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### RESEARCH ARTICLE

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### TRENDS IN IPRS IN INDIA WITH A SPECIAL FOCUS ON PATENTS-AN ANALYSIS

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#### Manuscript Info

##### Key words:-

Inventions, Applications, Patents, Trade Marks, Designs, Geographical Indications, Institutes, Universities

#### Abstract

This study makes an attempt to analyse the trends in India's Property Rights (IPRs) with a special focus on Patent rights. Initially, the trends in the applications for IPRs such as Patents, Trademarks, Design and Geographical Indications are examined during the period 2008-09 to 2017-18. The average number of filed applications in trademarks are higher (207349.6) than other forms of IPRs like Designs, Trademarks and GIs during the study period 2008-09 to 2017-18. Further the number of Patent applications filed from 2013-14 to 2017-2018 under major fields of inventions are also analysed. The results reveal that in mechanical and chemical fields significant number of Patent applications are found during the period 2013-14 to 2017-18. Lastly this study also analyse the number of Indian applicants for Patents from Institutes and Universities during the period 2008-09 to 2017-18. The number of applicants from Indian Institute of Technology (all IITs) have significantly increased from 152 to 540 during 2011-12 to 2017-18. Similarly the number of applicants from Indian Institute of Science (IIS) have constantly grown during the study period from 21 to 58, which indicates more scientific development in India. Finally it is interesting to note that 17 private universities have applied for the patents, which indicates the rapid growth of them during recent decade in India. This study also exposed that the total number of total Indian applicants for Patents from Institutes and universities have significantly increased from 196 in 2008-09 to 1300 in 2017-18. All the conclusions suggest that there is an immense need for further growth of research in science and technology and wide spread expansion of business in all sectors

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**Introduction:-**

As an engine of economic growth, Intellectual Property Rights (IPRs) contribute a lot for the rapid economic development of any economy. PRs work as an intangible asset that plays a vital role in the socio, economic and technological eco systems. Thus the creation and protection of IPRs is very important for the sustainable growth of the economy.

All over the world, the Intellectual Property Rights are accepted since they provide incentive to the individual for new creations, provide due recognition to the creators and inventors, ensure the material reward for intellectual property, ensuring the availability of the original products. For acceleration of economic growth and advancement in technology sector, protection of Intellectual property is very important. Besides IPRs are very beneficial for the growth and expansion of business in the field of technology. IPRs can be classified into four types namely Patents, Designs, Trademarks and Geographical Indications.

**Patents:**

Patent means it is an official right to be the only person or an organisation is allowed to make or sell a new product for a certain period of time. There are three major types of patents.

1. Design patents: Anyone who creates a new design for a product can apply for a design patent. Examples are ornamental designs, beverage bottles or furniture.
2. Plant patents: Botanists involved in grafting and creating new hybrid plant forms can apply for a plant patent. Examples are the Smooth Angel rose or Drought-Tolerant and Pest Resistant Seeds.
3. Utility patents: Anyone who invents any new and useful process, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof can apply for a utility patent.

**Design:**

Industrial design is the title granted by an official authority, generally the Patent office, to protect the aesthetic or ornamental aspect of an object. This protects exclusively the non-functional features of an industrial product and does not protect any technical features of the object to which it is applied. Industrial design rights are granted to the creator of designs to reward them for their effort and investment in manufacturing the product. These rights enable the owner to make articles to which the design is applied. The holder of this legal title has the special right to make, import or sell any objects to which the design is applied. They can permit others to exploit the design and bring a legal action against anyone using the design without authorisation. In general the period of protection granted is from 10 to 25 years.

**Trademark:**

Trademark is a name or symbol on a product that shows it was made by a particular company and that it cannot be used by other companies without permission. Trademarks are issued for a predetermined period of time, but they can (in the proper circumstances) be renewed. A trademark protects something that is used to identify where a product or a service comes (origin) from. An example of a trademark would be a corporate identity, such as a logo, which is placed on products to inform consumers that the product is originated from that particular company.

