International Journal of Management, IT & Engineering
Vol. 15 Issue 06, June 2025,
ISSN: 2249-0558 Impact Factor: 7.119
Journal Homepage: http://www.ijmra.us, Email: editorijmie@gmail.com
Double-Blind Peer Reviewed Refereed Open Access International Journal - Included in the International Serial Directories Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gate as well as in Cabell's Directories of Publishing Opportunities, U.S.A

Guardians of Innovation: Unraveling the Complex Web of Technology & Innovation and Patents

Dr. Syed Azhar Abbas Rizvi
Associate Professor
Department of BCA
School of Management Sciences Lucknow

Mrs. Shuchi Srivastava
Assistant Professor
Department of BCA
School of Management Sciences Lucknow

Dr. Rajeev Tripathi
Assistant Professor
Department of BCA
School of Management Sciences Lucknow

Abstract

Technological advancement is an inevitable requirement for the growth of any economy. This creates a need for a healthy environment that promotes and protects innovation. This protection of innovation is done through patents.

Objective of the Study

This study explores the intersection between patent law's role and technological advancement. It further delves into the observation that the grant of a patent itself does not mean a boost in innovation rather it is the working of such a granted patent that reflects innovation and developmental progress.

Findings of the Research

The findings of the research work conclude with sufficient evidence that the patent granting has direct and close relationship with the innovation status of any industry. The more innovative an industry aspire to be will be directly proportional to the number of patent protection it can achieve. With the amendments in the patent law in India, as discussed in the paper in detail, it has created a robust environment having a catalytic impact on the adoption of technology and knowledge diffusion, leading in the overall economic development of the economy as a whole.

Research Methodology

For the accuracy and authenticity of the research, the official sites of the Indian Patent Office, WIPO, TRIPS, etc., will be browsed and relied on. To analyze the impact of the patenting regime in India, which is the objective of this research work, the annual reports published by the patent office will be relied on for information regarding the granting and filing of patents. Further, trends in innovation and technology shall be researched with the help of the annual reports published by the Ministry of Commerce and Industry under the government of India.

Since the data for the latest year was not released when the research work started, the data used has been of the previous financial year, that is, 2020-21. Therefore, throughout this paper the current year referred to as is 2022 and the previous year referred to as is 2021.

Practical Implications

This research highlights the importance of an efficient patent system within an economy which enables technological development and innovation adoption framework. The patent system gives incentive to the industries and firms to take up innovative strategies without the risk of exploitation of their innovation by anyone but themselves. Thus, to enable greater technological progress, the patent granting policies should be made abundant and stringent in cases of violation. Legal framework has to be made an enabling factor rather than a restricting one. Government should also devote funds as well as sufficient patent protection to such firms and industries who are in the process or have produced potential and capable technological innovations which becomes harmonious to economic growth. Some of these policies were adopted in the patent amendments, which in line with further policies of relaxation will foster a healthy innovative environment.

Introduction

In today's global economy, intellectual property rights are unavoidable tools. One of India's long-term development initiatives is to stimulate innovation. "An India where Intellectual Property stimulates creativity and innovation for the benefit of all" is the goal of our country's National IPR Policy. Several programs, including Make in India, Start-up India, Digital India, and Skill India, have promoted innovation. The expanding adaptation of patents to protect ideas by corporations and government-backed research groups is directly linked with recent changes in innovation processes, economic situations, and patent regimes in the economies. Scientific and technological advancements have fostered new waves of invention, and innovation processes have migrated away from individual businesses and toward interactions among global stakeholders in the public and private sectors. Changes in patent regimes' legal and regulatory frameworks have resulted in more broad domains of patentable subject matter, as well as stronger and more valuable patents. This has widely impacted the innovation landscape and the ease of protection for such innovations.

Review of Literature

Ever since the international adoption of regularized intellectual property rights through the TRIPS agreement, WIPO, Paris, and Berne Convention, the study of the impact of such protection and exclusivity has been a relevant practice. Researchers tend to bring out the actual outlook of the protection guaranteed by such rights and to what extent they imply in the real sense whether or not they have a deterrent effect on the infringement of intellectual property and how such infringements are dealt with.

One research paper includes Transfer of Innovations: A Case of Working of Patents in India.[1]. This research paper highlights the importance of patents in protecting innovative and technological advancement in the numerous industries that have benefitted from patenting their innovations and disseminating the patented information.

