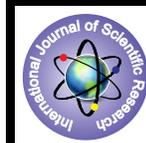


Gerd and Iprs



Management

KEYWORDS :

Yasmeen Pathan

Asst. Professor, Shanti Business School, Ahmedabad

ABSTRACT

The Economy of India is the tenth-largest in the world by nominal GDP (1,937,797 mn \$) and the third-largest by purchasing power parity (PPP). The country is one of the G-20 major economies, a member of BRICS and a developing economy among the top 20 global traders according to the WTO.

Some of the Opportunities include Young Labour Force, Make in India Campaign, Manufacturing Industry, Huge Customer Base (2nd largest populated country amongst the world) while the Challenges are Technology, Intellectual Property, Bureaucracy, Institutions, Institutional Environment (Customs, Traditions of doing business) and Tax Regimes.

The world economic forum's latest report "The Global Competitiveness Report 2014-15" provides an overview of the competitiveness performance of 144 economies. Amongst the 12 pillars of competitiveness that they talk about, one is Innovation. Bloomberg has recently come out with "the Bloomberg Innovation Index". The parameter of the Index is R & D intensity, Manufacturing Capability, High Technology Density, Researcher Concentration, Education (Tertiary) Levels and Patent Activity.

Innovation can emerge from new technological and non-technological knowledge. Non-technological innovations are closely related to the know-how, skills and working conditions that are embedded in organizations while Technological Knowledge is related to Intellectual Property of the Country i.e. its Patents, Trademarks and Industrial Designs.

This paper focuses on the functional relationship between Research and Development (R&D) Expenditure and Intellectual Property Rights.

1. INTRODUCTION

International Trade is the exchange of Goods, Services (like tourism, banking, transportation etc.) and Capital across international borders. International Business offers citizens and countries opportunity to be exposed to new products and markets. Since ancient times, India has always played a very important role in international Trade. Historically, the Silk Route (the beginning of international Trade) mentions about India as one of the countries which was a trade partner with different countries. Table 1 shows the volume and annual percentage change of exports world wide. Merchandise exports account for 80 % and Commercial Services account for 20 % of the total world exports in the year 2013.

Table 1: World Exports of Merchandise and Commercial Services

World exports of merchandise and commercial services, 2005-13					
(US\$ billion and annual percentage change)					
	Value	Annual % Change			
	2013	2011	2012	2013	2005-13
Merchandise	18,816	20	0	2	8
Commercial Services	4,645	12	2	6	8
Source: WTO					

India is emerging as a global trade partner for lot of countries of the world like United States of America, United Arab Emirates, Hong Kong, China and other countries. Table 2 and Table 3 show the top 5 trading partners for India for Exports and Imports for Feb 2015. The data has been taken from the ministry of commerce and industry, GOI.

Table 2: India's Exports incl. re-exports to Top 5 Countries in terms of value in: FEB, 2015

Country	Value (in Rs. Lakh)	% of total exports
Total Export incl. re-export:	13541087	
USA	1980391	15%
UAE	1400657	10%

Hong Kong	927636	7%
China	551561	4%
UK	450532	3%

Source: Directorate General of Commercial Intelligence and Statistics, Ministry of Commerce and industry, Govt. of India

Table 3: India's Imports from Top 5 Countries in terms of value in: FEB, 2015

Country	Value (in Rs. Lakh)	% of total imports
Total import excl. Petroleum	13722600	
Total import incl. Petroleum	17507608	
China	3030548	17%
USA	916012	5%
UAE	661144	4%
Indonesia	613336	4%
Switzerland	603342	3%

Source: Directorate General of Commercial Intelligence and Statistics, Ministry of Commerce and industry, Govt. of India

Some of the **sectors** that have **potential for international business** in India are Information Technology and Electronics Hardware, Telecommunication, Pharmaceuticals and Biotechnology, R&D, Banking, Financial Institutions and Insurance & Pensions, Capital Market, Chemicals and Hydrocarbons, Infrastructure, Agriculture and Food Processing, Retailing, Logistics, Manufacturing, Power and Non-conventional Energy.

Sectors like Health, Education, Housing, Resource Conservation & Management Group, Water Resources, Environment, Rural Development, SME and Urban Development have a huge scope for growth and development.

