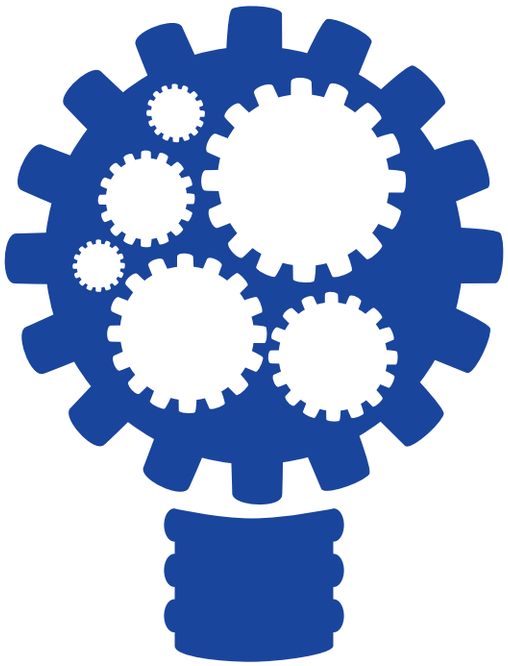
TASK FORCE ON INNOVATION

REPORT ON GLOBAL INNOVATION INDEX: AN INDIAN PERSPECTIVE

cipam
Creative India
Innovative India

Special thanks to

Padma Vibhushan Dr. R.A. Mashelkar, FRS, National Research Professor & President, Global Research Alliance and former Director General of the Council of Scientific & Industrial Research (CSIR) for his insightful suggestions



TASK FORCE ON INNOVATION

REPORT ON GLOBAL INNOVATION INDEX: AN INDIAN PERSPECTIVE

Contents

Global Innovation Index

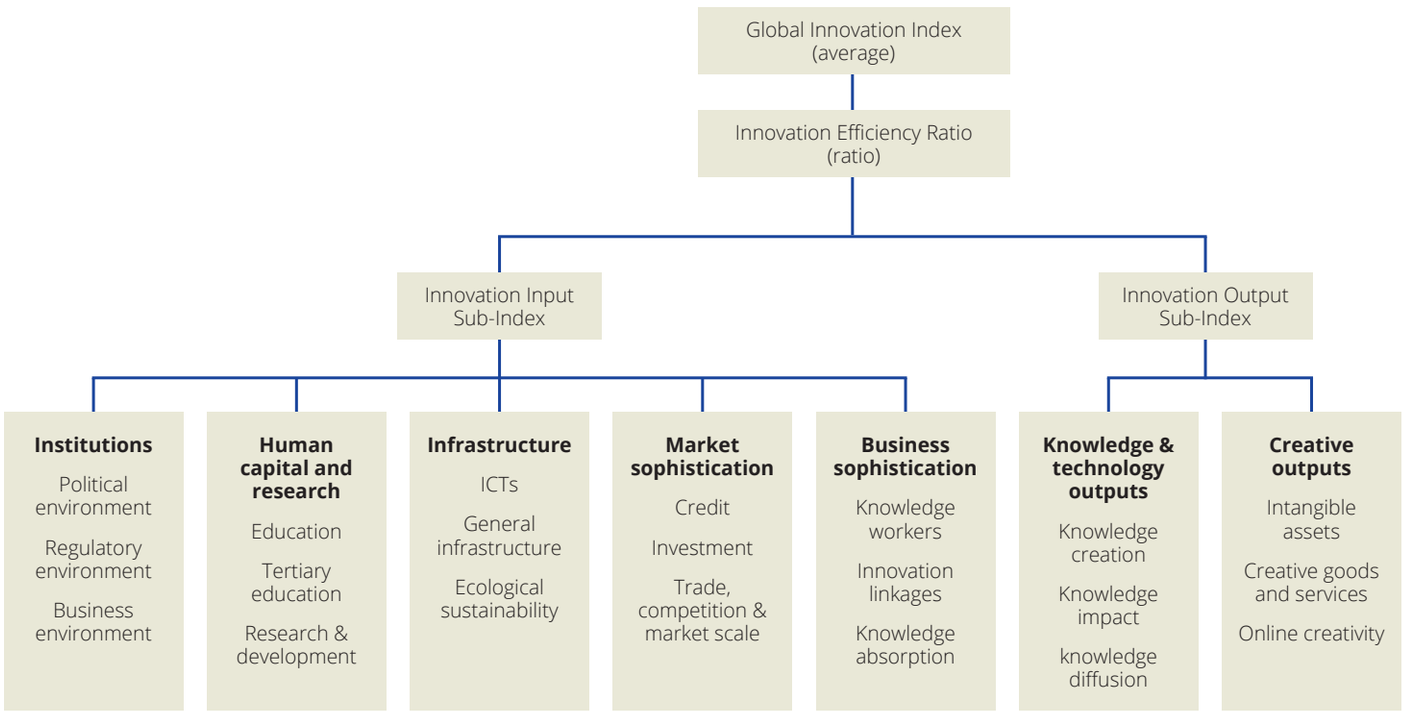
Global Innovation index ranks countries on an annual basis for their contribution towards successful innovations based on their capacity. Published by Cornell University, INSEAD and WIPO in partnership with other organizations and institutions, it is based on both objective and subjective data derived from several sources such as the International Telecommunication Union (ITU), World Bank and World Economic Forum (WEF).

The GII report has been published each year since 2007, becoming a leading benchmark tool for policy makers and business executives who seek insight into the state of innovation around the world, as a tool to measure progress.

GII marks indicators for ranking world economies, their innovation capabilities and subsequent results. It provides a broader horizon by marking indicators going beyond the traditional measures such as levels of research and development.

The GII has two sub-indices: The Innovation Input Sub-Index and the Innovation Output Sub-Index.

Framework of the Global Innovation Index 2016



The Innovation Input Sub-Index includes five input pillars which capture elements of the economy that enable innovative activities: (1) Institutions, (2) Human capital and research, (3) Infrastructure, (4) Market sophistication, and (5) Business sophistication.

The Innovation Output Sub-Index includes two output pillars which captures the results/ outcomes of innovative activities within the economy. These are: (6) Knowledge and technology outputs and (7) Creative outputs.

The Innovation Efficiency Ratio is ratio of the Output Sub-Index score and Input Sub-Index score. It shows how much innovation output a given country is getting for its inputs.

The GII 2016 included following features:

- 128 country profiles, including data, ranks and strengths and weaknesses on 82 indicators.
- 82 indicators from over 30 international public and private sources.
- Representation of more than 92% of the world's population and close to 98% of the world's GDP (in current terms).

India's Position in GII

In Global Innovation Index (GII) 2016, India improved its innovation rank to reach 66th position from 81st (in 2015). This improvement in India's rank came after 5 years of continuous drop in its ranking. India has retained the top rank in Information and Communication Technology Service Export for more than three years. India is the top-ranked economy in Central and Southern Asia, and shows particular strengths in tertiary education and R&D, including global R&D intensive firms, the quality of its universities and scientific publications. India also over-performs in innovation relative to its GDP. As per the GII-2016 report, **"India is a good example of how policy is improving the innovation environment".**

The following table reflects India's ranking over time, well-noting that year-on-year comparisons of this kind are imperfect, and influenced by modelling and other changes.

Year	GII Overall Rank	Input Side Rank	Output Side Rank	Efficiency
2016	66	72	59	63
2015	81	100	69	31
2014	76	93	65	31

India had shown a downward trajectory during the period of 2013-2015 in its ranking for inputs and outputs. In 2016, however, the rank in both inputs and outputs has increased significantly, reaching its best performance for inputs over the 4-year period.

India's overall strengths and weaknesses in the GII model are shown below:

Strengths		Rank
2.2.2	Graduates in science and engineering	8
2.3.3	Global R&D companies, average expenditure top 3	20
2.3.4	QS university ranking average score top 3 universities	20
3.2.3	Gross capital formation	18
4.2.1	Ease of protecting minority investors	8
4.3	Trade, competition, & market scale	20
4.3.3	Domestic market scale	3
6.1.5	Citable documents H index	22
6.2.1	Growth rate of GDP per person engaged	6
6.3.3	ICT services exports	1
7.2.5	Creative goods exports	16

Weaknesses		Rank
1.1.1	Political stability and absence of violence/ terrorism	113
1.3	Business environment	117
1.3.1	Ease of starting a business	114
2.1	Education	118
2.1.4	Assessment in reading, mathematics, and science	62
2.1.5	Pupil-teacher ratio, secondary	103
2.2.3	Tertiary inbound mobility	99
3.3.2	Environmental performance	110
6.2.2	New business density	101
7.2.3	Global entertainment and media market	59
7.2.4	Printing and publishing output	84
7.3.4	Video uploads on YouTube	68

The table below shows the indicators which are ranked based on outdated data (compared to base year used by Global Innovation Index in that indicator) with their base year and sources. It is recommended that concerned Ministries should coordinate with the resources given below to provide the latest data in each indicator.

S.no	Indicators	Sources	Base Year used in GII 2016
1	2.1.4 Assessment in reading, mathematics, and science	OECD Programme for International Student Assessment (PISA) (2010–12). (www. pisa.oecd. org/)	2012
2	2.1.5 Pupil-teacher ratio, secondary	UNESCO Institute for Statistics, UIS online database (2007–14). (http://stats.uis. unesco.org)	2014
3	2.3.1 Researchers	UNESCO Institute for Statistics, UIS online database (2007–14). (http://stats.uis. unesco.org)	2014
4	2.3.2 Gross expenditure on R&D	UNESCO Institute for Statistics, UIS online database (2007–15). (http://stats.uis. unesco.org)	2014
5	4.3.1 Applied tariff rate, weighted mean	World Bank, based on UNCTAD TRAINS, WTO, IDB, and UN COMTRADE databases; extracted from World Bank World Development Indicators database (2007–13). (http:// data.worldbank.org/)	2013
6	5.1.3 GERD performed by business	UNESCO Institute for Statistics, UIS online database (2007–14). (http://stats.uis. unesco.org)	2014
7	5.3.5 Research talent, % in business enterprise	UNESCO Institute for Statistics, UIS online database (2007–14); World Population Prospects: The 2015 Revision (population). (http://stats.uis.unesco.org)	2014
8	6.2.5 High- & medium-high-tech manufactures, %	United Nations Industrial Development Organization (UNIDO), Industrial Statistics Database, 3- and 4-digit level of International Standard Industrial Classification ISIC Revision 3 (INDSTAT4 2012); OECD, Directorate for Science, Technology and Industry, Economic Analysis and Statistics Division, 'ISIC REV. 3 Technology Intensity Definition: Classification of Manufacturing Industries into Categories Based on R&D Intensities', 7 July 2011 (2006–12). (http://www.unido.org/statistics. html; http://unstats.un.org/unsd/cr/ registry/ regcst.asp?cl=27; http://www.oecd.org/sti/ ind/48350231.pdf)	2012
9	7.2.4 Printing & publishing manufactures, %	United Nations Industrial Development Organization, Industrial Statistics Database; 2-digit level of International Standard Industrial Classification ISIC Revision 3 (INDSTAT2 2015) (2006–12). (http://www.unido. org/statistics.html; http://unstats.un.org/unsd/ cr/registry/ regcst.asp?cl=2)	2012

About Task Force on Innovation

Recognizing India's potential to reach great heights in innovation and creativity, a Task Force on Innovation was set up on the directions of Smt. Nirmala Sitharaman, the Commerce & Industry Minister, Government of India. The Task Force on Innovation had the mandate of assessing India's position as an innovative country, and suggest measures to enhance the innovation ecosystem in India and thus improve India's ranking in the GII. The Team, comprising of Government officials and experts from private organisations & academia, has compiled this Report to assist India in this journey.

