Location is limited as a cluster index since it only takes into account the number of employees and does not examine the number of industries, which is directly associated with the definition of a cluster. For the purposes of the LQ index, the term cluster refers to a grouping of industries that come together to share information and expertise in order to produce new synergistic effects.

Similarly, to locate industrial clusters in a region, take into account the number of employees, as this can help explain company size and the industry's impact on employment. If we merely use the number of businesses in the cluster index, the index will not be able to capture the cluster effect's range of firm sizes.

4. Results and Discussion

Biotechnology clusters have been identified in India using the Industry, Employment, and Cluster model, according to the findings of this study. According to the findings, there are distinct trends among the biotechnology clusters based on geography. To conclude, it appears that the cluster index is preferable to the location index when looking for clusters, as clusters are collections of industries, and large industry concentrations are strongly linked to the cluster index.

The biotechnology cluster has a favourable impact on patents after running the regression models, and it is the only significant biotechnology explanatory variable for five models. It's clear that biotechnology cluster growth boosts the number of issued patents by 0.25 percentage points for every 1% rise in the cluster. Biotechnology's location has no bearing on patents (Table 2).

According to this finding, researchers who use the location approach to determine the degree of biotechnology clustering in a region may be overestimating the cluster effect on patent applications. Contrary to popular belief, industries drive patent issuance, whereas employees have less of a connection to patents. This suggests that the differences between the cluster index and the location index can be explained by this.

Another way of saying this is that patents are heavily influenced by industry quotient and the cluster reflects this influence in the index. The location, on the other hand, is unable to take the high industry quotient into account when calculating the index. If we want to look at the association between biotechnology industries and patents, or how much an area has clustered innovation, we should use the cluster index rather than the location index.

Regional Innovation Systems differ depending on the industrial field, as seen in Table 3. Biological clusters have the greatest impact on patents of the five industries studied. Based on this finding, the biotechnology industry is positively related to regional innovation systems. However, researchers who use a classification method that does not include the biotechnology industry, cannot identify a significant impact of biology industries on patents.

Table 2. Ranking of BiotechnologyInnovations – Company

Biotechnology Industries	Mean	SD	Skewness	Kurtosis
R&D in Biotechnology	3.95	1.269	-1.068	.013
Dental Equipment and Supplies	3.80	.984	-.492	-.201
Electromedical and Electrotherapeutic Apparatus	3.66	1.050	-.416	-.653
In-Vitro Diagnostic Substance	3.61	1.184	-.467	-.852
Irradiation Apparatus	3.56	.828	-.739	.725
Medical Laboratories	3.46	1.098	-.342	-.716
Medicinal and Botanical	3.40	1.005	-.866	.481
Pharmaceutical Preparation	3.28	1.281	-.367	-.814

Surgical and Medical Instrument	3.25	.908	-.206	.149
Surgical Appliance and Supplies	3.11	1.340	-.207	-1.057
Basic Organic Chemical	4.29	.759	-.548	-1.073
Cellulosic Organic Fiber	3.83	.837	-1.366	3.233
Cyclic Crude	3.74	1.016	-.025	-1.276
Ethyl Alcohol	3.51	1.026	-.391	-.208
Gum and Wood Chemical	3.39	1.037	-.220	-.426
Non-cellulosic Organic Fiber	3.38	1.131	-.277	-.361
Pigment	3.37	1.112	-.257	-.562
Synthetic Organic Dye	3.30	1.198	-.102	-.809
Fats and Oils Refining and Blending	3.12	1.285	-.225	-.915
Flour Milling	4.74	.564	-2.748	9.240
Malt Manufacturing	4.21	.703	-.325	-.954
Rice Milling	4.05	.972	-.515	-1.004
Soybean and Oilseed Processing	4.03	.951	-.197	-1.573
Wet Corn Milling	3.92	1.039	-.486	-.572
Fats and Oils Refining and Blending	3.74	.935	-.348	-.726
Agricultural Chemical	3.73	1.201	-.662	-.487
Fertilizer	3.69	1.124	-.678	-.084
Nitrogenous Fertilizer	3.48	.970	-.294	.135
Pesticide	3.37	.744	.100	-.285
Phosphatic Fertilizer	4.10	.700	-.243	-.613
Biological Product	3.81	.776	-.393	.297
Biomass Power Generation	3.80	.728	.233	-.920
Manufacturing	3.76	.583	.092	-.442

Table 3: Ranking of Industry Classification

Industry	Mean	SD	Skewness	Kurtosis
R&D	3.37	.744	.100	-.285
Medical and Manufacturing	4.10	.700	-.243	-.613
Manufacturing in chemical	3.81	.776	-.393	.297
Agriculture	3.80	.728	.233	-.920
Agriculture Manufacturing	3.76	.583	.092	-.442
Biology	3.37	1.112	-.257	-.562
R&D	3.30	1.198	-.102	-.809
Medical and Manufacturing	3.12	1.285	-.225	-.915

With a novel Cluster Quotient measure and an analysis of their impact on regional innovation systems, this study sheds light on the cluster characteristic of biotechnology businesses. One of the most significant differences between this study and previous research is that it proposes an entirely new classification of biotechnology industries, one that takes into account the number of industries and workers in order to measure the spatial patterns of biotechnology clusters rather than the Location Quotient, which is commonly used but has a limitation in terms of finding clusters; and this study provides new information on the relationship between biotechnology clusters and employment patterns.

Biotechnology clusters have a significant impact, according to this study. Clusters are better defined by the cluster index, which is more closely aligned with that definition than location, which omits factors such as top-tier industry concentration, size, and industry concentration quotient. In the opinion of many scholars, clusters are defined as a geographic concentration of industries, and thus the cluster index is a better index than the location index to highlight clusters of industries in the regions because it takes into account the number of industries and workers, while the location index only takes into account the number of employees.

An 1% increase in clusters results in a 0.25% increase in patents, demonstrating that biotechnology clusters have a positive impact on patents.It turns out, however, that geographic location has little bearing on the number of patents, suggesting that researchers may be underestimating the cluster effect of biotechnology on patents. As a result of this, scholars should consider biology industries when studying biotechnology industries. This is because biology industries are an important part of the biotechnology industries and have a favourable effect on patents. Scholars may miss the considerable impact of biology industries on regional innovation systems if they don't include biology industries as a biotechnology sector, according to the results of this research.

5. Conclusions

In this study, innovations in biotechnology is regarded as a serious factor that gets influenced by various other factors like government policies, research development polices and collaborative policies with corporates. The study reports the data collected from various respondents of biotechnology firms in India. Based on which, the hypothesis is framed and tested. The research shown significant impact of all the related factors with innovations activities and the implications are provided to advance the flaws associated with innovations.

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