Although the share of India's trade with other countries is growing, it is faced with Challenges such as Technology, R&D, Intellectual Property, Bureaucracy, Lack of Institutions, Institutional Environment (Customs, Traditions of doing business) and Tax

Regimes. Opportunities include Young Labour Force, Make in India Campaign, Manufacturing Industry, Huge Customer Base (2nd largest populated country amongst the world).

“The Global Competitiveness Report 2014-15” developed by World Economic Forum provides an overview of the competitiveness performance of 144 economies. The pillars are Institutions, Infrastructure, Macroeconomic Environment, Health and Primary Education (**Basic Requirement Sub Index**), Higher Education and Training, Goods Market Efficiency, Labour Market Efficiency, Financial Market Development, Technological Readiness, Market Size (**Efficiency Enhancers Sub Index**) and Business Sophistication, Innovation (**Innovation and Sophistication Factors Sub Index**). Basic Requirement Sub Index is the key for Factor Driven Economies (Stage I), Efficiency Enhancers Sub Index is the key for Efficiency Driven Economies (Stage II) and Innovation and Sophistication Factors Sub Index is the key for Innovation Driven Economies (Stage III). **India** is one of the 37 economies listed on the 1st Stage i.e. **Factor Driven Economy**. Table 4 shows the rankings of different countries on the basis of GCI. **India ranked 71st with a score of 4.21 out of 7 in the year 2014-2015**. On the sub index rankings, India is on **92nd Rank on the basic requirement sub index, 61st on the Efficiency enhancers sub index, and 52nd on the Innovation and sophistication factors sub index**. Overall, India does best in the more complex areas of the GCI i.e. **innovation (49th) and business sophistication (57th)**. In contrast, it obtains low marks in the more basic and more fundamental drivers of competitiveness.

Table 4: The Global Competitiveness Index 2014–2015 Rankings by World Economic Forum

Country / Economy	Rank (out of 144)	Score (1-7)
Switzerland	1	5.70
Singapore	2	5.65
United States	3	5.54
Finland	4	5.50
Germany	5	5.49
Japan	6	5.47
UK	9	5.41
UAE	12	5.33
Australia	22	5.08
China	28	4.89
Russian Federation	53	4.37
South Africa	56	4.35
Brazil	57	4.34
Mexico	61	4.27
India	71	4.21

Bloomberg L.P. which is a privately held financial software, data and media company headquartered in New York City, recently published a report of most innovative countries in the world in 2014. The parameters of the Index are **R & D intensity, Manufacturing Capability, High Technology Density, Researcher Concentration**, Education (Tertiary) Levels and **Patent Activity**. **India** does not feature in the list of 50 most innovative countries of the world. The top 5 countries are South Korea, Sweden, United States, Japan and Germany.

This paper is aimed at finding out how significantly **R&D Inten-**

sity, Patent Activity, High Technology Density and Researcher Concentration are related.

2. INTELLECTUAL PROPERTY RIGHTS

Research in Science, Social Science and Business is essential to improve performance and is the main driving force in the growth process of every country. As seen earlier innovation is one of the important pillars for countries to be competitive and lead in business. Expenditure in research is important for progress in science and technology and also social and economic development of the country. Innovation can exist only if there is enough R&D expenditure, Scientific and Technical Knowhow, Use of latest technology and good number of Researchers to develop new processes and products. The research information seeking behavior is very critical in economic success of a country. This study is aimed to compare the impact of Research and Development Expenditure(% of GDP) i.e. R&D Intensity on Patent Applications, Trade mark Applications, Scientific and Technical Journal Articles, High Technology Exports and Number of Full Time Research Personnel. Research Expenditure Data here is expressed as a percentage of GDP. **R&D intensity** for a country is defined as the R & D expenditure as a percentage of gross domestic product (GDP). **The gross domestic expenditure on R&D (GERD)** is mainly used for international comparisons of R&D expenditures. GERD data and their components are compiled on the basis of the OECD Frascati Manual 2002 methodology, which defines R&D as - “creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications”. GERD is often reported in relative terms as a percentage of GDP, to denote the R&D intensity of an economy.

3. STATISTICAL ANALYSIS

The data were analyzed by using Statistical Package for the Social Sciences (SPSS) software version 22. The Pearson Correlation coefficient was calculated to find the strength of relation between different variables. **p** Value < 0.05 was considered significant.