Dr. Naushad Forbes

Co - Chairman, Forbes Marshall

Dr. Naushad Forbes is Co - Chairman of Forbes Marshall, India's leading Steam Engineering and Control Instrumentation firm. He chairs the Steam Engineering business within the group.

Forbes Marshall's deep process knowledge helps their customers save energy, improve product quality, increase process efficiency, and run a clean and safe factory. Market leadership in India and, increasingly, internationally comes from highly trained people and the depth of their knowledge. A close connect with customers enables the design of products that address customer needs around the world. The products are made in a facility that is world-class in scale, aesthetics and work environment. Forbes Marshall has consistently ranked amongst India's Great Places to Work.

Naushad was an occasional Lecturer and Consulting Professor at Stanford University from 1987 to 2004 where he developed courses on Technology in Newly Industrializing Countries. He received his Bachelors, Masters and PhD Degrees from Stanford University.

Naushad is on the board of several educational institutions and public companies.

Naushad has long been an active member of CII and was President of CII for 2016 – 17. He has at various times chaired the National Committees on Higher Education, Innovation, Technology and International Business.

Dr. Anil Wali

Managing Director at Foundation for Innovation and Technology Transfer (FITT)

Dr. Anil Wali is an IIT Delhi Doctorate,and has years of experience in specialty chemicals and clean processes. He has worked in the chemical industry for 19 years, and has several proprietary reports, patents and publications to his credit. Since 2006, Dr. Wali is the Managing Director at Foundation for Innovation and Technology Transfer (FITT) – an autonomous industry-interface organization at IIT Delhi.

Besides having strategic customer and quality orientation, Anil Wali has multifaceted experience with respect to R&D management, training, entrepreneurship, IPR policy and strategy, open innovation etc.

Dr. Wali has been a member of the Board of Management, Indira Gandhi National Open University, N. Delhi from 2013-16. He is actively associated with the major industry associations (CII, FICCI and ASSOCHAM) in India as an invited expert.

Besides looking at issues of concern to SMEs, Anil Wali is overseeing technology transfer, enabling partnerships, capacity building programs and driving innovations and incubation in the academia. Dr. Wali has piloted several industry partnership models at/ from academia. He is part of several expert committees in the Government and Academia, and lectures widely.

Dr. Gopichand (Gopi) Katragadda

Group Chief Technology Officer and
Innovation Head for Tata Sons

Dr. Gopichand Katragadda is the Group Chief Technology Officer and Innovation Head for Tata Sons. He also serves as a director on the boards of Tata Elxsi, Tata Communications, Tata Teleservices, Tata Autocomp Systems, and Flisom AG.

Previously, as Chairman and Managing Director he helped grow GE's largest R&D Centre – the John F. Welch Technology Centre (JFWTC). Under his leadership, the JFWTC team was contributing to over 300 US patents a year. Gopi also served as the chairman for GE-BEL.

Before joining GE, as VP at the US based Karta Technologies, Gopi led the development of advanced sensor technology for US government agencies and research consortiums. He also was an Adjunct Professor at the University of Texas and served on the Board of Directors for Texas Public Radio.

Gopi provides the voice of technology for various Academic and Industry bodies including CII, IET, and Anita Borg Institute. He is the current Chair of the CII National Technology Committee, Co-Chair of the Indo-UK JETCO Technology Track, and the Chair for the India Development Panel of the IET.

Gopi is a Fellow of the IET. He is a GE Certified Six Sigma Master Black Belt. Gopi has over 30 publications and 5 patents. He has authored a book on innovation "SMASH," published by Wiley.

Gopi holds MS and PhD degrees in Electrical Engineering from Iowa State University, Ames, Iowa.

Mr. Senapathy "Kris" Gopalakrishnan

Chairman of Axilor Ventures

Mr. Senapathy "Kris" Gopalakrishnan is the Chairman of Axilor Ventures, an accelerator that helps start-ups during the early stage of their business journey. Kris served as the vice chairman of Infosys from 2011 to 2014 and the chief executive officer and managing director of Infosys from 2007 to 2011. Kris is one of the co-founders of Infosys. Recognized as a global business and technology thought leader, he was voted the top CEO (IT Services category) in Institutional Investor's inaugural ranking of Asia's Top Executives and selected as one of the winners of the second Asian Corporate Director Recognition Awards by Corporate Governance Asia in 2011. He also was selected to Thinkers 50, an elite list of global business thinkers, in 2009. He was elected president of India's apex industry chamber Confederation of Indian Industry (CII) for 2013-14, and served as one of the co-chairs of the World Economic Forum in Davos in January 2014. In January 2011, the Government of India awarded Mr. Gopalakrishnan the Padma Bhushan, the country's third-highest civilian honor.

Mr Gopalakrishnan serves on the Board of Governors of Indian Institute of Technology, Madras, Indian Institute of Management, Bangalore, is the Chairman, Board of Governors of IIIT, Bangalore, Board of Governors of National Institute of Technology, Hamirpur, and is on the Board of Trustees of Chennai Mathematical Institute. He is the Chairman of the Vision Group on Information Technology of Karnataka Government and the Chairman of CII Start-up Council. Mr. Gopalakrishnan holds Master's degrees in physics and computer science from the Indian Institute of Technology, Madras. Kris is a Fellow of Indian National Academy of Engineers (INAE) and an Honorary Fellow of Institution of Electronics and Telecommunication Engineers (IETE) of India.

Dr. Nikolai Dobberstein

Partner, A.T. Kearney in India

Nikolai Dobberstein is a Partner at A.T. Kearney in India and Head of the Communications, Media & Technology Practice in Asia Pacific. He has been involved in multiple large scale transformation programs of telecom operators and technology companies in India, Southeast Asia, the Middle East and Africa. He also works closely with IMP³rove, A.T. Kearney's the European Innovation Management Academy, to help Asian companies and countries raise their innovation game.

Before joining A.T. Kearney in 2011, Nikolai was the Exco member for New Businesses & Strategy at Maxis, Malaysia's leading mobile operator. Nikolai had P&L responsibility for all data and digital businesses, launched several world-first services, and propelled Maxis into one of the global top 10 data operators.

Before Maxis, Nikolai was 12 years with McKinsey & Company, mainly in Asia. Nikolai moved back to India in April 2011, after having worked for 14 years in Malaysia. Previously, Nikolai spent 4 years in India from 1993 to 1996.

Nikolai is German and has a PhD in Technology & Innovation Management from the University of Kiel, Germany.He is married to an Indian.

Prof. Rajeev Srinivasan

Adjunct Faculty, Innovation, IIM Bangalore and
Chief Consultant, Maker Village, IIITM-K, Trivandrum

Prof Rajeev Srinivasan is an expert in innovation and strategy. He spent twenty years in engineering and management roles with technology companies such as Bell Labs and Sun Microsystems in the US. His tasks included product management for the Unix operating system, marketing massively parallel computers, and introducing Java into India. Thereafter he was a founder with several startup companies, and advised VC firms. He has taught innovation at several IIMs, and most recently managed Maker Village, a Meity-funded electronics startup incubator in Kerala. Earlier, he was director of a business school, and was a member of the panel that wrote India's first Intellectual Property Rights policy in 2016. He is a graduate of IIT Madras and the Stanford Business School. He also writes widely about technology strategy and foreign affairs.

Mr. Rajiv Aggarwal

Joint Secretary
Department of Industrial Policy & Promotion
M/o Commerce and Industry, Government of India

Rajiv Aggarwal is presently serving as Joint Secretary in-charge of administering Intellectual Property Rights in the Government of India. He is thus the key person in dealing with WIPO, as also bilateral and multilateral negotiations in the field of Intellectual Property. In addition, he was also the Controller General of Patents, Designs and Trademarks during the past year, responsible for implementation of industrial property rights including GIs. He has thus had the unique opportunity of working very closely in the field of IPRs, both at policy and execution levels. An officer belonging to the Indian Administrative Service, Rajiv Aggarwal has more than 23 years of administrative experience. He has served in various capacities and at all levels from village to the Government of India in the fields of Land Revenue Management, Agriculture & Rural Development, Housing, Urban Development & Planning, Food & Civil Supplies, Public Administration, Home etc. His vast experience includes being the District Magistrate in 9 districts, including Varanasi, Allahabad and Muzaffarnagar. In this capacity, he has handled events that attract millions of people annually. He has also undertaken the challenging assignments of Commissioner, Food & Civil Supplies and Managing Director of Lucknow Metro Rail Corporation. Rajiv Aggarwal possesses a Mechanical Engineering degree from the prestigious Indian Railways Institute of Mechanical & Electrical Engineers, as also holds a Masters degree in Business Administration.

Mr. Siddhant Chouksey

Assistant Manager, CIPAM
Department of Industrial Policy & Promotion
M/o Commerce and Industry, Government of India

Siddhant Chouksey is an Assistant Manager at Cell for IPR Promotion and Management (CIPAM), Department of Industrial Policy and Promotion (DIPP), Ministry of Commerce and Industry (MOCI), India. His role at CIPAM includes the planning and strategy making exercises for the promotion and commercialization of IPRs in India. He had worked as a Young Professional in Make in India project for one year at Department of Industrial Policy and Promotion, M/o Commerce and Industry, India.