Another research work on a similar path was conducted in 2010 by Sadao Nagaoka, Kazuyuki Motohashi, and Akira Goto in the title – Patent Statistics as an Indicator of Innovation[2]. This study points out that information on patents is increasingly used for the analysis of innovation and its processes, as well as patent statistics are becoming more widely used to measure innovation. In fact, patents were the only source of quality information on new

[1] A Case of Working of Patents in India.Vikram Singh, Kajal Chakraborty.Current Science, Vol. 117, No. 6 (25 September 2019), pp. 1032-1044

[2] Sadao Nagaoka, Kazuyuki Motohashi, Akira. Handbook of the Economics of Innovation, Volume 2, 2010, Pages 1083-1127

technologies which was systematically examined by governments over a long span of time using large amounts of resources.

Another research work in this field was done by Keith Pavitt[3], which aimed at exploring that better measurement of technical change is needed to understand and policy towards technological change. There's no single measure that works perfectly. Together, the statistics on R&D and patent activity give significant indications as to how much innovation is taking place and where it's going.

In summary, the extensive body of literature on patents and innovation underscores a nuanced and dynamic connection between the two concepts. Despite the undeniably crucial role that patents play in stimulating innovation, ongoing discussions persist regarding their influence on knowledge dissemination, the quality of patents, and the capacity of existing systems to accommodate emerging technologies. The ever-evolving nature of the innovation landscape emphasizes the need for continuous exploration and enhancement of the relationship between patents and innovation by policymakers, industry participants, and researchers.

This research work is to fill the void which has been proposed in the past studies which is to find the exact correlation between the current patent regime and the innovation landscape.

Number of Patents Granted

Firstly, we will have a look at the number which were granted by the Indian Patent Office[4]. During the financial year of 2022, a total of 66,440 patent applications were filed with the patent office with an increase of about 13.57% from the previous year (2021). Domestic filing of patent applications was also seen to have increased to 29,508 which was 44.41% of total filing in the current year compared to 41.58% in the previous year. The journey of the previous five years for patent applications filed, examined, granted, and disposed of are given below in the table. Disposal of applications means patents granted and refused by the Patent Office and applications abandoned and withdrawn by the applicants within the expiry period.

Trends in Patent Applications

Year	2017-18	2018-19	2019-20	2020-21	2021-22
Filed	47854	50659	56267	58503	**66440**
Examined	60330	85426	80080	73165	**66571**
Granted	13045	15283	24936	28385	**30073**
Disposal	47695	50884	55945	52755	**35990***

The table indicates that the total number of patent applications filed in 2021-22 is 66,440, an increase of 13.57% compared to 58,503 in the year 2020-21. Throughout the year, the filing of applications in nearly every field of inventions has demonstrated a moderate to substantial increase, particularly in the fields of Computer Science & Electronics, Communication, Mechanical and Electrical, as reported by the Indian Patent Office in its annual report for 2022.

[3] Keith Pavitt, R&D, patenting and innovative activities: A statistical exploration, Research Policy, Volume 11, Issue 1, 1982, Pages 33-51, ISSN 0048-7333, https://doi.org/10.1016/0048-7333(82)90005-1.

[4] Office of the Controller General of Patents, Designs, Trademarks and Geographical Indications, 2021-22, Annual report.

The Number of Patent Applications Examined

In the year 2021-2022, the Patent Office examined a total of 66,571 patent applications compared to 73,165 applications examined in the previous year. The diminution of approximately 9% was primarily attributable to the circumstances arising from the COVID-19 pandemic. Various protocols and amendments were implemented to address the unprecedented situation and safeguard the economic and innovative landscape of the country.

The Number of Disposal of Request for Examination (RQ)

In this year, 35,990 requests for examination were disposed of, compared to 52,755 in the previous year. This indicates a 31.78% decline in disposal, which is a good indicator for the economy. This decline in adaptation is attributed to the extension of the prescribed period of limitation by The Hon'ble Supreme Court of India. A disposal includes applications granted, refused, abandoned under section 21(1) of the Patent Act of 1970, and withdrawn thereof.

The Number of Patents Granted and in Force

The total number of patents granted during the year was 30,073, out of which 6,397 were given out to the applications filed by Indians. The number of patents granted during the current year has increased by approximately 6% compared to the number granted in the year 2020-21 (28,385) As of March 31, 2022, there were 1,15,916 patents in force, of which a majority, 19,700, belonged to Indian patentees.