**Geographical Indication(GI):**

A Geographical Indication (GI) is a name or sign used on products which corresponds to a specific geographical location or origin (e.g. a town, region, or country). The use of GI, as a type of indication of source acts as a certification that the product possess certain qualities, is made according to traditional methods or enjoys a certain reputation, due to its geographical origin. Industrial design renders an object attractive or appealing thus including its marketability and adding to its commercial value. The design may be associated with the shape, surface of the object, colour, novelty, originality and appeal are essential if an industrial design is to be patented

**Review Of Literature:**

Some of the studies on intellectual property rights are reviewed as follows:

Livia Iliea (2014) made an attempt to analyse the intellectual property rights from an economic perspective. This paper discussed the views of prominent economists in relation to the positive and negative impacts of the intellectual property systems. It also assesses the role of IPR as a barrier to entry and a mean to restrict competition and to favour monopoly situations.

LalitJajpura, BhupinderSingha and Raj Kishore Nayak(2017) undertaken a study which is mainly based on secondary data. This paper presents an overview of the innovation policy framework in India in order to assess its role in innovations and enterprise development in the Indian industry during the period 2008-09 to 2017. India's innovation strategies have been guided by the policy statements of Science & Technology, whereas the industrial policy statements have given direction to the development of manufacturing enterprises over a period of time. These twin processes have tried to ensure that India is able to develop a vigorous manufacturing base and at the same time build a sound S&T infrastructure and create a high-skilled manpower base. This study examines the Indian scenario with respect to technological capability of its industry and draw suggestive international comparisons. It also devotes more focus on the emerging issue of innovations in the SME sector in India and discuss in detail technological interventions in two traditional industry clusters in India. Finally, it highlights the existing bottlenecks in India's innovation system and suggest certain measures.

SrinivasaRao(2014) in his study focussed on the overview of Intellectual Property Rights (IPRs) in India and their trends. The IPR trends during the period 2003-13 reveals that the approved rate of designs and trademarks registrations were significantly higher than the granted patents in India. Though, the patents (63.26%) have generated huge revenues than the designs, trademarks and GIs over last decade. Total number of patent grants over the last 10 years was 69,745 out of which 21.71% were granted to Indians and 78.29% were to foreign applicants. In filing patents, Maharashtra, Delhi and Southern states are leading. Streams like chemical and mechanical engineering have produced highest number of patents whereas bio-technology and foods field were at the low preference. This paper also deals with the patent grants in Asian countries in Japan, Korea and Taiwan. China has shown massive interest in patent filing in recent years and the overall patent grants during last 12 years of his study.

AshishArora in his study made to explain the issues relating to international technology transfer and raises some basic challenges. He summarized some quantitative estimates of the international flow of technology. This study also provides an analytical framework for how IPRs may condition the international flow of technology and provides a short discussion of the key conceptual and data-related challenges. This is followed by a very brief overview of empirical papers in Economics on the relationship between IPRs and international technology transfer. Lastly the author summarises the potential areas for further research in developing countries on some of the topics related to IPRs.

Albert has conducted a review of the Economics literature on the relationship between IPRs and the international transfer of technology in the context of developing countries. The thoughtful research agenda that he set out will no doubt be a useful guide for empirical researchers working in this area. The author's comments will largely involve elaborating on some of the themes touched upon in Arora's paper and also highlighting some of the conceptual and measurement challenges researchers often find themselves wrestling with in this literature. This study further tries to bring out some of the empirical observations of the experiences of the newly industrialized East Asian economies and China.

### **Research Methodology:-**

This study mainly focussed on the following objectives. They are aimed -

1. to analyse the trends in the number of applications filed, examined, registered and disposal of patents, design, trademarks and geographical indications from 2008-09 to 2017-18,
2. to examine the number of Patent applications filed from 2013-14 to 2017-18 under major fields of inventions and
3. to study the Indian applications for patents from different Institutes and Universities during the period 2008-09 to 2017-18

This study is mainly based on secondary data and the study period is confined to 10 years i.e from 2008-09 to 2017-18. The data for this study has been collected from Intellectual Property India, Annual Reports, Published by Government of India, Ministry of Commerce and Industry, Department of Industrial Policy and Promotion.

Using the excel sheet, the averages and percentages are calculated at various levels and appropriate figures are drawn to analyse the time series data.

### **Data Analysis:**

All three objectives of the study are analysed under this heading.

Initially discussion starts with the first objective to understand the status of intellectual property rights and different types of Patents. Subsequently second and third objectives are analysed to understand the status of Patent applications indifferent (9)fields and to assess the increase in the numberof Indian applicants for patents from institutes and universities. The entire analysis provides a macro picture about growth of the economy in different dimensions like Science and Technology(S&T), Research and Development (R&D), primary sector, industrial (secondary) sector& service sector and business sector. Increase in the number of applications for IPRs represents the growth of the economy indirectly, therefore it can be taken as a proxy to the overall development of the country.