Siddhant holds a Masters degree in Information Technology Engineering and Bachelors degree in Electronic and Communication Engineering. His research papers related to future traffic management system and heads-up display for cars have been published in international journals. Prior to all his current roles and responsibilities using his innovative skills, he has worked hard on several inventions. He already has one patent published and another two filed in India in the field of renewable energy and automobile sector. He has also filed for a patent in the field of Electric vehicles in the United States of America.

Siddhant has toiled hard in assisting the Task Force in collating and preparing this Report.

How to Read this Report

- Out of 82 indicators, 58 variables are hard data; 19 are composite indicators from international agencies, distinguished with an asterisk (*) and 5 are survey questions from the World Economic Forum's Executive Opinion Survey (EOS), singled out with a dagger (†).
- 36 indicators that were assigned half-weight are singled out with an 'a'.
- Indicators for which higher scores indicate worse outcomes, commonly known as 'bads', are differentiated with a 'b'.
- The clock symbol (🕘) represents the outdated data and needs to be updated.
- Strengths are those scores with percent ranks greater than the 10th largest percent rank among the 82 indicators in that economy. A solid circle indicates that an indicator is one of the strengths (●).
- Weaknesses are those scores with percent ranks lower than the 10th smallest percent rank among the 82 indicators in that economy. A hollow circle indicates that it is a weakness (○).
- In the representation of nations on the map, BRICS represents the 5-nations bloc of Brazil, Russia, India, China and South Africa, while CSA means the Central and South Asian region.

This report consists of:

A. **Comparative analysis of GII (2015-2016):** The table gives a bilateral comparison between the GII reports of 2015 and 2016 of all 82 indicators. For each indicator, the table shows whether the indicator is a composite indicator, World Economic Forum Executive opinion survey based indicator or a hard indicator. It also identifies whether the indicator is a weakness or strength, the weightage (full or half), bad indicators, and outdated data.

B. **Seven chapters:** These are based on the pillars of GII 2016, which are then divided into Sub-pillars and indicators. Recommendations are given for each indicator; for some indicators, double arrow sign (») is used as reference to national and international successful models/ schemes/ programs which can be adopted and/ or replicated and scaled up. These models can play a vital role in further improving India's position in that particular indicator. Recommendations made in Blue colour are recommendations where the research methodology used needs to be re-examined and suitably modified.

C. **Appendix A:** International Models, Programs and Schemes

D. **Appendix B:** National Models, Programs and Schemes

E. **Appendix C:** Source and definition of Indicators

Comparative Analysis of India's Ranking in GII 2015 & 2016

Index	Property	2015										2016									
		Score	Rank	Composite Indicator	WEF Executive opinion survey	Hard Indicators	Data outdated	Weakness	Strength	Half Wieghtage	Bad Indicator	Score	Rank	Composite Indicator	WEF Executive opinion survey	Hard Indicators	Data outdated	Weakness	Strength	Half Wieghtage	Bad Indicator
1	**INSTITUTIONS**	**50**	**104**									**50.7**	**96**								
1.1	Political environment	35.5	109									36.2	98								
1.1.1	Political stability and safety	34.8	124	*				○				38.9	113	*				○			
1.1.2	Government effectiveness	36.3	82	*								33.4	82	*							
1.2	Regulatory environment	62.4	81									61.9	77								
1.2.1	Regulatory quality	35.2	107	*						a		33.6	99	*						a	
1.2.2	Rule of law	45	63	*						a		44.9	66	*						a	
1.2.3	Cost of redundancy dismissal, salary weeks	15.7	70			✓					b	15.8	67			✓					b
1.3	Business environment	52.2	130					○				54.1	117					○			
1.3.1	Ease of starting a business	68.4	125	*				○				73.6	114	*				○			
1.3.2	Ease of resolving insolvency	32.6	118	*								32.6	110	*							
1.3.3	Ease of paying taxes	55.5	120	*								56.1	109	*							
2	**HUMAN CAPITAL AND RESEARCH**	**20**	**103**									**32.2**	**63**								
2.1	Education	26.8	126					○				26	118					○			
2.1.1	Expenditure on education	3.8	90			✓						3.8	83			✓					
2.1.2	Government expenditure on education per pupil, secondary	15.5	82			✓						15.2	83			✓					
2.1.3	School life expectancy	11.7	95			✓	◴					11.6	92			✓					

Index	Property	2015										2016									
		Score	Rank	Composite Indicator	WEF Executive opinion survey	Hard Indicators	Data outdated	Weakness	Strength	Half Wieghtage	Bad Indicator	Score	Rank	Composite Indicator	WEF Executive opinion survey	Hard Indicators	Data outdated	Weakness	Strength	Half Wieghtage	Bad Indicator
2.1.4	Assessment in reading, mathematics, and science	336	62			✓	🕘	○		a		336	62			✓	🕘	○		a	
2.1.5	Pupil-teacher ratio, secondary	25.9	97			✓	🕘			a	b	30.8	103			✓	🕘	○		a	b
2.2	Tertiary education	10.5	123					○				34.1	67								
2.2.1	Tertiary enrolment	24.8	85			✓				a		23.9	87			✓				a	
2.2.2	Graduates in science and engineering	n/a	n/a			✓						29.1	8			✓			●		
2.2.3	Tertiary inbound mobility	0.1	112			✓		○		a		0.1	99			✓		○		a	
2.3	Research and development (R&D)	22.6	44									36.4	31								
2.3.1	Researchers	155.9	75			✓	🕘					156.6	77			✓	🕘				
2.3.2	Gross expenditure on R&D (GERD)	0.8	42			✓	🕘					0.8	40			✓	🕘				
2.3.3	Global R&D companies, average expenditure top 3	NI	NI									433.9	20			✓			●		
2.3.4	QS university ranking average score top 3 universities	47	28	*					●			57.1	20		*				●		
3	**INFRASTRUCTURE**	**34.6**	**87**									**37**	**87**								
3.1	Information and communication technologies (ICTs)	38.6	86									39.2	86								
3.1.1	ICT access	30.5	115	*								31.3	108		*						
3.1.2	ICT use	6.8	117	*								8.5	107		*						
3.1.3	Government's online service	54.3	57	*								54.3	57		*						
3.1.4	Online e-participation	62.7	40	*								62.7	40		*						
3.2	General infrastructure	38.9	43									39.3	52								
3.2.1	Electricity output	911.8	94			✓				a		954.8	91			✓				a	
3.2.2	Logistics performance	46.9	52	*				○		a		3.1	52		*					a	
3.2.3	Gross capital formation	32.2	14			✓			●			30.7	18			✓			●		
3.3	Ecological sustainability	26.3	117									32.6	109								

Index	Property	2015										2016									
		Score	Rank	Composite Indicator	WEF Executive opinion survey	Hard Indicators	Data outdated	Weakness	Strength	Half Wieghtage	Bad Indicator	Score	Rank	Composite Indicator	WEF Executive opinion survey	Hard Indicators	Data outdated	Weakness	Strength	Half Wieghtage	Bad Indicator
3.3.1	GDP per unit of energy use	7	65			✓						7.5	63			✓					
3.3.2	Environmental performance	31.2	126	*								53.6	110	*				○			
3.3.3	ISO 14001 environmental certificates	0.9	70			✓				a		0.9	66			✓				a	
4	**MARKET SOPHISTICATION**	**46.5**	**72**									**50.3**	**33**								
4.1	Credit	28.1	80									29.4	78								
4.1.1	Ease of getting credit	65	34	*								65	39	*							
4.1.2	Domestic credit to private sector	51.8	64			✓						51.6	62			✓					
4.1.3	Microfinance institutions' gross loan portfolio	0.3	50			✓						0.3	43			✓					
4.2	Investment	44.3	42						●			46.6	30								
4.2.1	Ease of protecting minority investors	72.5	7	*					●			73.3	8	*					●		
4.2.2	Market capitalization	68	24			✓			●	a		76.1	21			✓				a	
4.2.3	Total value of stocks traded	33.5	25			✓			●	a		35.7	21			✓				a	
4.2.4	Venture capital deals	0.1	35			✓				a		0.1	32			✓				a	
4.3	Trade, competition & market scale	67.2	104									74.9	20						●		
4.3.1	Applied tariff rate, weighted mean	8.2	109			✓	◴			a	b	6.8	99			✓	◴			a	b
4.3.2	Intensity of local competition	63.1	88		†							60.6	96		†					a	
4.3.3	Domestic market scale	NI	NI									7411.1	3			✓			●		
5	**BUSINESS SOPHISTICATION**	**26.4**	**116**									**32.2**	**57**								
5.1	Knowledge workers	13.7	132					○				31.4	86								
5.1.1	Employment in knowledge-intensive services	n/a	n/a			✓						n/a	n/a			✓					
5.1.2	Firms offering formal training	15.9	98			✓	◴	○				35.9	42			✓					

Index	Property	2015										2016									
		Score	Rank	Composite Indicator	WEF Executive opinion survey	Hard Indicators	Data outdated	Weakness	Strength	Half Wieghtage	Bad Indicator	Score	Rank	Composite Indicator	WEF Executive opinion survey	Hard Indicators	Data outdated	Weakness	Strength	Half Wieghtage	Bad Indicator
5.1.3	GERD performed by business enterprise	0.3	43			✓	🕘			a		0.3	45			✓	🕘			a	
5.1.4	GERD financed by business enterprise	n/a	n/a			✓				a		n/a	n/a			✓				a	
5.1.5	Females employed with advanced degrees	n/a	n/a			✓				a		n/a	n/a			✓				a	
5.2	Innovation linkages	37.3	52									37	43								
5.2.1	University/industry research collaboration	47.8	48		†					a		47.8	49		†					a	
5.2.2	State of cluster development	58.4	25		†				●			56	28		†						
5.2.3	GERD financed by abroad	n/a	n/a			✓						n/a	n/a			✓					
5.2.4	Joint venture/strategic alliance deals	0	51			✓				a		0	37			✓				a	
5.2.5	Patent families filed in at least two offices	0.1	52			✓				a		0.4	37			✓				a	
5.3	Knowledge absorption	28.1	99									28.2	66								
5.3.1	Intellectual property payments	0.8	42			✓				a		0.9	32			✓				a	
5.3.2	High-tech imports	6.7	70			✓						7.1	66			✓					
5.3.3	ICT services imports	0.7	74			✓						0.8	70			✓					
5.3.4	Foreign direct investment, net inflows	1.5	98			✓						1.7	86			✓					
5.3.5	Research talent in business enterprise	NI	NI									38.7	31			✓	🕘				
6	**KNOWLEDGE AND TECHNOLOGY OUTPUTS**	**30.1**	**49**									**31**	**43**								
6.1	Knowledge creation	15.2	59									14.4	57								
6.1.1	Patent applications by origin	1.6	53			✓				a		1.6	54			✓				a	
6.1.2	PCT international applications by origin	0.2	49			✓				a		0.2	51			✓				a	
6.1.3	Utility model applications by origin	n/a	n/a			✓						n/a	n/a			✓					
6.1.4	Scientific and technical publications	7.5	77			✓				a		7	77			✓				a	

