



## Patenting Trends among BRICS and Effect on GDP

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### Abstract

Patenting trends of a country indicates its technological competitiveness. The present study has been conducted with the objective to analyse the patenting trends amongst BRICS (Brazil, Russia, India, China and South Africa) characterized by rapidly growing economies and increasing international influence. Number of patent applications filed, patents earned and patent-population ratio of BRICS are among the factors assessed. An effort has been made to find correlation of patenting activities of BRICS on their Gross Domestic Product (GDP). The data related to patents and GDP of BRICS was downloaded from WIPO's website and analysed using MS-Excel and Statistical Package for Social Sciences (SPSS). A robust rise was noticed in number of patents earned and the GDP of China. India also showed a very good progress in the assessed factors. A direct relationship was observed between number of patents granted and GDP of BRICS on a whole. The study led to the conclusion that increase in patenting activities amongst BRICS play a pivotal role in the overall growth and development of these nations.

**Keywords:** Patents, invention, innovation, BRICS, GDP

Research and innovations are conclusive to survival and thriving of mankind. Today's comfortable life has been possible only because of the constant and diligent efforts of scientists and researchers since existence of human life. Research and innovation is not accomplished in a day. It may take a few days, months, years and even generations to reach acceptable form. Besides physical and mental efforts, research may involve financial implications on part of researchers. Therefore, to encourage research and innovation, it becomes obligatory to give credit and financial benefits arising of the research outcomes to the researcher or the sponsors of the research projects. This led to the development of patent as a legal tool to stimulate investments in research and development and serve as a major enabler for inventive endeavours (Kumar *et al.*, 2010). The word patent originates from the Latin words 'litterae patentes', meaning an open letter (Thomson Reuters, 2015). Medieval monarchs used these letters to confer rights and privileges. The oldest formal patent system exists in Britain and the earliest known English patent was given in 1449 to Flemish-born John of Utynam for a method of making stained glass (Ralston *et al.*, 2005). The World Intellectual Property Organization

(WIPO, 2015) defines a patent as "an exclusive right granted for an invention, which is a product or a process that provides a new way of doing something, or offers a new technical solution to a problem." However, a patent may not always be protecting an existing prototype, but signifies the applicant's invention to be novel (Organisation for Economic Co-operation and Development, 1994). The patents provide exclusive rights to the originator to use and exploit the invention for twenty years from the date of filing of the patent application. These rights prevent others from commercially using the patented invention. However, the patents are transferable. The inventor may sell the patent or license the rights to commercialize it to other enterprise on his/her discretion. According to WIPO (2015) applicants can simultaneously seek protection for an invention in 148 countries throughout the world by filing one international patent application under Patent Cooperation Treaty (PCT). Patents are instrumental in transforming the information to property (Bera, 2009). Practical use of new inventions and innovations, protected by patents, leads to better products and services ultimately affecting the economy of a nation.

Invention and innovation by a nation draws special attention and patents originating from a country can be used as indicators to measure its' technological competitiveness (Jana *et. al.*, 2014). The BRICS (Brazil, Russia, India, China and South Africa) are characterized by rapidly growing economies and increasing international influence. These five nations are home to over 40 percent of the world's population and combined output of these nations constitutes more than 20 percent of the global Gross Domestic Product (O'Boyle, 2014). Many studies have been conducted in the recent past using patents as an indicator to assess the science and technology output of different countries. Perhaps no attempt has been made to assess and compare the influence of patenting trends on the GDP of BRICS.

In view of the above, the present study has been carried out with some specific objectives. These are (i) to analyse the number of patent applications filed and grants earned by BRICS, (ii) to examine the patent-population ratio of BRICS and (iii) to observe the effect of patenting activities of BRICS on respective GDP.

## Database and Methodology

The study has been conducted based on secondary data. The period selected for the study ranges from the year of establishment of BRICS i.e. 2001 to till date i.e. 2013. The secondary data related to patents by BRICS has been downloaded from the IP Statistics Data Center, the on-line service enabling access to WIPO's statistical data. The GDP related data of BRICS has been downloaded from respective IP Statistical Country Profiles. Data has been analysed using MS-Excel and Statistical Package for Social Sciences (SPSS).