#### **Trends in Applications for Intellectual Property Rights-2008-09 to 2017-18:**

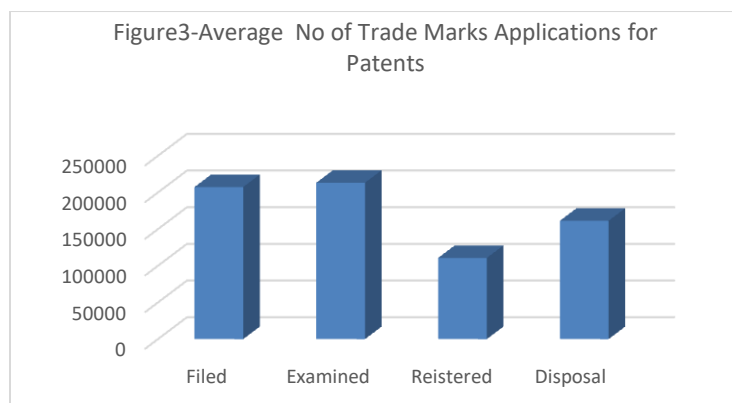
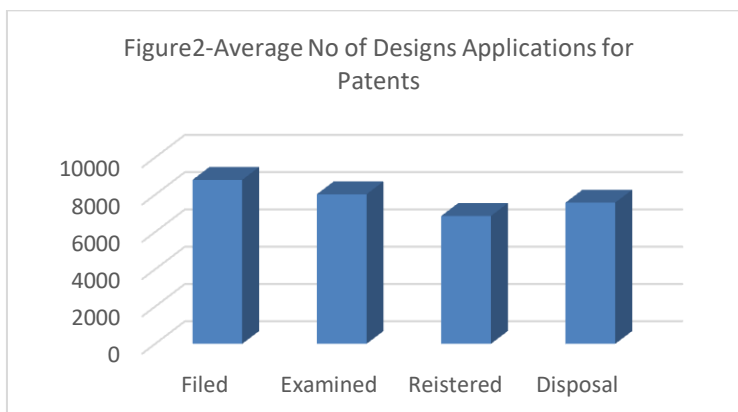
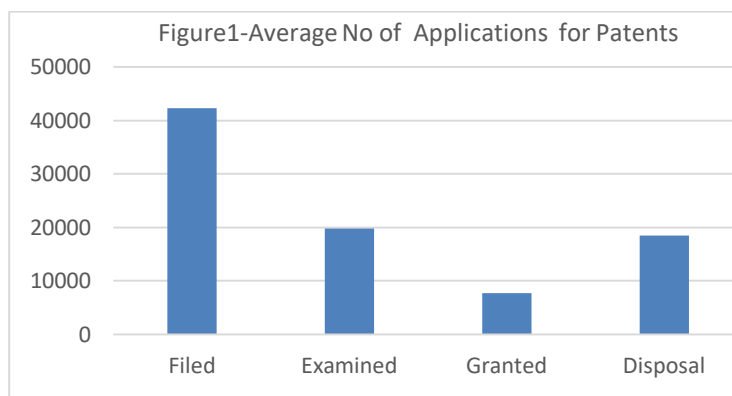
The Trends in Applications for Intellectual Property Rights namely patents,trademarks,designs and geographical indications during the period 2008-09 to 2017-18 are analysed (Table1)below.The number of applications Filed, Examined, Granted and Disposed for different Intellectual Property Rights are considered for this study.

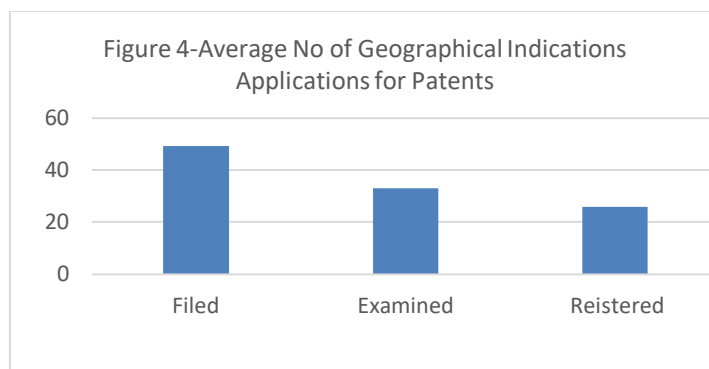
**Table-1:-** Trends in Applications for Intellectual Property Rights-2008-09 to 2017-18.