Index	Property	2015										2016									
		Score	Rank	Composite Indicator	WEF Executive opinion survey	Hard Indicators	Data outdated	Weakness	Strength	Half Wieghtage	Bad Indicator	Score	Rank	Composite Indicator	WEF Executive opinion survey	Hard Indicators	Data outdated	Weakness	Strength	Half Wieghtage	Bad Indicator
6.1.5	Citable documents H index	341	23			✓			●	a		383	22			✓			●	a	
6.2	Knowledge impact	35	84									39.3	48								
6.2.1	Growth rate of GDP per person engaged	2.4	38			✓						5	6			✓			●		
6.2.2	New business density	0.1	99			✓		○		a		0.1	101			✓		○		a	
6.2.3	Total computer software spending	0.2	68			✓		○		a		0.2	62			✓				a	
6.2.4	ISO 9001 quality certificates	6	57			✓				a		5.5	59			✓				a	
6.2.5	High-tech and medium high-tech output	32.5	32			✓	◴			a		31.7	36			✓	◴			a	
6.3	Knowledge diffusion	40.1	34						●			39.2	26								
6.3.1	Intellectual property receipts	0.1	57			✓				a		0.1	45			✓				a	
6.3.2	High-tech exports	3.5	39			✓			●	a		3.5	37			✓				a	
6.3.3	ICT services exports	10.1	1			✓			●	a		10.7	1			✓			●	a	
6.3.4	Foreign direct investment, net outflows	0.1	92			✓						0.5	60			✓					
7	**CREATIVE OUTPUTS**	**25.9**	**95**									**22.5**	**94**								
7.1	Intangible assets	37.9	101									34.8	98								
7.1.1	Trademark application class count by origin	27	75			✓						27	72			✓					
7.1.2	Industrial designs by origin	n/a	n/a			✓				a		0.8	72			✓				a	
7.1.3	ICTs and business model creation	51.7	84		†							51.5	87		†						
7.1.4	ICTs and organizational model creation	48.1	86		†							53.7	64		†						
7.2	Creative goods and services	17.3	77									19.1	72								
7.2.1	Cultural and creative services exports	0.1	59			✓				a		0.1	45			✓				a	
7.2.2	National feature films produced	1.5	65			✓	◴			a		2	54			✓				a	

Index	Property	2015										2016									
		Score	Rank	Composite Indicator	WEF Executive opinion survey	Hard Indicators	Data outdated	Weakness	Strength	Half Wieghtage	Bad Indicator	Score	Rank	Composite Indicator	WEF Executive opinion survey	Hard Indicators	Data outdated	Weakness	Strength	Half Wieghtage	Bad Indicator
7.2.3	Global entertainment and media market	0.2	58			✓		○		a		0.1	59			✓		○		a	
7.2.4	Printing and publishing output	0.7	84			✓	◴					0.6	84			✓	◴	○			
7.2.5	Creative goods exports	2.5	18			✓			●			2.9	16			✓			●		
7.3	Online creativity	10.3	78									1.3	101								
7.3.1	Generic top-level domains (gTLDs)	1.1	104			✓						1	98			✓					
7.3.2	Country-code top-level domains (ccTLDs)	0.7	92			✓						0.7	84			✓					
7.3.3	Wikipedia monthly edits	264.6	102			✓						264.6	96			✓					
7.3.4	Video uploads on YouTube	37.3	68			✓		○				1.5	68			✓		○			

Rank Increased

No change in ranking

Data not available

Rank Declined

New Indicator (NI)

GII: An Indian Perspective

Pillars

Indicators

Recommendations

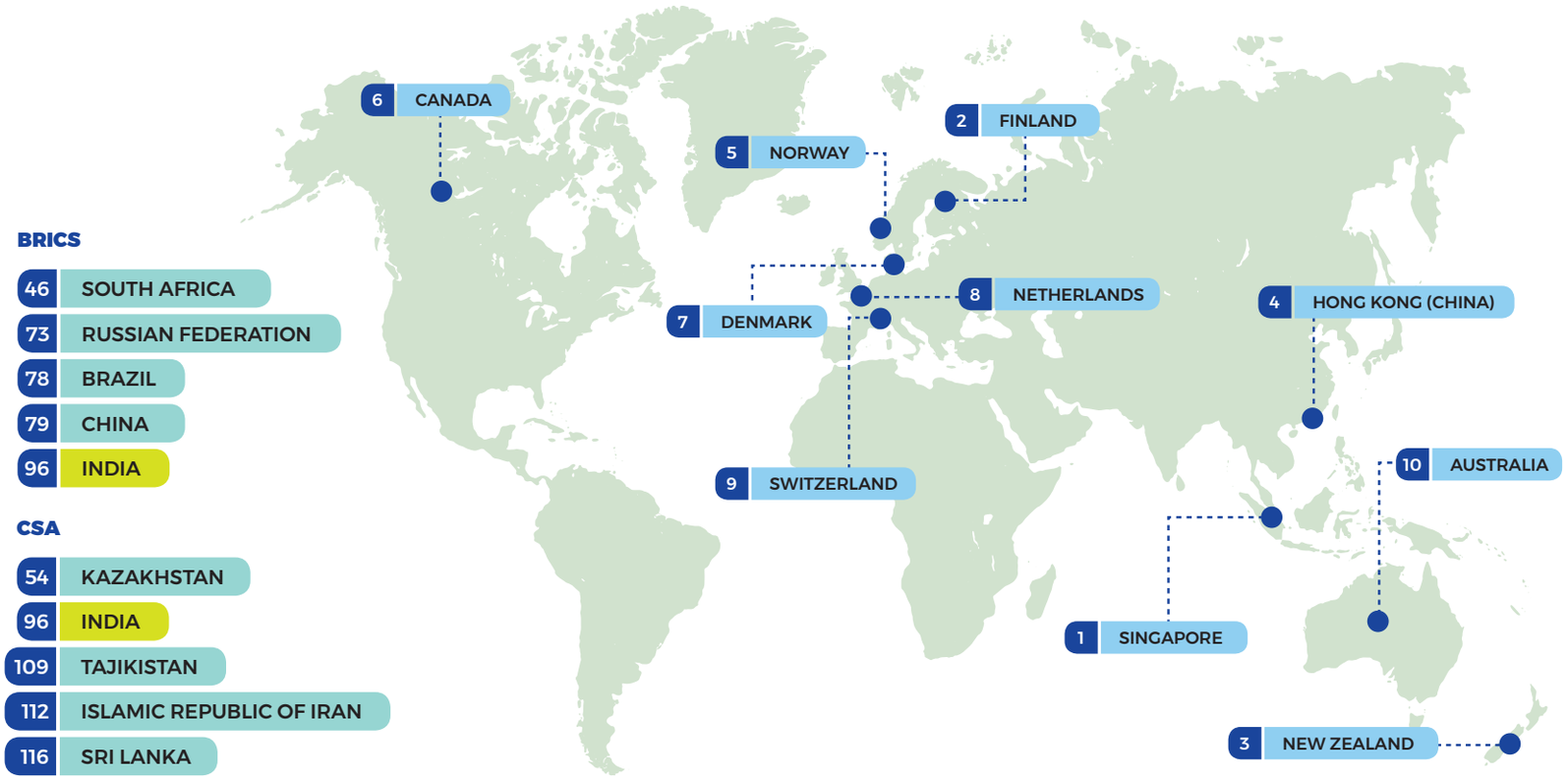
1 INSTITUTIONS

India's rank for the **Institutions pillar** was 96 out 128 countries in 2016, lagging behind most of the BRICS economies and selected Asian economies. However, relative to India's own position in 2015, there has been a marked improvement in rank from 104 to 96.

The pillar comprises three sub-pillars, namely ***Political environment***, ***Regulatory environment***, and ***Business environment*** with a total of eight individual indicators. It is clear from the following table, India's rank has improved under all sub-pillars in 2016 vis-a-vis 2015.

S. No	Indicator	Rank in 2015	Rank in 2016
1	**INSTITUTIONS**	104	96
1.1	Political environment	109	98
1.2	Regulatory environment	81	77
1.3	Business environment	130	117

Top Ten Ranking 2016: Institutions



1.1: Political environment

For this sub-pillar, the improvement in rank was driven by an increase in score for *political stability and absence of violence/ terrorism* by 4.1 from 2015 to 2016.

S. No	Indicator	Rank in 2015	Rank in 2016
1.1	**Political environment**	**109**	**98**
1.1.1	Political stability and absence of violence/ terrorism	124	113
1.1.2	Government effectiveness	82	82

RECOMMENDATIONS

1.1.1: Political stability and absence of violence/ terrorism

[Political stability and absence of violence/ terrorism index]*

a. "Political stability and absence of violence/ terrorism", as defined in GII 2016, is "Index that captures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically motivated violence and terrorism". India's rank on this parameter is a lowly 113 out of a total of 128 countries. Clearly, with a vibrant and stable democracy, the largest in the world, ever since Independence 70 years ago, India deserves much better. The ranking needs to be based on a quantifiable methodology approach, rather than the present composite indicators approach.
b. An objective measure such as the number of unconstitutional changes in government in last 50 years or since independence (whichever is later), should be used to better capture the status of any country under this indicator.
c. Violence and terrorism are a sad fact of life that all nations have to face. Thus, adding this factor here may not really be appropriate.