## Results and Discussion

The total number of patent applications (direct and under PCT national phase entries) filed by BRICS and the number of patent granted is given in table 1. The figures reveal that the number of applications for the grant of patent filed by China in 2013 was more than 23 times than the applications submitted in 2001. Further the number of applications by China in 2013 was even more than the total number of applications by its other

**Table 1: Status of patent over the years**

Year	Brazil	Russian Federation	India	China	South Africa	BRICS	World	Share of BRICS
<b>Number of patent applied</b>								
2001	3948	25657	3456	31232	1647	65940	1456900	4.53%
2002	4031	24499	4164	41418	1661	75773	1443600	5.25%
2003	4451	25644	5370	58757	1540	95762	1490300	6.43%
2004	4814	25040	6728	69017	1802	107401	1574400	6.82%
2005	4920	25948	8028	97948	2109	138953	1702900	8.16%
2006	4969	30575	9434	129290	1913	176181	1791200	9.84%
2007	5393	30489	10529	161308	2063	209782	1876900	11.18%
2008	5521	31095	11546	204268	2099	254529	1929200	13.19%
2009	5420	28859	11939	241434	1964	289616	1861700	15.56%
2010	5735	32837	14869	308326	1996	363763	1996800	18.22%
2011	6359	31464	15896	436170	1763	491652	2157900	22.78%
2012	6603	34379	18202	561408	1688	622280	2356500	26.41%
2013	6846	34065	20907	734081	2211	798110	2567900	31.08%
Total	69010	380551	141068	3074657	24456	3689742	24206200	15.24%
<b>Number of patent granted</b>								
2001	921	14224	817	5722	1383	23067	535000	4.31%
2002	911	15594	1044	6348	1408	25305	558600	4.53%
2003	302	21137	1236	11984	1357	36016	618500	5.82%
2004	255	20344	1617	18967	1388	42571	621200	6.85%
2005	535	20819	2284	21575	1493	46706	631300	7.40%
2006	593	20441	2826	26356	1246	51462	752200	6.84%
2007	350	20490	4298	33502	1346	59986	774200	7.75%
2008	630	24159	3939	48919	1332	78979	779400	10.13%
2009	732	28070	3192	68502	1251	101747	812100	12.53%
2010	805	23633	3134	84814	1381	113767	911400	12.48%
2011	947	22179	2880	118130	1122	145258	999500	14.53%
2012	1026	24400	3583	152097	1352	182458	1134300	16.09%
2013	1242	23365	4388	154485	1439	184919	1169900	15.81%
Total	9249	278855	35238	751401	17498	1092241	10297600	10.61%

counterparts during the period under study. An increase by six times in number of applications from 2001-2013 was also noticed in case of India. It is also evident that the overall share of applications by BRICS out of the world's total applications has considerably increased from 4.53% in 2001 to 31.08% in 2013.

A steep rise was noticed in the number of total patent granted (direct and PCT national phase entries) to China. The year 2013 has witnessed the 27 folds growth in number of patent granted to China in comparison to 2001 (table 1). A tremendous growth was noticed in the number of patent granted to China in the last three years with more than 1,00,000 patents each year. A gradual growth was observed in the number of patent granted to Russia and India. The number of patent granted to Brazil and South Africa from 2001 to 2013 has remained almost constant. It has been also evidenced that BRICS has bagged 15.81 percent of the total patent granted in 2013 as compared to only 4.31 percent in 2001.

As shown in table 2, Russia led the BRICS from 2001 to 2009 in terms of number of patent applications per

million populations with gradual increase per year, but it was surpassed by China in 2010. The number of patent applications per million population by China increased manifold from 24 in 2001 to 519 in 2013. Though the number of patent filed by India per million of population had increased from 2 in 2001 to 9 in 2013, but the figure stood lowest amongst BRICS throughout the period under study. In contrast to other nations, the number of patent applications per million populations by South Africa decreased from 22 in 2001 to 12 in 2013. As compared to 2001, the patent-population ratio of BRICS in 2013 increased by three times.