The above given data has also been presented in the form of a table given below for better understanding:

Year	Requests for Expedited Examination filed				PatentGranted				Refused			
	Start ups	Applicants for ISR	others	Total	Start ups	Applicants for ISR	Others	Total	Start up	Applicants for ISR	Others	Total
2017-18	136	162	NA	298	17	39	NA	56	8	1	NA	9
2018-19	294	318	NA	612	102	187	NA	289	34	23	NA	57
2019-20	408	311	304	1023	189	235	5	429	53	57	0	110
2020-21	433	331	802	1566	252	212	283	747	57	48	24	129
2021-22	548	411	1554	2513	49	65	143	257	4	3	14	21
Total	**1819**	**1533**	**2660**	**6012**	**609**	**738**	**431**	**1778**	**156**	**132**	**38**	**326**

Reasons of the Increase in Patent Filing

It can be observed that there was a substantive increase in the patent filing in the year 2022 from 2021 across a lot of factors and components. Now, we delve into a more important aspect which is what were the possible reasons for the increase in the filing of the patent applications. The following reflections as enlisted by the Indian Patent Office are considered for the increase. They are as follows:

Amendments in the Patents Rules

One of the most important reasons for this is that the Patents Rules have been amended in 2016, 2017, 2019, and 2020 in order to simplify the processes for removing procedural inconsistencies and to foster the granting of patents.

By altering the regulation, certain categories of applicants, including startups, micro- and small-scale enterprises, and female applicants, were provided with incentives, such as fee rebates and the option of expedited review, to encourage IP registration in crucial sectors for

the country. During the course of the year, the Patents Rules, 2003 were amended on September 21, 2021, with the aim of reducing the official fees owed by educational institutions for patent filing and prosecution by 80%, acknowledging their significance in the innovation and IP ecosystem of the country and encouraging greater participation. These revisions contribute to the development of a patent filing culture in the country, which increases the protection afforded to inventions created by various companies, resulting in overall technical and economic improvement.

Coincidence of Innovation with Growth

Now, we will discover the other aspect of the research work which is to understand the role of innovation in the growth of a nation. For this purpose, we must first delve into the question that why is innovation required?

Innovation has emerged as a pivotal factor in the advancement of economic growth, however, it has taken a considerable amount of time for economists and policymakers to comprehend this phenomenon. Adam Smith, the founder of modern economics, was among the first to contemplate the significance of modern individuals in implementing technological advancements in factories and society. His thesis stated that it was an inquiry into the nature and causes of national wealth. Nonetheless, it failed to incorporate innovation and its constituent elements in the computation of the outcomes. Instead, he offered a simple understanding of wealth creation as output(O) based on capital(K) and labor(L).

$$O = f(K, L)$$

Nevertheless, it was a faulty and incomplete measure of the real potential of a market. Robert Solow, in 1956, argued that the expansion of labor and capital on its own is insufficient to explain the bulk of economic expansion. He argued that technological advancements enhanced the effectiveness and profitability of production elements, such as human and financial resources. Solow's neoclassical growth model shows that residual A (technical progress) accounts for most economic expansion.

$$O = A\, f(K, L)$$

As a result, it is possible to state that innovation in the accumulation of knowledge and the enhancement of human capital will encourage economic expansion. The same thing happens when economic expansion boosts knowledge and enhances the value of human capital. Thus, there exists a dual causal link between economic expansion and technological advancement, but the direction and intensity of this connection vary depending on the country's progress.

Results

Coincidence of Patents and Innovation

Having established the influence of technological development in the economic progress of an economy, we can now begin to analyze the inter-dependence of the patent filing and technological growth. To establish this fact, the following data can be studied:

Indian Applicants Filing Patent Applications State-Wide

When we look at the state-wise fining of patent applications domestically to see how it relates to innovation, the Indian Patent Office's annual report shows that Tamil Nadu had the most ordinary applications filed by Indian applicants in 2021-22. Maharashtra and Uttar Pradesh were next. This year, Tamil Nadu had more applications than last year and is now at the top of the list. States like Karnataka, Punjab, Telangana, and Haryana, union territories like Chandigarh, Jammu & Kashmir, and Daman & Diu, also increased the number of patent