1.1.2: Government effectiveness

[Government effectiveness index]*

a. A program should be designed in a way which increases the synergies between different Ministries and Departments so that efforts can be combined in a particular direction or project to give better output.
b. Adoption of new technologies should be promoted in government organizations to further increase efficiency of work.

1.2: Regulatory environment

Notwithstanding the improvement in rank for the ***Regulatory environment*** sub-pillar, the scores for two of the indicators have deteriorated from 2015 to 2016, namely, *Regulatory quality* (decreased by 1.6) and *Rule of Law* (decreased by 0.1). Based on the existing methodology used to compute the ranking for this sub-pillar, several key areas have been identified to strengthen our regulatory environment, thereby improving India's GII ranking.

S. No	Indicator	Rank in 2015	Rank in 2016
1.2	**Regulatory environment**	**81**	**77**
1.2.1	Regulatory quality	107	99
1.2.2	Rule of law	63	66
1.2.3	Cost of redundancy dismissal, salary weeks	70	67

RECOMMENDATIONS

1.2.1: Regulatory quality

[Regulatory quality index[a]]*

a. Systematically carrying out ex-ante and ex-post estimates of economic benefits of regulatory reforms as well as creating the necessary policies, institutions, and processes to implement transparent, evidence based regulation-making system (using best practice tools), would greatly enhance the country's position.
b. Regulations should be made and enforced only after careful thought, and necessary stakeholder consultation.
c. However, even as any such regulations should keep in mind the state of our domestic industry and needs of our people, they should not be unnecessarily restrictive or out of sync with global best practices.
d. Predictability and continuity in policies are of paramount

importance hence a consistent effort in this direction should be considered by policy makers.

e. An increased focus on improving the procurement cycle from project design through the tendering process, and to the contract management would help mitigate risks of waste and corruption. Additionally, extending the use of regulatory quality tools, including competition assessments, to all new regulations would enhance the quality.

1.2.2: Rule of law

[Rule of law index[a]]*

a. There is a need to fill up the vacancies of Judges, especially at the district level, by timely appointments, as well as to revise, repeal and update the old laws to be in sync with modern technologies and latest developments in various fields. The establishment of Commercial Courts is a step in the right direction.
b. Establishment of an Indian Judicial Service at an all India level would help bring uniformity in application of law and dispensation of justice.
c. The states have an important role to play in areas such as order and security, fundamental rights, civil justice, criminal justice and informal justice. Measures need to be taken so that the states work in harmony with each other and help to reduce disparity amongst them.
d. Develop Training Material/ Toolkits for enforcement agencies and various stakeholders in the fields of law which are at nascent stage, like IPRs should be treated as priority.

1.2.3: Cost of redundancy dismissal, salary weeks

[Sum of notice period and severance pay for redundancy dismissal (in salary weeks, averages for workers with 1, 5, and 10 years of tenure, with a minimum threshold of 8 weeks[b]]

a. Stricter enforcement of contracts would also make the employer-employee relationship more transparent and thus enable such contracts to have better severance terms.
b. Guidelines should be made in order to govern the employer-employee relationship so as to foster better working environment.

1.3: Business environment

The improvement in ***Business environment*** has been driven by an increase in score for *Ease of starting a business* (by 5.2 points) and *Ease of paying taxes* (by 0.6 points) between 2015 and 2016. There is a need to enhance the indicators to provide details regarding legislative structure, which promote innovation and protect the rights of the innovator.

It is noted that the Doing Business Report ranks the nations based on a survey, instead of the actual logs and the position as per law. This may be inappropriate as perceptions are many times flawed and not based on the assumptions of the study. So the ranking should be based on position in law and the actual logs shared by the government.

S. No	Indicator	Rank in 2015	Rank in 2016
1.3	**Business environment**	**130**	**117**
1.3.1	Ease of starting a business	125	114
1.3.2	Ease of resolving insolvency	118	110
1.3.3	Ease of paying taxes	120	109

RECOMMENDATIONS

1.3: Business environment

[Ease of starting a business (distance to frontier)]*

a. It is observed that in the methodology, the cost is measured as percentage (%) of per capita income of the country. In India, while the country's per capita income is low, the cost is calculated based on the case study cities- Delhi and Mumbai- as percentage of per capita income. To have comparison of costs across cities, the calculations of such costs should be in terms of purchasing power parity (PPP) terms, instead of as the percentage of per capita income of the country. Alternatively, the per capita income of the case study cities should be considered to have a fair comparison; costs vary depending on the cost of living index, which is much higher in the case study cities vis a vis the rest of the country as a whole.
b. The list of respondents/ contributors is not even across nations. The reforms undertaken by a country, or the prevalent procedures, are measured by relying on the statement of a few respondents in countries like New Zealand/ Singapore with just 3 to 4 respondents

per indicator. While in case of India, the respondents are 30 to even 80 in few of the indicators. Most of the times, respondents are not aware of actual government procedures specific to the issue. Due weightage should be given to proof submitted by Governments.

c. In order to truly understand the business environment of a country in terms of innovativeness, the entire set of values need to be accounted for. The World Bank report comprehensively measures 10 indicators and assesses prevailing laws and practice. There is a need to enhance the indicators in GII to include more, if not all, of these 10 indicators. For starting a business, a basic requirement of industry is getting an electricity connection. The ease of 'Getting Electricity' from World Bank Doing Business Report for assessing the business environment of country should be included as a data point.

d. For large countries like India, drawing respondents from only 2 cities is not a true representation of the ground realities. Thus, more geographical regions need to be covered in the World Bank report, and these will get automatically reflected here in the GII ranking also.

1.3.1: Ease of starting a business

[Ease of starting a business (distance to frontier)]*

a. Simplify the process for registration of company
b. Remove Company Seal requirement, especially from Bank Account opening forms
c. Alternative for digital signature to be introduced such as user name/ OTP, e-signature, etc.
d. Integrate PAN and TAN registration into a single application/ process
e. Mandate online submission of documents for PAN registration for companies and eliminate hard copy submission
f. Generate e-PAN card and number
g. Reduce time and cost for PAN/ TAN registrations
h. Mandate online GST registration within one day and inspections, if required, should be replaced by post-registration advisory visits.
i. Make registration for ESIC real time with no hard copy submission and no need for physically signed certificate
j. Reduce time for EPFO/ ESIC registrations
k. Integrate ESIC/ EPFO registration into an online single form
l. Make registration under Mumbai Shops and Establishment Act online and real time eliminating the requirement of inspection for granting registration

Models, Programs or Schemes which may be adopted and/ or replicated and scaled up:

- » JOBS ACT (A.13)
- » Industrial Corridor (B.28)
- » Make in India (B.30)
- » GST (B.33)
- » Startup India (B.34)

1.3.2: Ease of resolving insolvency

[Ease of resolving insolvency (distance to frontier)]*

a. The Insolvency and Bankruptcy Code, 2016 aims to promote entrepreneurship, availability of credit, and balance the interests of all the stakeholders by consolidating and amending the laws relating to reorganization and insolvency resolution of corporate persons, partnership firms and individuals in a time bound manner and for maximization of value of the assets of such persons and matters connected therewith or incidental thereto. This will have a positive impact on India's rank in upcoming years.
b. Provisions should be made for:
   - Debtors to initiate both liquidation and reorganization proceedings
   - Creditors to initiate both liquidation and reorganization proceedings
   - Debtor (or an insolvency representative on its behalf) to continue performing contracts essential to the debtor's survival
   - Allowing the debtor (or an insolvency representative on its behalf), after commencement of insolvency proceedings, to obtain financing necessary to function during the proceedings.
   - Post-commencement finance to receive priority over ordinary unsecured creditors during distribution of assets
   - Reorganization plan to be voted on only by the creditors whose rights are modified or affected by the plan
   - Creditors entitled to vote on the plan are divided into classes, each class votes separately and the creditors within each class are treated equally
   - Dissenting creditors to receive as much under the reorganization plan as they would have received in liquidation

- Creditors to participate in the selection of an insolvency representative
- Creditors to approve the sale of substantial assets of the debtor in the course of insolvency proceedings
- Individual creditor to object to a decision of the court or of the insolvency representative to approve or reject claims against the debtor brought by the creditor itself and by other creditors

1.3.3: Ease of paying taxes

[Ease of paying taxes (distance to frontier)]*

a. Simplify the forms for filing Income Tax return, VAT return, CST return and GST return, EPFO(Employees' Provident Fund Organisation) and ESIC(Employees' State Insurance Corporation) return. To make return filing mandatorily online (including GST) along with e-payment.
b. Any form of excess credit should promptly be refunded to applicants as is prevalent in the current VAT laws.
c. Devising a mechanism to reduce the time to comply and complete corporate income tax audit.
d. Mandate a single return, single challan and online payment of fees for EPFO and ESIC
e. Mandate unified e-filing, returns and payment of contributions for EPFO and ESIC by eliminating offline filing of returns and payment

Models, Programs or Schemes which may be adopted and/ or replicated and scaled up:

» GST (B.33)