<b>PATENT APPLICATIONS</b>											
<b>Year</b>	<b>2008-09</b>	<b>2009-10</b>	<b>2010-11</b>	<b>2011-12</b>	<b>2012-13</b>	<b>2013-14</b>	<b>2014-15</b>	<b>2015-16</b>	<b>2016-17</b>	<b>2017-18</b>	<b>Average</b>
Filed	36812	34287	39400	43197	43674	42951	42763	46904	45444	47854	42328.6
Examined	10298	6069	11208	11031	12268	18615	22631	16851	28967	60330	19826.8
Granted	16061	6168	7609	4381	4126	4227	5978	6326	9847	13045	7776.8
Disposed	17136	11339	12851	8488	9027	11411	14316	21987	30271	47695	18452.1
<b>DESIGNS APPLICATIONS</b>											
<b>Year</b>	<b>2008-09</b>	<b>2009-10</b>	<b>2010-11</b>	<b>2011-12</b>	<b>2012-13</b>	<b>2013-14</b>	<b>2014-15</b>	<b>2015-16</b>	<b>2016-17</b>	<b>2017-18</b>	<b>Average</b>
Filed	6557	6092	7589	8373	8337	8533	9327	11108	10213	11837	8796.6
Examined	6440	6266	6277	6511	6776	7281	7459	9426	11946	11850	8023.2
Registered	4772	6025	9206	6590	7252	778	7147	7906	8276	10620	6857.2
Disposed	4897	6045	9221	6705	7300	7226	7218	8023	8332	10788	7575.5
<b>TRADEMARKS APPLICATIONS</b>											
<b>Year</b>	<b>2008-09</b>	<b>2009-10</b>	<b>2010-11</b>	<b>2011-12</b>	<b>2012-13</b>	<b>2013-14</b>	<b>2014-15</b>	<b>2015-16</b>	<b>2016-17</b>	<b>2017-18</b>	<b>Average</b>
Filed	130172	141943	179317	183588	194216	200005	210501	283060	278170	272974	207349.6
Examined	105219	25875	205065	116263	202385	203086	168026	267861	532230	306259	213226.9
Registered	102257	67490	115472	51735	44361	67876	41583	65045	250070	300913	110680.2
Disposed	126540	76310	132507	57867	69736	104756	83652	116167	290444	555777	161375.6
<b>GEOGRAPHICAL INDICATIONS APPLICATIONS</b>											
<b>Year</b>	<b>2008-09</b>	<b>2009-10</b>	<b>2010-11</b>	<b>2011-12</b>	<b>2012-13</b>	<b>2013-14</b>	<b>2014-15</b>	<b>2015-16</b>	<b>2016-17</b>	<b>2017-18</b>	<b>Average</b>
Filed	44	40	27	148	24	75	47	17	32	38	49.2
Examined	21	46	32	37	30	42	60	20	28	14	33
Registered	45	14	29	23	21	22	20	26	34	25	25.9

As shown in Table1, the average number of filed applications in trademarks are higher (207349.6) than other forms of IPRs during the study period 2008-09 to 20017-18. Simultaneously, the average number of filed applications in Patents (42328.6) and Designs (8796.6) and GIs (49.2) occupied the second, third and fourth places. The status of applications filed, examined, granted and disposed on average during the study period in case of Patents, Designs, Trademarks and GIs are shown in Figures 1 to 4.

Based on the data given in Table I, it is estimated that the number of applications disposed in filed applications is 86.12% in Designs and 72.83% in Trademarks, 52.64% in GIs and 43.59 in Patents on average during the study period.

