An Analysis on Growth Dimensions of Patent in Indian Economy with Special Reference to Chemical, Pharmaceutical and Food Sector

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Abstract: R&D expenditure in India has increased over time, contributing indirectly to the country's economic growth. However, there appears to be a weak correlation between R&D expenditure and the number of patents granted. This study aims to analyse the impact of patents granted and applied for in the Indian economy, focusing on the growth of patents in three key sectors: Pharmaceuticals, Chemicals, and Food. To enhance patent granting, certain policy measures need to be implemented, with a particular focus on improving ease of patenting. The gap between R&D expenditure and patent grants needs to be identified, and appropriate solutions must be proposed to address this issue.

INTRODUCTION

One of the most important factors of economic growth is technological development. Which not only increases the productivity but also increases the level of output. Among those factors one such is patents covered by Intellectual Property Rights (IPR) which encourages the inventors by providing them property rights over their inventions. Intellectual property rights include Patent, copyright, trademark, industrial design, Geographical indication.

Intellectual Property Rights

Intellectual Property Rights are intangible in nature and which gives special rights for the inventors or creators for their valuable creation or invention. The main objective of Intellectual Property Rights is to encourage the creation of wide variety of intellectual goods. India is a country with 1.33 billion population with the aspiration to build intellectual, inclusive and sustainable knowledge based innovative society. The culture of IP in India roots from centuries the efforts to stimulate a change in the society for meeting both domestic and overseas needs are to be sustained. India signed the Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement on 15 April 1994 to set up minimal standards, procedures and remedies to protect IPRs.

India's realisation on Intellectual Property

1. Issue of Turmeric Patent - Turmeric is an herb grown in east India. Turmeric powder is used in India as medicine, a food ingredient and a dye to name few of its uses. United States awarded patent on turmeric to University of Mississippi medical centre in 1995 for wound healing property. An exclusive right has been granted to sell and distribute. Two years later, India's Council of Scientific and Industrial Research challenged the University regarding the novelty of the discovery. The USPTO cancelled the patent due to lack of novelty.

2. Issue of Basmati rice Patent- Basmati rice is a famous cereal of India and is well known for its fragment taste. It was granted Patent in 1997. It is the rice, which is grown in Basmati region of India possessing its fragment taste. This rice was well developed by Indian farmers over hundreds of years, but, a Texan company obtained a patent for a cross breed with American long-grain rice. The US granted a patent to the company on the basis of aroma, elongation of the grain on cooking and chalkiness and since then the company can charge the farmers to grow the rice and not allow planting the seeds for the following year's crop. This made India to realise and file a petition with scientific evidence in the United States Patents and Trademarks office saying that most varieties of Basmati possess these qualities. The USPTO accepted the petition.

3. Issues of Neem Patent -W.R. Grace and the Department of Agriculture, USA has first filed a patent in European Patent Office. In 1994 EPO granted the patent. This is a method of controlling fungi on plants comprising of contacting the fungi with a neem oil formation. A legal opposition have been filed by Indian against the grant of Patent. The opponents submitted evidence that hydrophobic extracts of neem seeds were known and used for centuries in India, both in curing dermatological diseases in humans and in

protecting agricultural plants from fungal infections. Since then, traditional Indian knowledge is in public. The EPO identified the lack of novelty, inventive step and possibly form a relevant prior art and revoked the patent. In addition to this patent, several other patents dealing with neem are pending.

Patent

A patent is protection granted by a national government for an invention. It is an exclusive right given by a country to the owner of an invention to make use, manufacturing and market the invention. Provided the invention satisfied. This protection excludes others from making, using or selling an invention for a period of up to 20 years.Before the creation of WTO in 1995, individual countries were free to have their patent laws. India was one of the developing countries which took advantage of freedom and replaced the British patents

Patent Cooperation Treaty

Rights arising from a patent can only be claimed in countries in which that patent is granted (territoriality). In order to obtain patent protection in multiple countries, applicants may either file individual applications in each country or follow different application or registration routes. The Patent Cooperation Treaty (PCT) is an application system, managed by the WIPO, which allows filing one single international patent application that has the same effect as national applications filed in separate PCT states. Through the PCT route, applicants enjoy the benefit of filing one application, in one language paid for in one currency (CHF) in more than 150 countries.

Requirements for patentability

1. Usefulness/Utility - The claimed invention must be useful/functional. A machine must work according to its intended purpose and a chemical must exhibit an activity or have some use.

2. Novelty -The invention must be different than anything known before; it must not have been described in a prior publication and it must not have been publicly used or sold.

3. Non-obviousness/Ingenuity -The invention must be a development or an improvement that would not have been obvious beforehand to workers of average skill in the technology involved.