2 HUMAN CAPITAL AND RESEARCH

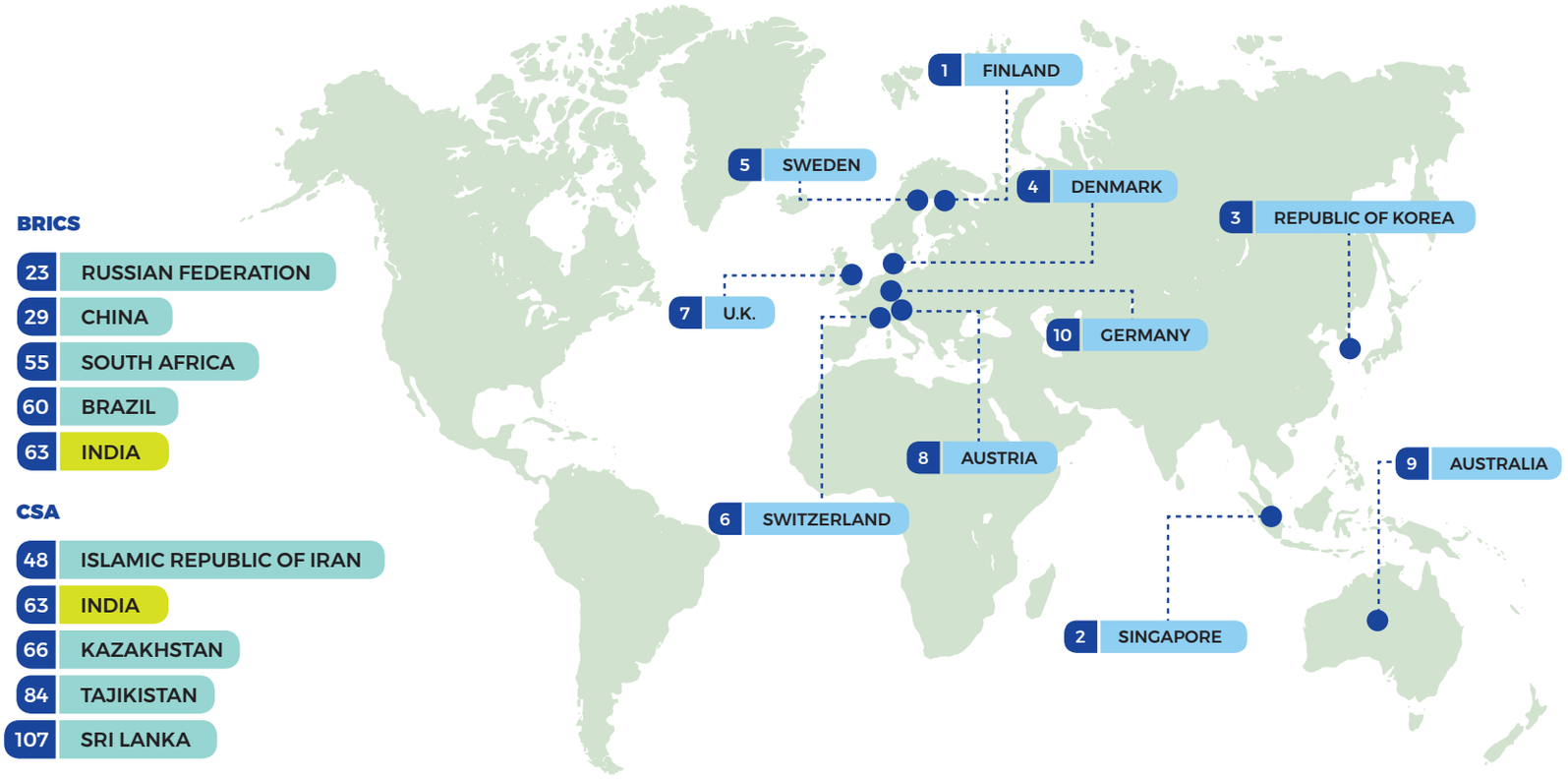
Human capital and research is a very important component in the Global Innovation Index framework for India, as improvement in the human capital and research score has long term implications on improving a country's global ranking. India's rank for the **Human Capital and research** pillar was 63 out of 128 countries in GII 2016, lagging behind most of the BRICS economies and select Asian economies except Indonesia. However, there was a significant jump of 40 places over its own 2015 rank of 103. Clearly, this pillar offers immense scope for energising the innovation landscape in India.

The pillar comprises three sub-pillars, namely ***Education***, ***Tertiary education*** and ***Research & Development (R&D)*** with a total of twelve individual indicators. The following table gives the change in rank compared to 2015. The improvement in ranking from 2015 to 2016 was driven primarily by the ***Tertiary Education*** sub-pillar.

Most of the parameters under human capital and research sub-index can be addressed only from a medium to long term perspective to realize durable effects on the innovation index score. Although gradual in take-off, improvement in the education sector, given its nature, has long term implications for improving the country's global ranking by impacting several dependent parameters.

S. No	Indicator	Rank in 2015	Rank in 2016
2	HUMAN CAPITAL AND RESEARCH	103	63
2.1	Education	126	118
2.2	Tertiary Education	123	67
2.3	Research & Development (R&D)	44	31

Top Ten Ranking 2016: Human Capital and research



2.1: Education

Even though there has been an improvement in the rank for indicators such as *Expenditure on education(% GDP)* and *School Life Expectancy (years)* in 2016 over the previous year, the score has either remained constant or deteriorated- it is felt that increased budgetary allocation by the Government may ensure an upward trajectory. For instance, the parameter *Government expenditure per pupil, secondary (% GDP pc)* is a function of the *Expenditure on education (% GDP)*. While increasing enrolment is the desired objective of the Government, expenditure on education per pupil can be impacted only when the overall expenditure on education is increased. The effect on ranking will show up in 2-3 years after increased allocation gets reflected in the relevant database; there is thus an urgent need to act upon this.

Similarly, a constant score in the indicator *PISA scales in reading, maths, science* is hardly a solace. Several countries including the developed ones are prioritizing the study of mathematics and science in schools. It is ironic that a country, which has produced geniuses in mathematics and given the concept of zero to the entire world, does not have adequate number of good teachers in mathematics and sciences. Even apart from GII, a strong emphasis on this parameter will fundamentally strengthen the innovation capacity as also academic prowess of the younger generation in the country.

S. No	Indicator	Rank in 2015	Rank in 2016
2.1	**Education**	**126**	**118**
2.1.1	Expenditure on education	90	83
2.1.2	Government expenditure per pupil, secondary	82	83
2.1.3	School life expectancy	95	92
2.1.4	Assessment in reading, mathematics, and science	62	62
2.1.5	Pupil-Teacher ratio, secondary	97	103

RECOMMENDATIONS

2.1: Education

The current indicators and strategy in this report are all based on Science 1.0 and Education 2.0. But we should be looking at Science 2.0 & Education 3.0, which will disrupt the way we learn and create new knowledge.

A simple note on Science 2.0 and Education 3.0 is enclosed in Annexure B.36. Indicators as well as strategies pertaining to the *rapidity of movement* from current practice of Science 1.0 to Science 2.0 and from Education 1.0 to Education 2.0 should be designed and included.

It should be noted that the goal of Education 2.0 was to create homogenised workforce equipped with basic skills produced in the cheapest and most efficient way possible. Goal of Education 3.0 will be the creation of knowledgeable and adaptable workforce, who can work with others in the new innovation economy.

In that context, we will have to make qualitative shifts, which will be as follows:

STUDENTS	
From	**To**
Completing	Creating
Consuming	Producing
Memorising	Processing
Isolation	Collaboration
Answering	Asking

TEACHERS	
From	**To**
Teacher centred	Student driven
Mass production	Mass communication
Presenter	Facilitator
Telling	Listening
Content experts	Process experts

Metrics for measuring and monitoring these will have to be continuous work-in-progress, at least in the near future.

2.1.1: Expenditure on education

[Government expenditure on education (% of GDP)]

a. Government spending on education has a direct bearing on the score for the **Education** sub-pillar and thus calls for prioritizing such expenditure – more particularly at the primary level where a given quantum of budget can have a larger bearing on the overall numbers. The increase in spending should come with suitable reform measures to ensure better and more efficient resource utilization.

Models, Programs or Schemes which may be adopted and/ or replicated and scaled up:

- » Sarvya Siksha Abhiyaan (B.20)
- » Uchchatar Avishkar Yojna (B.31)
- » Beti Bachao Beti Padhao Yojna (B.13)

2.1.2: Government expenditure per pupil, secondary

[Government expenditure per pupil, secondary (% of GDP per capita)]

a. This parameter is a function of the government expenditure on education. While there was an increase in the score, the rank actually came down. This may be due to increased enrolment on account of various Government initiatives like *Rashtriya Madhyamik Shiksha Abhiyan* and other initiatives. While increasing enrolment is the desired objective of the Government, expenditure on education per pupil can be impacted only when the overall expenditure on education is increased as at 2.1.1. The effect on ranking may show up in 2-3 years after increased allocation gets reflected in the relevant database.

b. Targeting more teachers in the education field through measures like increasing intake of specialized/ qualified teachers, reducing the administrative workload of teachers, increasing the application of technology in teaching methods and introducing incentive schemes (e.g. tenure extension on appraisal) will also help to attract, retain and reward people in the teaching profession.

Models, Programs or Schemes which may be adopted and/ or replicated and scaled up:

- » Beti Bachao Beti Padhao Yojna (B.13)
- » Rashtriya Madhyamik Shiksha Abhiyan (B.18)
- » Uchchatar Avishkar Yojna (UAY) (B.31)

2.1.3: School life expectancy (years)

[School life expectancy, primary to tertiary education (years)]

a. Enlist the services of credible NGOs and other organizations to help enhance the school enrolment/ school life expectancy. Any successful local model in this regard can be scaled-up/ replicated in other needy areas.

b. Suitable incentive structures (eg Direct Benefit Transfer) may be designed to encourage marginalized children to complete their education till at least the 10th grade, if not 12th.

c. Open distance-learning (ODL) system of education (eg. National Institute of Open Schooling) should be promoted and strengthened as this is an effective and economical mode of providing quality education. In another successful instance, IGNOU has an amazing reach and enrolment with good quality offerings albeit, at post-school levels. Such models need to be promoted/ encouraged with greater vigour, given our vast difficult-to-access hinterland. This also helps students in special situations.

d. Retired school teachers, particularly in rural areas, can be mobilized (with due incentives) to sensitize the community members on the merits of longer schooling.

e. Panchayats can be mobilized to spread awareness about the advantages of increased formal schooling.

f. Campaigns like '*Beti Padhao Beti Bachao*' need to be sustained.

g. The no-detention policy may be suitably designed at primary school level, without diluting the learning standards.

h. Government schools across the country need to be revitalized by upgrading the syllabus and learning content based on experiential learning. Organizations like the Agastya Foundation and Pratham Foundation can be leveraged for the same.

i. While the Mid-Day Meal scheme has definitely had a positive impact on increasing enrolment at the primary and middle school levels, it could be suitably adapted to enhance the quality of teaching and learning also.

Models, Programs or Schemes which may be adopted and/ or replicated and scaled up:

- » Beti Bachao Beti Padhao Yojna (B.13)
- » Sarva Shiksha Abhiyan (B.16)
- » Agastya (B.15)

2.1.4: Assessment in reading, mathematics, and science

[PISA average scales in reading, mathematics, and science [a]]

a. Recruitment of higher number of teachers, particularly in the science and mathematics stream, and induction after suitable orientation programs will enhance their capacities and capabilities.

b. Novel pedagogical tools and curriculum design may be adopted to shore up the interest of students in mathematics and science subjects.

c. Re-employment of retired but good teachers to address shortage of science and maths teachers in schools should be done.

d. Courses like Intellectual Property Rights should be incorporated in school curriculum.
e. In GII 2016, base year for data needed to rank countries in this indicator was 2012; however, data provided by India in this indicator was even further outdated.