Hypothesis 1: There is no correlation between R&D Expenditure (% of GDP) and number of Patent Applications filed by Residents.

Hypothesis 2: There is no correlation between R&D Expenditure (% of GDP) and number of scientific and Technical Journal Articles.

Hypothesis 3: There is no correlation between R&D Expenditure (% of GDP) and number of Trademark Applications.

Hypothesis 4: There is no correlation between R&D Expenditure (% of GDP) and Value of High Tech Exports (\$ Millions).

Hypothesis 5: There is no correlation between R&D Expenditure (% of GDP) and Full Time Researchers (per million people).

Hypothesis 6: There is no correlation between Number of Researchers (per million people) and Number of Patent Applications (Residents).

Hypothesis 7: There is no correlation between Number of Researchers (per million people) and High-technology exports (\$ Millions).

Table 5: Correlation Analysis (R&D Intensity and IPRs)

	Patent Applications Filed	Scientific and Technical Journal Articles	Number of Trademark Applications	High-technology exports (\$ Millions)	FT Researchers(per million people)	
R&D Exp. (% of GDP)	.288*	.371**	0.139	.345**	.858**	Pearson Correlation
	0.016	0.002	0.262	0.003	0	Sig. (2-tailed)
	69	69	67	70	68	N
	*. Correlation is significant at the 0.05 level (2-tailed).	** Correlation is significant at the 0.01 level (2-tailed).		** Correlation is significant at the 0.01 level (2-tailed).	** Correlation is significant at the 0.01 level (2-tailed).	

Table 6: Correlation Analysis (Number of researchers with Patent Applications and High Technology Exports)

	Number of Patent Applications (Residents)	High-technology exports (\$ Millions)	
Number of Researchers (per million people)	0.057	0.12	Pearson Correlation
	0.644	0.331	Sig. (2-tailed)
	67	68	N

4. RESEARCH OUTCOME

The above analysis shows the Research and Development expenditure (% of GDP) also known as R&D Intensity is an important factor to improve the intellectual property of countries. There is positive and significant correlation between R&D Expenditure (% of GDP) and Patent Applications, Scientific and Technical Journals, High Technology Exports and Full Time Researchers. But R&D Expenditure (% of GDP) is not correlated with number of Trademark Applications.

One more important finding is that there is no correlation between number of researchers with number of patent applications and high technology exports.

5. R & D INTENSITY IN THE INDIAN CONTEXT

For India, the R&D Intensity is 0.81% which is less than the data for the world which is 2.13%. Generally developed countries have a higher R&D Intensity compared to developing countries. Since we know that R&D Intensity is positively related to Patent Applications (an IPR), we have to put in steps to improve our R&D Capabilities. Also R&D Intensity can help in more scientific and technical development and high technology export development of countries which is needed for India especially at present when we have launched the "Make in India" campaign.

Appendix 1: Country Data 2012-2013

Countries	Expenditures for R&D (% of GDP)	Researchers (full-time equivalent per million people)	Scientific and Technical Journal Articles	High-technology exports (\$ Millions)	Patent applications filed (Residents)	Trademark applications filed
Argentina	0.65	1,236	3,863	2,434	643	87,921
Australia	2.39	4,280	20,603	4,565	3,061	62,541