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Journal Homepage: http://www.ijmra.us, Email: editorijmie@gmail.com
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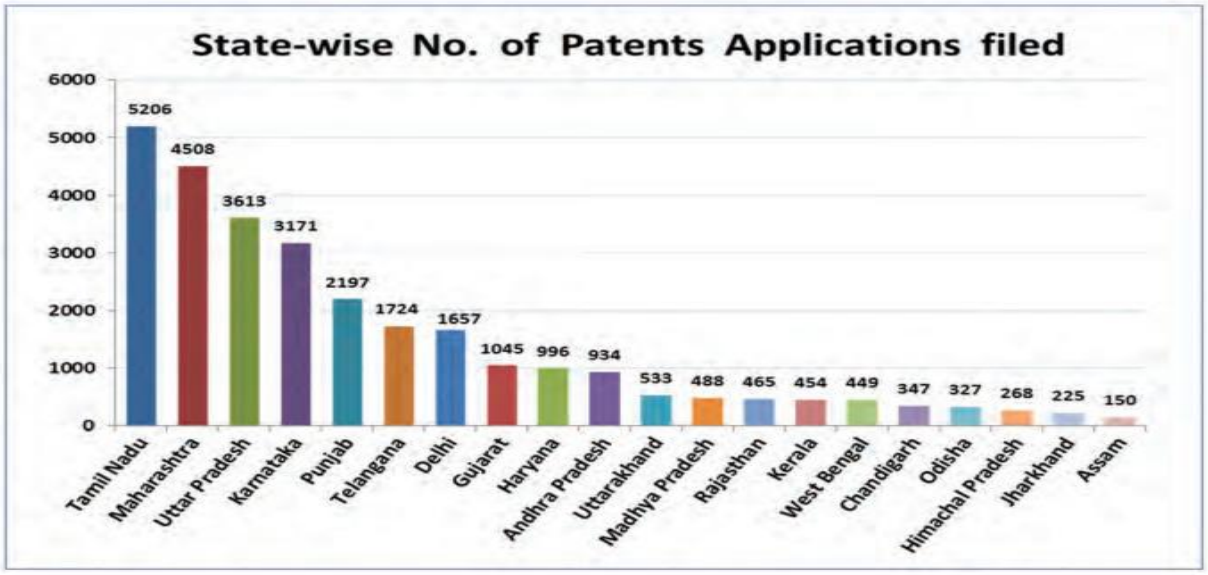
applications submitted by Indian applicants. The number of patents filled in each state and union territory is shown in the following diagram:



To substantiate the point of focus of the paper further, let us have a look at the innovation analysis published by the NITI AYOG for the year 2021-22[5] under the India Innovation Index:

Major States		
States	III 2021	Rank
Karnataka	18.01	1
Telangana	17.66	2
Haryana	16.35	3
Maharashtra	16.06	4
Tamil Nadu	15.69	5
Punjab	15.35	6
Uttar Pradesh	14.22	7
Kerala	13.67	8
Andhra Pradesh	13.32	9
Jharkhand	13.10	10
West Bengal	12.98	11
Rajasthan	12.88	12
Madhya Pradesh	12.74	13

Discussion and Conclusion

Having seen the data for the patent filing and innovation index, we can make the following inputs: The top performing states in the filing of patents were the same as the ones with the highest rankings in the innovation index as well. Tamil Nadu, Maharashtra, Uttar Pradesh, Karnataka and Telangana, were the states with the highest number of patent filing. While Karnataka, Telangana, Haryana, Maharashtra, Tamil Nadu, Punjab and Uttar Pradesh, were among the highest ranked in the innovation index.

[5] National Innovation Foundation Annual Report, NITI Ayog, (2021-2022), g

We can now, easily identify the notion that the states which have performed better in the innovative parameter had higher number of patents filed within them.

STATE	PATENT FILED	RANK IN INNOVATION INDEX
Tamil Nadu	5,262	5
Maharashtra	4,566	4
Uttar Pradesh	3,622	7
Karnataka	3,222	1
Punjab	2,197	6
Telangana	1,750	2