Models, Programs or Schemes which may be adopted and/ or replicated and scaled up:

» Quality Improvement Program (B.17)
» National Program for Technology Enhanced Learning (B.10)

2.1.5: Pupil-Teacher ratio, secondary

[Pupil-teacher ratio, secondary [a, b]]

a. Smaller class sizes would obviously improve our ranking in this indicator; however, given the huge requirement of infrastructure and teachers, this may be taken up progressively depending on availability of resources.
b. Reducing the ratio shall trigger increase in the requirement of secondary school teachers (as also at other levels) in the country. However, existing vacancies ought to be filled up first.
c. Targeting more teachers in the education field calls for measures like increasing intake of specialized/ qualified teachers, reducing the administrative workload on the teachers, increasing the application of technology in teaching methods and introducing incentive schemes (eg tenure extension on appraisal) to attract, retain and reward people in the teaching profession.
d. A suitable orientation program may be put in place for those qualified and interested persons who lack a B.Ed. qualification for recruitment as regular teachers to cope with teacher scarcity, particularly in the backward hinterland.
e. Where feasible, retired teachers (with verifiable good credentials) can be re-employed to supplement teacher shortages.
f. In GII 2016, base year for data needed to rank countries in this indicator was 2014; however, data provided by India in this indicator was even further outdated. There is an urgent need for making available updated data.

2.2: Tertiary education

The improvement in rank for the ***Tertiary Education*** sub-pillar has been driven majorly by the inclusion of data for the indicator *% Graduates in Science and Engineering* which was previously not reported for India. India has a high rank of 8 on this indicator with a score of 29.1. The *gross tertiary enrolment %* in the last two years has been nearly constant for India.

S. No	Indicator	Rank in 2015	Rank in 2016
2.2	**Tertiary Education**	**123**	**67**
2.2.1	Tertiary Enrolment,	85	87
2.2.2	Graduates in Science and Engineering,	n/a	8
2.2.3	Tertiary inbound mobility,	112	99

RECOMMENDATIONS

2.2: Tertiary education

a. There is scope for marked improvement if vocational trainings are also considered (if not already) as a component of tertiary education, as it directly impacts skill development.
b. A new indicator that could potentially be included in this sub-pillar is the share of *Science & Engineering (S&E) doctoral degrees as a % of total doctoral degrees granted.* According to the data reported by the University Grants Commission (UGC), India compares well with Switzerland, and performs better than Germany, Japan and Korea while just lags behind United States, China and Taiwan

2.2.1: Tertiary enrolment,

[School enrolment, tertiary (% gross)[a]]

a. Community college model is a sound model for India, as long as quality considerations are scrupulously adhered to, not merely in terms of building numbers but to strengthen the underlying capacity.
b. The Prime Minister's Fellowship Scheme for Doctoral Research should be leveraged by the industry to drive innovation big-bets for long-term advantage for the nation. Industry needs to take a lead in publicizing and ensuring sustainable quality of the program.

2.2.2: Graduates in science and engineering,

[Tertiary graduates in science, engineering, manufacturing, and construction (% of total tertiary graduates)]

a. More IITs, IIITs and NITs should be opened across the country so as increase the number of engineers as well as quality of education

Models, Programs or Schemes which may be adopted and/ or replicated and scaled up:

» Quality Improvement Program (B.17)
» KIRAN (B.12)
» National Scheme of Apprenticeship Training (B.9)
» PM Fellowship Scheme for Doctoral Research (B.35)

2.2.3: Tertiary inbound mobility

[Tertiary inbound mobility ratio (%)[a]]

a. There is a need for calibrated yet quality expansion of top institutions for increased intake. A limited number of places in top public Universities can also be earmarked for bright foreign students, particularly at PG/ doctoral levels,
b. It is essential to identify a critical few (say, ten) existing universities or academic institutions for research and innovation excellence in order to create a road map for 25 years for the selected universities to rank in the global top 100 universities. The government should further ensure adequate funding to meet global benchmarks and create avenues to attract foreign students and women to create a diverse and idea rich environment.
c. The methodology for this sub-pillar can also be assessed in terms of the need and weightage for the *% tertiary inbound mobility* indicator. In a large country like India, students from various States travel to other States for tertiary education. Given the gigantic numbers of Indian students and the pressure on admissions, the number of foreign students will always be very low. Thus, this data point should be either completely done away with, or its weightage reduced further.

Models, Programs or Schemes which may be adopted and/ or replicated and scaled up:

» Knowledge Transfer Partnership (A.10)

2.3: Research & Development (R&D)

The ranking for the ***Research & Development (R&D)*** sub-pillar has been positively affected by the inclusion of the *Global R&D, top 3 average spending (US$ mn)* indicator for the first time in GII 2016 where India has a high rank of 20. The increased emphasis of the government on enrolling more doctoral students should also positively impact the *Researchers, FTE/ mn pop* indicator. However, this can be sustained only if such students find more work opportunities.

The score and the rank for *GERD as a % of GDP* continue to be stable. While the present 0.8% GDP spent on R&D is inadequate, there is a good prospect of improving on these parameters as there is a constant call from various quarters to increase the science and technology budget. The policy initiatives like Make in India, increasing FDI and availability of a huge talent pool is attracting global R&D companies and this is giving a respectable score and rank to India.

S. No	Indicator	Rank in 2015	Rank in 2016
2.3	**Research & Development (R&D)**	**44**	**31**
2.3.1	Researchers	75	77
2.3.2	Gross expenditure on R&D (GERD)	42	40
2.3.3	Global R&D companies, average expenditure Top 3,	n/a	20
2.3.4	QS university ranking, average score top 3 university	28	20

RECOMMENDATION

2.3: Research and Development

a. Channeling CSR funds to R&D
   - In order to promote R&D expenditure by companies, there is a need to create awareness about R&D being considered as a CSR activity. Communication to companies about this provision would go a long way towards increasing the financial commitment on R&D efforts. There could be special notification in this regard issued by the Ministry of Corporate Affairs. Social media would play a key role in disseminating information on this aspect.
   - Funding programs like Society for Innovation and

Entrepreneurship, IIT Mumbai (Appendix) should be created by companies and R&D labs, research associations, universities for channeling CSR funds to R&D.

b. 200 percent weighted deduction on R&D expenses should be maintained in order to incentivize
   - According to the Income Tax Act, Section 35, 1 (i) - sum paid to a research association which has as its object the undertaking of scientific research or to a university, college-the weighted deduction under is currently 175%. This should be increased to 200%. This would promote R&D expenditure and also support R&D by universities and colleges.

c. Continue R&D incentives and redefine private sector's R&D to include translation of research outputs to commercial production including design and procurement of IP under 35 (2AA) and (2AB) of Income Tax Act.
   - Current estimates of private sector investment into R&D are generally limited to those incurred for direct research in a laboratory in the form of plant and machinery, manpower, consumables and utilities. They do not cover costs relating to translation of R&D like test-bed, design and development, standardization, field costs, etc., as well as pre-commercialization trial production. These are not currently considered as R&D investment by industry while providing Income Tax benefits. R&D spends of the private sector should be redefined to include translation of research outputs to commercial production including design and procurement of IP under 35 (2M) and (2AB) of Income Tax Act.

d. Ease accreditation of private sector's "in-house R&D" by a professional accrediting agency or self-declaration should be implemented
   - Currently Indian industry needs to be recognized by government as "in-house R&D units" to avail benefits. However, the process of such recognition is often cumbersome and complex. This is crucial to provide a hassle free environment for private sector to invest in R&D and create innovative products from India for domestic and global markets. There should be ease accreditation of private sector's "in-house R&D units" by a professional accrediting agency or self-declaration.
   - Department of Revenue should consider providing the applicable incentives u/s 35(2AB) of IT Act, 1961 for R&D.

e. Reintroduce Section 80-1B (8A) of Income Tax Act, to encourage setting up "R&D firms" and "Design firms"
   - Currently manufacturing companies who have government-recognized R&D units get income tax benefits on expenditure on R&D and design. In the past, there used to be a special benefit to firms who used to do only R&D, not manufacturing. This benefit saw a surge successful Indian R&D firms who in turn started manufacturing activities. This special benefit has been repealed by the government.

f. An amount of Rs 6,787.08 crores as R&D Cess (levied @ not more than 5% on all import of technologies as per the R&D Cess Act, 1986) has been collected since 1996-97 upto 2015-16. Technology Development Board (TDB) was created under the TDB Act, 1995 on 1st September, 1996 to spend the funds generated as R&D Cess. Till 2015-16 however, only Rs 579.17 crores (about 9 %) had been made available to TDB. This defeats the very purpose for which this Cess was created. The entire amount should be made available for R&D.

g. With the coming in of GST, the R&D Cess Act is being repealed. However, a mechanism should be developed to generate and provide funds for R&D.

h. Translation of basic research to practical application is vital for the lifecycle of an innovation. Hence, Collaboration and cooperation between academia and industry is the need of the hour.

i. The R&D institutions and innovators should work in the direction of finding solutions to the challenges faced by the industry, so that the probability of commercialization of the R&D output will be higher.

j. Incentivizing Commercialization of IPRs in Government R&D Labs should be done.

k. The present HR incentive structure in Government R&D Labs in India only incentivizes registration of patents but not commercializing of developed technology and products. Most of these patents are not adapted for commercialization. Also, higher incentives to the individual scientists, even in terms of percentage of commercial revenues, may be considered.

l. Enable valuation of IP rights as intangible assets by application of appropriate methodologies and guidelines facilitating securitization of IP rights and their use as collateral by creation of enabling legislative, administrative and market framework.

m. Public research institutions should be allowed access to Traditional Knowledge Digital Library (TKDL) for further R&D, while the

possibility of using TKDL for further R&D by private sector may also be explored, provided necessary safeguards are in place to prevent misappropriation.

n. Expired patents can be of great use to increase productivity of industries economically.

o. Dynamic Utilities allows the stakeholders to conduct searches on the granted and published patent databases, conduct searches to ascertain the status of patent, access the desired information on a real-time basis, search the patent information using combination of various search parameters, access on real-time basis the examination reports issued by the office. Same can be leveraged by the R&D institutes and Universities.

p. There has been a constant demand to increase the R&D spend to initially at least 2%, and eventually 3%, of our GDP. It has steadfastly remained around 0.8 to 0.9%. This is because around two-third of this spend is from the Government, with the industry investment in R&D being well below its potential as also global averages. The ratios in the advanced world are exactly the reverse. So the only way to push up the R&D spend is by increasing the private sector R&D spend. This requires innovative incentives and stimuli.

q. To increase the R&D spend as well as to derive great benefits, all the socio-economic ministries must have a Science & Technology Advisory Board with a dedicated funding instrument. Ministry of Petroleum and Natural Gas is the only one that has this with OIDB funding since 1982 and as a result great benefits to Indian refining industry are there for everyone to see. Other ministries have had either sporadic or non- existent efforts. The Government must mandate every Ministry to follow suit.