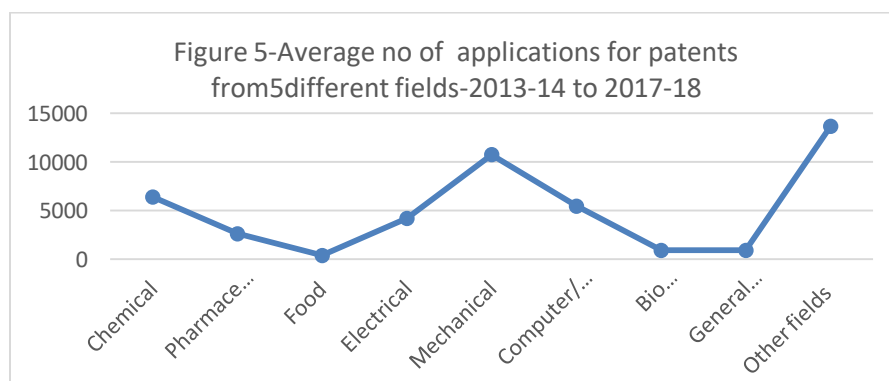




### Number of Patent Applications Filed under Major Fields of Inventions during 2013-14 to 2017-2018

The second objective of this study deals with the number of Patent applications filed for a period of 5 years i.e., from 2013-14 to 2017-2018 under major fields of inventions. Based on the availability of data, nine (9) fields like chemical, pharmaceuticals, food, electrical, mechanical, computer/electronics, bio technology, general engineering and other fields are considered for this analysis.

Table 2-Number of Patent Applications Filed under Major Fields of Inventions from 2013-14 to 2017-18										
year	2013-14	%	2014-15	%	2015-16	%	2016-17	%	2017-18	%
Chemical	6769	15.76	6454	15.09	6463	13.78	5911	13.01	6343	13.25
Pharmaceuticals	2507	5.84	2640	6.17	2966	6.32	2122	4.67	2741	5.73
Food	387	0.90	395	0.92	387	0.82	283	0.62	344	0.72
Electrical	4371	10.18	4031	9.43	4102	8.74	4141	9.11	4278	8.94
Mechanical	11318	26.35	10031	23.46	10164	21.67	10715	23.58	11572	24.18
Computer/Electronics	4410	10.27	4285	10.02	5988	12.77	6443	14.18	6089	12.72
Bio technology	647	1.51	1035	2.42	887	1.89	876	1.93	992	2.07
General Engineering	652	1.52	775	1.81	757	1.61	1225	2.69	1032	2.16
Other fields	11890	27.68	13117	30.67	15190	32.38	13728	30.21	14462	30.22
<b>Total</b>	<b>42951</b>	<b>100</b>	<b>42763</b>	<b>100</b>	<b>46904</b>	<b>100</b>	<b>45444</b>	<b>100</b>	<b>47854</b>	<b>100</b>



From Table 2, it is strong that 23.49% of patent applications are made in mechanical field and 14.19% of patent applications are made in chemical field on average during the study period.

The number of patent applications in miscellaneous fields are shown under other fields. It has increased from 27.68% in total patent applications in 2013-14 to 32.38% in 2015-16 but declined to 30.22% in 2017-18.

Figure 5 represents the total number of applications in nine fields together during the study period of five years (2013-14 to 2017-18). This number has gradually increased from 42951 in 2013-14 to 47854 in 2017-18.

### **The number of Indian applicants for Patents from institutes and universities during the period 2008-09 to 2017-18:**

Lastly, this study also attempts to examine the number of Indian applicants for Patents from institutes and universities during the period 2008-09 to 2017-18.

The results represented in Table 3 shows that the number of applicants from Indian Institute of Technology (all IITs) have significantly increased from 152 (2011-12) to 540 (2017-18) during the study period. Similarly, the number of applicants from Indian Institute of Science (IIS) have constantly grown during the recent decade from 21 to 58, which indicates more scientific development in India. Finally it is interesting to note that 17 private universities also have applied for the patents, which shows the rapid growth of private universities during the recent decade in India. On the whole the number of as an indication of technological progress, the number of patent applications filed from 2013-14 to 2017-18.

**Table 3:- Indian Applicants for Patents from Institutes and Universities**

Applicants	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
1. All India Institute of Medical Sciences				12						
2. Amity University	33			114	140	92	43	99	106	119
3. Amrita Viswavidyapeetham University					10					
4. Bharat University						37		65	45	66
5. Central Institute of Fisheries Technology		13								
6. Central Institute of Research on Cotton	12									
7. Central Power Research Institute					11					
8. Centre for Development of Advanced Computing (C-DAC)		7	16	13						
9. Centre for Materials And Electronics Technology					10					
10. Chandigarh Group of Colleges									30	58
11. Chitkara University								46	29	
12. Council of Scientific and		162								