Belgium	2.24	3,983	7,484	36,504	715	24,064
Brazil	1.21	710	13,148	8,392	4,959	163,422
Bulgaria	0.64	1,552	650	1,128	282	6,177
Canada	1.73	4,563	29,017	29,137	4,567	49,819
Chile	0.42	317	1,979	506	340	33,564
China	1.98	1,020	89,894	560,058	704,936	1,848,858
Hong Kong SAR, China	0.75	2,925	-	600	226	37,092
Croatia	0.75	1,553	1,289	633	230	6,239
Cyprus	0.47	793	211	31	2	2,036
Czech Republic	1.88	3,111	4,127	20,921	984	11,237
Denmark	2.98	6,730	6,071	9,185	1,341	5,054
Ecuador	0.23	103	60	72	4	16,195
Egypt, Arab Rep.	0.43	524	2,515	70	641	4,492
Estonia	2.18	3,541	514	1,302	25	2,837
Finland	3.55	7,482	4,878	3,725	1,596	5,431
France	2.26	3,918	31,686	113,000	14,690	89,715
Germany	2.92	4,139	46,259	193,088	47,353	64,826
Greece	0.69	2,168	4,534	855	698	1,653
Guatemala	0.05	25	22	197	4	9,175
Hungary	1.30	2,389	2,289	14,471	642	5,905
Iceland	2.60	7,012	258	93	33	3,601
India	0.81	160	22,481	16,693	10,669	200,769
Indonesia	0.08	90	270	4,818	663	60,983
Ireland	1.72	3,513	3,186	21,915	333	3,690
Israel	3.93	6,602	6,096	9,635	1,201	9,414
Italy	1.27	1,820	26,503	29,752	8,307	40,965
Japan	3.39	5,158	47,106	105,076	271,731	117,198
Kazakhstan	0.16	652	87	3,074	1,824	10,515
Kenya	0.98	227	290	100	127	5,806
Korea, Rep.	4.04	5,928	25,593	130,460	159,978	158,677
Latvia	0.66	1,895	204	925	225	3,308
Lithuania	0.90	2,650	457	1,782	117	4,215
Luxembourg	1.44	6,194	204	863	113	-
Macedonia, FYR	0.22	425	77	118	42	4,478
Malaysia	1.07	1,643	2,092	60,372	1,199	32,225
Malta	0.84	1,854	46	1,012	13	948
Mexico	0.43	386	4,128	45,419	1,210	103,994
Moldova	0.4	781	76	14	67	5,506
Morocco	0.73	864	386	950	316	11,338
Netherlands	2.16	3,506	15,508	69,040	2,315	-
New Zealand	1.27	3,693	3,472	723	1,614	18,776
Nigeria	0.22	39	439	84	50	19,332

Norway	1.65	5,588	4,777	4,826	1,101	15,273
Oman	0.13	160	144	160	..	2,319
Pakistan	0.33	149	1,268	349	151	20,822
Philippines	0.11	78	241	19,645	220	22,685
Poland	0.90	1,753	7,564	12,052	4,237	17,476
Portugal	1.50	4,781	4,621	1,942	647	17,216
Romania	0.49	828	1,626	2,858	993	11,790
Russian Federation	1.12	3,096	14,151	8,656	28,765	64,062
Saudi Arabia	0.07	..	1,491	288	491	..
Singapore	2.10	6,438	4,543	135,602	1,143	20,968
Slovak Republic	0.82	2,804	1,099	7,574	184	5,032
Slovenia	2.80	4,398	1,239	1,467	470	1,700
South Africa	0.76	364	3,125	2,217	638	36,070
Spain	1.30	2,719	22,910	16,346	3,026	49,976
Sri Lanka	0.16	103	130	69	328	8,825
Sweden	3.41	5,181	9,473	17,025	2,332	10,706
Switzerland	2.87	3,285	10,019	53,350	1,525	29,227
Thailand	0.25	332	2,304	33,901	1,572	46,097
Tunisia	1.10	1,837	1,016	616	112	4,408
Turkey	0.86	987	8,328	2,177	4,392	108,087
Uganda	0.56	37	158	8	10	2,079
Ukraine	0.74	1,253	1,727	2,189	2,856	34,082
United Arab Emirates	0.49	..	324	67	18	18,747
United Kingdom	1.72	4,024	46,035	24,216	14,972	50,415
United States	2.79	3,979	208,601	147,833	287,831	342,287
Uruguay	0.43	538	290	189	22	6,021
World	2.13	1,284	582,012	1,989,837	1,624,969	4,595,564

REFERENCE

1. S.A. Meo, A.M. Usmani (2014), "Impact of R&D expenditures on research publications, patents and high-tech exports among European countries", European Review for Medical and Pharmacological Sciences 2. http://articles.economicstimes.indiatimes.com/2013-03-06/news/37500213_1_overseas-shipments-cent-exports 3. http://www.oecd-ilibrary.org/sites/sti_scoreboard-2011-en/02/05/index.html?itemId=/content/chapter/sti_scoreboard-2011-16-en 4. World Bank Data 5. World Economic Forum "Global Competitiveness Index" 6. Bloomberg "Most Innovative Countries 2014" 7. International Monetary Fund 8. World Intellectual Property Organization 9. Directorate General of Commercial Intelligence and Statistics, Ministry of Commerce and Industry, Govt. of India