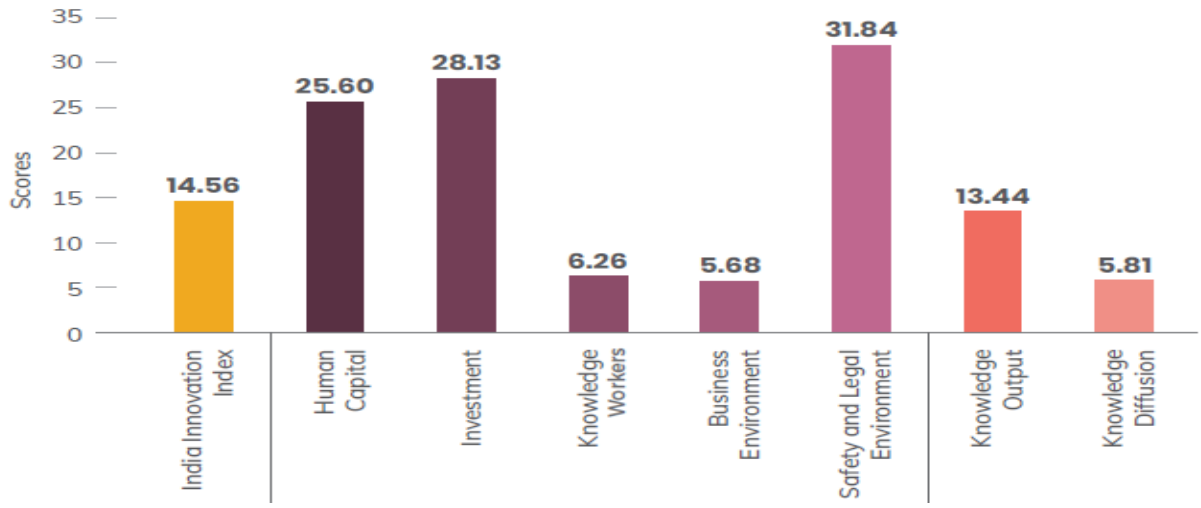
After having established that patent filing boosts innovation in the states as it gives the private and public level industries and firms enough incentive to take up R&D and other technological advancements for the overall efficiency and effectiveness of either some already existing process of development or the invention of some new better category of products[6].

Conclusion Points

Now, let us have a deeper understanding as to why this happens. Why does patent filing have a direct relationship with the innovative performance of the states, and the economy as a whole[7]. It is clear to us that patent grant exclusive exploitation rights to the owners for their innovation and process of development. This gives them a surety of results in a sense that only they will have a legal right to preserve and gain benefits from their development. This allows the industries to invest heavily in the R&D and innovation strategies to improve the already existing technology and also to develop better technology. The risk factor as such gets minimized where even after successive failures and ineffective trials to find such innovations, once the desired results as sustained, it is only available to the owner and developers of such technology and innovation to exploit the benefits as a reward for the risk factor they have undertaken.

This can also be justified in the findings of the NITI AYOG in the Indian Innovation Index 2021-22 where it has analyzed the various factors which have influenced the taking up the more innovative line and stand out in the innovation and developmental landscape.

[6] Hemantkumar, P. B., Shailesh, G. and Porey, P. D., Commercialization of technology: innovations and patents – issues and challenges. Tech Monitor, 2010, pp. 12–18.
[7] Sadao Nagaoka, Kazuyuki Motohashi, Akira. Handbook of the Economics of Innovation, Volume 2, 2010, Pages 1083-1127



Some important factors here include things like human capital, investment, business environment, knowledge output and diffusion, and others, play a very significant role in influencing the innovation framework. Human capital is a source of innovation, knowledge and skills necessary for the economic growth of a region. Education levels and standards are important determinants of a country's innovation capacity.

The role of investment in a region is significant, influencing the pace of innovation in the area. A column has six characters, separated into two sub-columns. Developing and enhancing, enhancing the marketplace. Entrepreneurs and investors often take into account the business environment before making investment decisions.

A thriving business scene draws in foreign capital to the area. It accurately reflects both internal and external influences on the local economic scene. The surge in new ventures, patents, designs for machines, production and ingenuity in the country is a result of a more favorable business environment that encourages individuals to establish fresh enterprises.

Knowledge exchange reflects a country's ability to absorb knowledge. There are usually two sub-columns. Share knowledge, innovative products and services. The pillars represent the nation's efforts to develop from a focused concept to an innovative one.

However, it should be noted that all other factors, security and the legal environment had the greatest weight. A strong regulatory and security environment allows the government to leverage the region's innovative environment to attract investment and increase growth.

Therefore, it follows from this study that a good patent system and the rapid adoption of patents in an economy are strong and accurate indicators of innovation and technological progress in an economy, which influence overall economic development and growth.

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