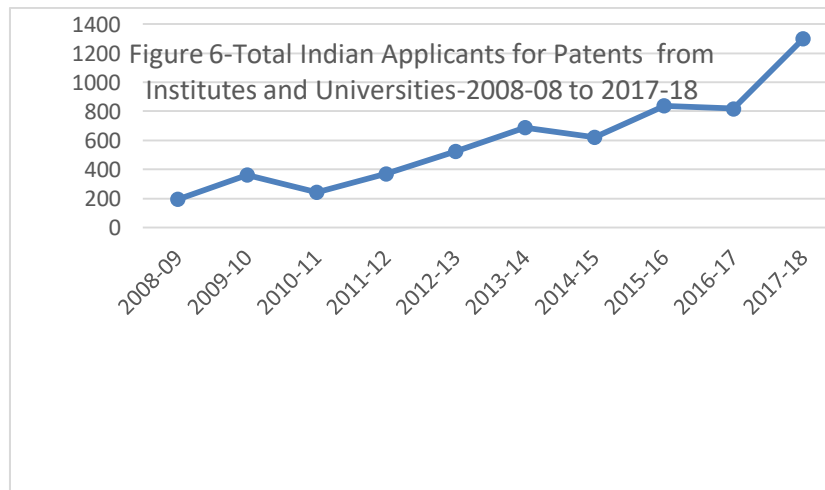
Industrial Research										
13. Defence Research and Development Organisation		80								
14. Dr.MGR Educational and Research Institute								15		
15. GH Raison College of Engineering/GH R Labs and Research Centre								33	49	
16. GH Raison College of Engineering						27				56
17. GHR Labs and Research Centre					10					56
18. Hindustan Institute of Technology & Science							31		28	
19. Indian Council of Research Organisation(ISRO)		55								
20. Indian Council of Medical Research		6								
21. Indian Institute of Science	21		38	14	31	32	46	46	54	58
22. Indian Institute of Technology	91									
23. Indian Institute of Technology( Bombay)			58							
24. Indian Institute of Technology( Delhi)			16							
25. Indian Institute of Technology( Kanpur)			32							
26. Indian Institute of Technology( Kharagpur)			29							
27. Indian Institute of Technology (Madras)			20							
28. Indian Institute of Technology(Coll ection)				152	205	342	337	391	400	540
29. Indian Space		17								



Research Organisation										
30. JanardhanRai Nagar Rajasthan Vidyapeet (Deemed) University							53	22		
31. Jawaharlal Nehru Centre for Advanced scientific Research				9	9					
32. KarpagamUniver sity							18			
33. KCG college of Technology										40
34. King George Medical University								15		
35. MsRamaiah School of Advanced Studies					13					
36. National Institute of Immunology	7	7			12					
37. National Institute of Ocean Technology					9					
38. National Institute of Pharmaceutical Education and Research (NIPER)	8	10	11		15			15		
39. National Institute of Technology(Coll ective)					10				26	
40. Parul Institute of Engineering and Technology					12					
41. Punjab Agricultural University	4									
42. Raja Rambapu Institute of Technology						13				
43. SAL Institute of Technology Engineering & Research							22			
44. Sandeep Foundation's Sandip Institute of Engineering							21			46

and Management										
45. Sandeep Foundation's Sandip Institute of Technology and Research Centre							33			
46. Saveetha College of Engineering ,Saveetha University						74		33		
47. Saveetha Dental College and Hospitals, Saveetha University										118
48. Sasthra University						13				
49. Shoolini University										62
50. Shoolini University of Biotechnology and Management Sciences								22		
51. Siddaganga Institute of Technology						24		17		
52. Siddaganga Institute of Technology and Institution of SreeSiddaganga Educational Society							18			
53. SN Bose National Centre for B.S	7									
54. Society for Employed Microwave Electronics Engineering & Research		6								
55. Sri ChitraTirunal Institute for Medical Sciences and Technology				15		20				
56. SRM University										81
57. Tamilnadu Agricultural University				15	16					
58. Tamilnadu Veterinary and Animal				9						

Sciences University										
59. Thaigarajagar College of Engineering	6									
60. The Energy and Resources Institute(TERI)			13		12					
61. The Energy and Resources Institute for Medical Sciences and Technology				17						
62. University of Calcutta			11		9	15				
63. University of Delhi	7									
64. Veltech Dr. Rr & Sr Technical University								20		
65. Veltech High/Multi Tech Dr Rr & Dr. Sr College and University									50	
<b>Total Applicants</b>	<b>196</b>	<b>363</b>	<b>244</b>	<b>370</b>	<b>534</b>	<b>689</b>	<b>622</b>	<b>839</b>	<b>817</b>	<b>1300</b>



As an indication of technological progress, results show that the number of applicants from Indian Institute of Technology (all IITs Bombay, Delhi, Kanpur, Kharagpur and Madras) have significantly increased from 152 (2011-12) to 540 (2017-18) during the study period (Table 3).