Patent and its Types

1. Process Patent

The process patent is a unique process to create a product. The product itself might not be unique. There are many processed Patent for a single product. It's suitable for manufacturing industries.

2. Product Patent

The product patent is a unique product. The inventor of the product, after getting the product patented always has rights over it, regardless of the process through which it was created. Most of the technological firms choose product patent to protect the technological inventions.

TRIPs follow the product Patent regime.

India's 1970 Patent Act allowed only process patent before it was amended in 2005 to comply with WTO's TRIPs provisions under which there is only product patents.

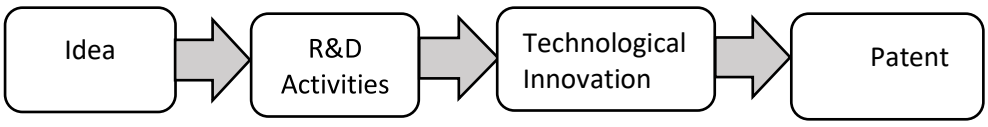
3. Other types of Patents

1. Utility patents - issued for any process, machine, article of manufacture, or compositions of matters, or any new useful improvement. In general, this type of patent protects the way an item is used or works.

2. Design patents - issued for a new, original, and ornamental design for an article of manufacture. In general, this type of patent protects the appearance of an item.

3. Plant patents - issued for asexually reproduced, distinct, and new variety of plants.

Patent – R&D relationship



Leading theories of invention protection

Table 1 Leading theories of invention protection

Category	Theory	Description
Morality based	Property-rights theory (natural law theory)	Ideas originating in the minds of individuals can, in accordance with natural law, be possessed by the creator. This right should be recognised and protected by society. Exclusive rights are a rational means of protecting property rights.
	Reward theory	Ideas originating in the minds of individuals can, in accordance with natural law, be possessed by the creator. This right should be recognised and protected by society. Exclusive rights are a rational means of protecting property rights.
Public interest based	Disclosure – compensation theory	Society makes a contract with inventors. Inventors are awarded a temporary monopoly, and in return must make their invention public.
	Incentive theory (invention- encouragement theory)	The provision of the opportunity to earn a considerable amount of profit gives an incentive to inventors, corporate managers, and investors to develop new products.
	Excessive – competition – prevention theory	By awarding a monopoly to the inventor alone, excessive competition between companies and countries is prevented and disciplined competition is maintained.
	Intellectual – creation – cycle theory	The more the intellectual creation cycle (under which society protects, uses, and reinvests intellectual property) expands and the faster it revolves, the more powerful an engine it will be for economic and social development.

History of Patent in India

Table 2 History of Patent in India

Year	Event
1856	Act for protection of inventions on the basis British law of 1852
1859	Patent monopolies called exclusive privileges
1872	Patent and Designs Act
1883	Protection of invention Act of 1888 Inventions and Designs Act 1911-1947 modern patent era by patents and Designs Act. First time an authority call controller general of patents appointed
1959	Justice Ayyangar's report
1967	Patent Act bill introduced in the parliament
1970	The Patent Act passed by the parliament
1972	The patents Act – 1970 came into force on April 20, 1972

1994	Amendment by ordinance to include Exclusive Marketing Rights (EMR)
1999	Amendment passed by the parliament. New patent Amendment bill referred to select committee
2003	Patents Act 1970 with second amendment comes into force
2005	Patent 1970(2005Amendment) comes in to force from 1-1-2005.

STATEMENT OF THE PROBLEM

Patent plays a vital role in economic growth and it is an exclusive right granted by a government for an invention and way of acquiring patent will promote research and development and encouraging economic development. There is a need for analysing the growth, promotional measures and dimensions of patents in India so as to get an in-depth knowledge about this crucial component of modern technological progress. Hence the present study.

OBJECTIVES

1. To identify the relationship between research and development expenditure and growth of Patents in India.
2. To study the growth of Patents in Chemical, Pharmaceutical and Food Sector in India.

Research and Development Expenditure and Percentage of Patent Granted in India.

Table 3 Research and Development Expenditure and Percentage of Patent Granted in India

Year	R&D Expenditure (Rs In Crores)	Patent Granted (Percentage)
2001-2002	17038.15	15.02
2002-2003	24117.24	12.02
2003-2004	29932.58	19.57
2004-2005	34238.39	10.94
2005-2006	39437.77	17.62
2006-2007	47355.38	26.05
2007-2008	53041.3	43.48
2008-2009	60196.75	43.62
2009-2010	65961.33	17.98
2010-2011	73982.79	19.05
2011-2012	79355.89	10.14
2012-2013	85326.1	9.44
2013-2014	94516.45	9.84
2014-2015	87473.44	13.97
2015-2016	95452.44	13.48
2016-2017	103099.26	21.66
2017-2018	113825.03	27.25
2018-2019	124740.14	30.16
2019-2020	132567.01	44.31
2020-2021	127380.96	48.51
2021-2022	127377.05	45.26

Source: Research & Development Statistics Department of Science & Technology, Ministry of Science & Technology, Government of India. Annual Report from the Office of Controller General of Patents, Designs, Trademarks and Geographical Indication.