A careful examination of the trends in GDP of BRICS (table 3) during the period under study shows that China led the group in this economic aspect too. There was robust rise in GDP of China each year and GDP has rose from 4935.56 in 2001 to 15643.22 in 2013. India also showed good economic growth in GDP with figures becoming more than double in 2013 than that of 2001. GDP of Brazil and Russia has showed a consistent growth from 2001 to 2013. South Africa showed a

**Table 2: Patent – population ratio**

Year	Brazil	Russian Federation	India	China	South Africa	Average of BRICS nations
2001	19	170	2	24	22	47.40
2002	19	163	3	31	21	47.40
2003	21	173	3	44	20	52.20
2004	22	161	4	51	20	51.60
2005	22	166	4	72	21	57.00
2006	21	197	5	93	18	66.80
2007	22	195	5	116	19	71.40
2008	22	197	5	147	17	77.60
2009	22	182	6	172	16	79.60
2010	22	204	7	219	16	93.60
2011	24	188	7	309	13	108.20
2012	24	204	8	396	12	128.80
2013	25	203	9	519	12	153.60

**Table 3: Gross Domestic Product of BRICS**

Year	Brazil	Russian Federation	India	China	South Africa
2001	1947.42	2029.42	2840.34	4935.56	430.30
2002	1999.15	2125.69	2948.39	5383.81	446.08
2003	2022.07	2280.78	3180.15	5923.56	459.23
2004	2137.61	2444.44	3432.11	6520.95	480.15
2005	2205.08	2600.31	3750.77	7258.47	505.49
2006	2292.30	2812.32	4098.24	8178.59	533.81
2007	2432.03	3052.35	4499.93	9336.88	563.43
2008	2557.75	3212.54	4675.02	10236.45	583.84
2009	2549.35	2961.27	5071.45	11179.66	574.92
2010	2741.41	3094.64	5591.78	12347.60	592.98
2011	2816.32	3226.60	5962.98	13495.91	614.32
2012	2845.38	3337.45	6245.40	14528.69	629.48
2013	2916.28	3381.46	6558.73	15643.22	641.38

negligible economic growth during the period under study.

**Table 4: Correlation-coefficient of number of patents earned with GDP**

Country	Correlation
Brazil	+ .5380 NS
Russian Federation	+ .7706*
India	+ .8121*
China	+ .9674*
South Africa	- .3228 NS
BRICS total	+ .8441*

\* Significant at 0.1 level of probability, <sup>NS</sup> indicates Non-Significant

Table 4 reveals that the number of patents earned by BRICS has highly significant relation with the GDP of the cluster. The number of patents granted to China, India and Russian Federation are positively related to the respective GDP. On the other hand, the number of patents attained by South Africa has negative and non-significant relationship with concerned GDP. The correlation of patents gained by Brazil with its GDP is positive, but non-significant. It can be observed from the given data that on a whole the patents earned by BRICS have significant bearing on the GDP of this group of nations.

The overall results of the study show that there was robust rise in GDP of China each year which has rose from 4935.56 in 2001 to 15643.22 in 2013. India also showed a good economic growth in GDP which is more than double in 2013 than that of 2001. A significant relationship between number of patents granted and GDP of China, India and Russian Federation was also found. Present study leads to the conclusion that China and India are progressing at a faster speed than that of other countries. Amongst BRICS, South Africa show a negligible economic growth during the period under study.

This supports the study conducted by Bagchi (2011) to analyse the factors fostering innovation in BRICS Countries, who has also found that China to be much ahead of its other counterparts and South Africa to be lagging behind. It has been also found that China and India are the fastest growing economies. The result supports the findings of Godinho and Ferreira (2012) who have found that China and India can catch up with the most advanced economies in a few decades if these countries maintain current Intellectual Property Right (IPR) growth rates.

## Conclusion

It can be concluded from the present study that China is doing tremendously good in research and innovation which is visible from the foregoing discussions viz. number of patent applications filed by China in 2013 is being even more than the total number of applications filed by the other countries from 2001 to 2013. The number of patent granted to China during the last three years is being more than 1,00,000 patent each year. There was manifold increase in patent-population ratio from 24 in 2001 to 519 in 2013. Six times increase in number of patent applications and a gradual growth in the number of patents granted to India from 2001-2013 showed that India is also progressing at faster speed in the field of research and innovation. A direct relationship has been observed between number of patents granted and GDP of BRICS on a whole. The study led to the conclusion that increase in patenting activities amongst BRICS play a pivotal role in the overall growth and development of these nations.

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