National Institute of Pharmaceutical Education and Research (NIPER) also occupied the significant position among the Indian applicants for patents during the study period.

Similarly, the number of applicants for patents from Indian Institute of Science (IIS) have constantly grown among the total Indian applicants during the recent decade from 21 to 58, which indicates more scientific development in India. Finally it is interesting to note that 17 private universities also have applied for the patents, which shows the

rapid growth of private universities during the recent decade in India. Among them, Amity University maintained the top position with the significant number of patent applications. Bharat University has occupied the second place and University of Calcutta and Saveetha University, Janardhan Rai University also maintained the significant position. As shown in Table 3, rest of the Indian applicants for patents from institutes and universities have appeared hardly once or twice during period considered for this analysis.

The number of total Indian applicants for Patents from Institutes and universities have significantly increased from 196 in 2008-09 to 689 in 2013-14 and further increased to 1300 in 2017-18 as shown in Figure 6.

### Summary Conclusions:-

Based on the entire analysis, the following conclusions are established:

1. The average number of filed applications in trademarks are higher (207349.6) than other forms of IPRs like Designs, Trademarks and GIs during the study period 2008-09 to 2017-18.
2. It is clear that the number of applications disposed in filed applications is 86.12% in Designs and 72.83% in Trademarks, 52.64% in GIs and 43.59 in Patents on average during the study period.
3. Among the number of patent applications filed under major (9) fields of inventions, of more patent applications (23.49%) are made in mechanical field and followed by chemical field (14.19%) on average during the period considered for analysis. Under other fields also, the number of patent applications have increased from 27.68% in total patent applications in 2013-14 to 32.38% in 2015-16, then declined to 30.22% in 2017-18.
4. This study concludes that the total number of applications in nine fields of inventions during the study period of five years (2013-14 to 2017-18) has gradually increased from 42951 in 2013-14 to 47854 in 2017-18.
5. The number of Indian applicants for Patents from institutes and universities during the period 2008-09 to 2017-18 discloses that Indian Institute of Technology (all IITs) and Indian Institute of Science (IIS) have shown significant increase during the study period as an indication of technological and scientific progress in the economy.
6. Further it is evident from this study that 17 private universities also have applied for the patents during the recent decade in India which shows the significant progress of private universities in higher education. This study also exposed that the number of total Indian applicants for Patents from Institutes and universities have significantly increased from 196 in 2008-09 to 1300 in 2017-18.
7. All the above conclusions suggest that there is an immense need for further growth of research in science and technology and wide spread expansion of business in all sectors.

### References:-

1. Livia Iliea, Intellectual Property Rights: An Economic Approach, Lucian Blaga University of Sibiu, Faculty of Economic Sciences, 17 Dumbrăvii Avenue, Sibiu 550324, Romania, 21st International Economic Conference 2014, IECS 2014, 16-17 May 2014, Sibiu, Romania, pp 1-5
2. Lalit Jajpura, Bhupinder Singha and Raj Kishore Nayak, An Introduction to Intellectual Property Rights and their Importance in Indian Context
3. Faculty of Engineering and Technology, BPS Mahila Vishwavidyalaya, Kanpur Kalan, Sonapat -131 305, India, Journal of Intellectual Property Rights Vol 22, January 2017, pp. 32-41
4. Biswajit Dhar Sabyasachi Saha, An Assessment of India's Innovation Policies, RIS-Discussion Paper # 189, March 2014, pp 1-64
5. Y. Srinivasa Rao, Intellectual Property Rights in India: Significance of Patents, SCIPR-2014: Paper presented in the National Conference, pp. 121-134 © School of Planning and Architecture, Vijayawada, 4-5 August 2014
6. Albert G. HU, Comments on intellectual property rights and the international transfer of technology: setting out an agenda for empirical research in developing countries, The Economics of Intellectual Property PP-62-64 IPR/wipo\_pub\_1012-Chapter 1
7. Ashish Arora, Intellectual Property Rights and the International Transfer of Technology: Setting out an Agenda for Empirical Research in Developing Countries The Economics of Intellectual Property, pp 41-58, IPR/wipo\_pub\_1012-Chapter.