Descriptive Statistics

The study analysed the average grant and research and development expenditure (R&D) values across 21 observations. The mean grant value was 10,041.43, while the mean R&D value was 114,460.69. The standard deviation for grant was 8,722.531, indicating wide variation from the mean. The standard deviation for R&D was 178,020.081, indicating significant

variability in R&D expenditures and their impact on the overall study.

Table 4 Descriptive Statistics

Variables	Mean	Std. Deviation	N
Patent Granted	10041.43	8722.531	21
R&D	114460.69	178020.081	21

Table 5Correlation Analysis

Test		Patent Granted	R&D
Patent Granted	Pearson Correlation	1	.046
	Sig. (2-tailed)		.844
	N	21	21
R&D	Pearson Correlation	.046	1
	Sig. (2-tailed)	.844	
	N	21	21

The correlation matrix between the variables "Patent granted" and "R&D" is interpreted as weak or negligible, with a Pearson correlation coefficient of 0.046. This value is close to zero, indicating a weak or negligible linear relationship. The p-value associated with this correlation is 0.844, suggesting that it is not statistically significant. The sample size for this correlation is 21 observations for both variables. The result suggests that the weak correlation observed could be due to random chance rather than a true relationship. Therefore, there is no strong evidence of a linear relationship between the amount of patent granted and the R&D variable in the sample.

Comparative analysis of patents granted among the selected sectors

Table 5 Comparative analysis of patents granted among the selected sectors

Year	Pharmaceutical Sector (in percentage)	Chemical Sector (in percentage)	Food Sector (in percentage)
2001-2002	3.57	1.87	2.22
2002-2003	3.48	1.55	4.14
2003-2004	4.67	2.36	6.80
2004-2005	2.14	2.22	4.14
2005-2006	5.10	4.43	6.25
2006-2007	8.91	7.73	15.09
2007-2008	10.10	10.34	9.52
2008-2009	13.47	9.23	6.00
2009-2010	5.91	5.52	4.45
2010-2011	6.65	7.38	5.19
2011-2012	3.14	4.54	1.29
2012-2013	3.84	5.01	2.28
2013-2014	2.85	4.31	3.15
2014-2015	4.34	5.95	2.97
2015-2016	4.13	6.52	1.98
2016-2017	3.91	10.34	4.39
2017-2018	26.74	53.22	30.81
2018-2019	28.36	6.46	17.67
2019-2020	34.32	93.26	10.26
2020-2021	158.00	68.95	27.39
2021-2022	64.04	82.71	33.91

Source: Annual Report from the Office of Controller General of Patents, Designs, Trademarks and Geographical Indication.

FINDINGS AND CONCLUSION

Research and Development Expenditure on Education by centre, State, Private, and Higher Education was increased in a Decreasing rate. Because the Economic Growth of the India was tremendously increasing as compared to it R&D Expenditure was insufficient.

The Pharmaceutical sector shows fluctuations over the years. It started at 3.57% in 2001-2002 and peaked at 13.47% in 2008-2009. The sector's contribution had its lowest point in 2011-2012, with only 3.14%, suggesting possible market changes or competitive pressures during this period.

The Chemical sector experienced gradual growth over the years. It began at 1.87% in 2001-2002 and saw an increase, reaching its peak at 10.34% in both 2007-2008 and 2016-2017.This steady increase suggests that the Chemical sector became more prominent over time, indicating possible expansions or increased demand in chemical-related products.

The Food sector showed a significant increase from 2.22% in 2001-2002 to 15.09% in 2006-2007, marking the highest point during the entire period. After this peak, the sector's contribution generally decreased, with fluctuations, and settled at 4.39% in 2016-2017. This suggests that after a period of rapid growth, the Food sector either faced market saturation or competition from other sectors.

Indian Patent Law was amended in compliance with the TRIPS agreement after India became a signatory to the TRIPS agreement. As a result, many sectors started investing in India. The R&D Expenditure has increased so far, where Research & Development process in India has indirectly increased the economic growth of India. But there is very less relationship between R&D Expenditure and patents granted. However, patents are granted from the patents filed this is due to the various policies and promotional measures.

Thus, certain steps need to be taken or to be concentrated to increase the granting of patents through ease policies. The gap between R&D Expenditure and granting of patents need to be identified and solutions to be given.

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