2.3.1: Researchers

[Researchers, full-time equivalence (FTE) (per million population)]

& 2.3.2: Gross expenditure on Research and development

[GERD: Gross expenditure on R&D (% of GDP)]

a. Recruitment in technical domains - both in industry and other organizations - should be increased & preferably shift to more qualified personnel (PSUs can be asked to start with this)

b. Efforts of organizations to recruit more number of qualified (Masters/ Ph.D.) personnel may be appropriately incentivized.

c. Budgetary support to non-strategic R&D sectors should be increased

d. Provision of CSR investments in R&D infrastructure and research programs in Universities should be encouraged

e. Adequate tax incentives should be provided on bona-fide R&D expenditure.

f. Increase in industry – academia research collaboration will induce higher R&D expenditure.

g. For GII 2016, the base year for the indicator, Researchers, FTE/ mn pop is 2014, but the data provided by India is outdated. We need to provide updated data.

h. For GII 2016, the base year for the indicator, Gross expenditure on R&D, %GDP is 2014, but the data provided by India is outdated. We need to provide updated data.

Models, Programs or Schemes which may be adopted and/ or replicated and scaled up:

- Knowledge Transfer Partnership (A.10)
- Pfizer-IIT Delhi Innovation and IP Program (B.1)
- IIT Madras Research Park (B.2)
- Society for Innovation and Entrepreneurship (B.7)
- Sosa, Israel (A.16)
- Basecamp Innovation Centre (A.17)
- Get in the Ring (A.18)
- Global Innovation Fund (A.19)
- Global Innovation Initiative (A.20)
- European Institute of Innovation and Technology (A.21)

2.3.3: Global R&D companies, average expenditure Top 3

[Average expenditure of the top 3 global companies by R&D, mn $US]*

a. Attracting global R&D centres to Research and Science parks (eg. IKP Knowledge Park, IIT Madras Research Park) can further augment and cement our position as an attractive destination for such companies

b. More research parks particularly with academic institutions need to be established and industry-academia tie-ups have to be institutionalized through effective technology transfer offices.

c. Every academic institute should have Innovation/ IPR Facilitation cell to encourage innovation and effect research translation and encourage participation in international consortium R&D projects.

Models, Programs or Schemes which may be adopted and/ or replicated and scaled up:

- Japan Innovation Network (A.6)
- IIT Madras Research Park (B.2)
- Society for Innovation and Entrepreneurship (B.7)

2.3.4: QS university ranking average score of top 3 universities

[Average score of the top 3 universities at the QS world university ranking]*

a. The MHRD's thrust on improving the ranking of top academic institutions in the country is seeing policy interventions like Vishwajeet and HEFA. This intervention is likely to enable a medium to long term rise in the global QS University ranking of Indian universities.

b. To improve QS university ranking, average score top 3, the focus should be on faculty recruitment, improving perception, strengthening student-teacher ratio and research capacity, as well as increasing foreign collaboration. Short-term interventions could include increasing faculty recruitment, induction of overseas faculty, and facilitating admission of bright foreign students in good universities here.

Models, Programs or Schemes which may be adopted and/ or replicated and scaled up:

- IIT Madras Research Park (B.2)
- Society for Innovation and Entrepreneurship (B.7)
- Pfizer-IIT Delhi Innovation and IP Program (B.1)
- Knowledge Transfer Partnership (A.10)

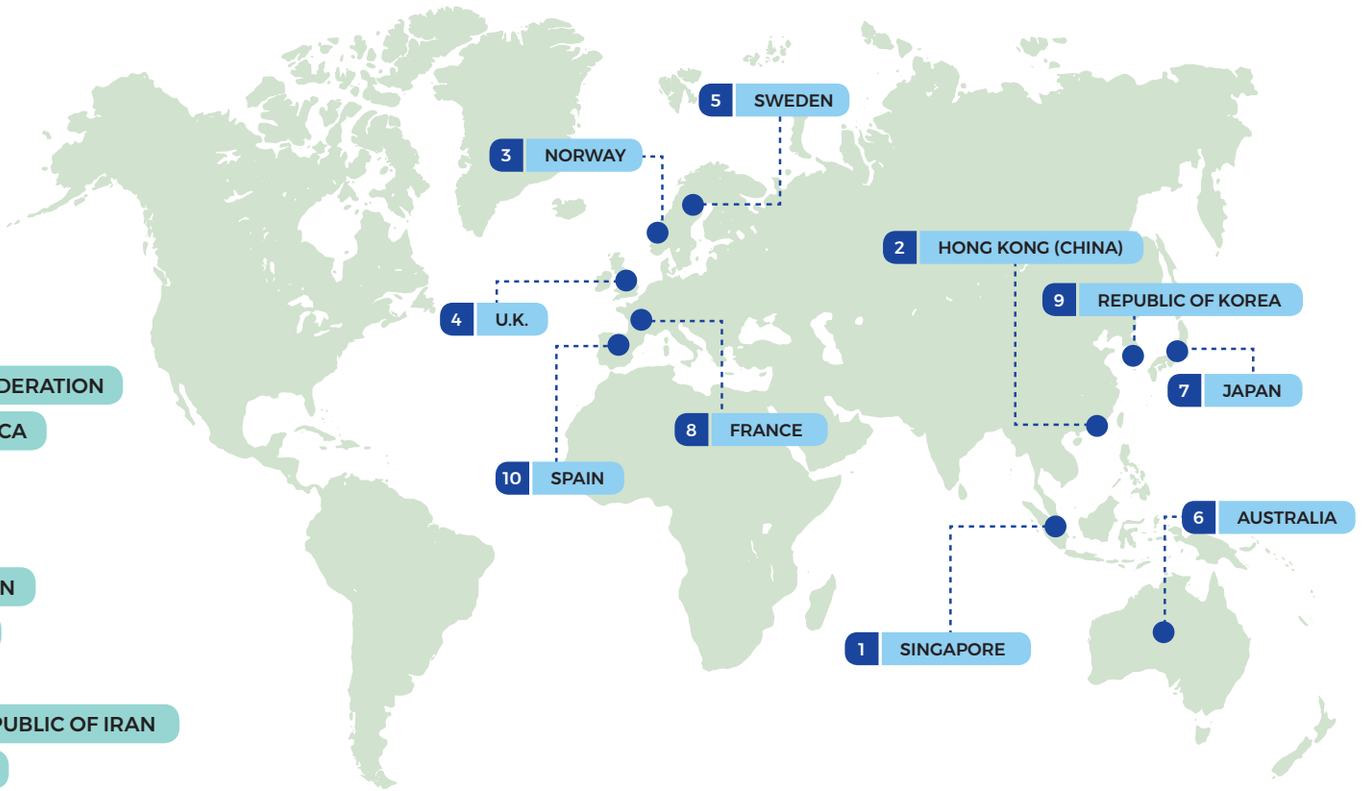
3. INFRASTRUCTURE

India ranked a rather low 87 out of 128 economies in the **Infrastructure** pillar in Global Innovation Index 2016, lagging behind the other BRICS and Asian economies. With respect to its own rank in 2015, India's rank remained unchanged, even as its score improved from 34.6 to 37.

The pillar comprises three sub-pillars, namely ***ICTs, General infrastructure and Ecological sustainability*** with a total of ten individual indicators. The following table gives the change in rank, as compared to 2015. While both the score and rank for ***Ecological sustainability*** improved in 2016, the rank for ***General infrastructure*** deteriorated from 43 to 52, despite a small improvement in India's own score from 38.9 to 39.3.

S. No	Indicator	Rank in 2015	Rank in 2016
3	**INFRASTRUCTURE**	87	87
3.1	Information & Communication Technologies (ICTs)	86	86
3.2	General infrastructure	43	52
3.3	Ecological sustainability	117	109

Top Ten Ranking 2016: Infrastructure



BRICS

- 36 CHINA
- 59 BRAZIL
- 60 RUSSIAN FEDERATION
- 85 SOUTH AFRICA
- 87 INDIA

CSA

- 54 KAZAKHSTAN
- 58 SRI LANKA
- 87 INDIA
- 91 ISLAMIC REPUBLIC OF IRAN
- 123 TAJIKISTAN

3.1: Information and Communication Technologies (ICTs)

The ***ICTs*** sub-pillar maintained a stable rank over 2015 and 2016, despite some improvement in score and rank for the indicators *ICT access* and *ICT use* for India. The ranks for *Government's online service* and *E-participation* stayed the same. With the increase in smartphone internet users, it is anticipated that connectivity will improve via mobile websites.

S. No	Indicator	Rank in 2015	Rank in 2016
3.1	**Information and communication technologies**	**86**	**86**
3.1.1	ICT access	115	108
3.1.2	ICT use	117	107
3.1.3	Government's online service	57	57
3.1.4	E-participation	40	40

RECOMMENDATIONS

3.1.1: ICT access & 3.1.2: ICT use index*

a. With regard to better data collection, the concerned Ministries need to provide latest data for percentage of individuals with cellular phones.
b. Programs should be designed for encouraging ICT access in rural areas. Initiatives like 'ICICI Digital Villages', IT @School, Bharat net etc. should be encouraged.
c. Programs may be designed to provide ICT services and resources to the rural areas at economical costs so that people can look at it as a basic need and not as a luxury, which provides them access and usage, helping to spread the ICT usage, as expected.
d. The methodology used by source-'International Telecommunication Union, Measuring the Information Society 2015, ICT Development Index 2015' should be altered to include the number of telephone connections/100 citizens (fixed/mobile) instead of having two separate sub-indicators for fixed and mobile connections.
e. Instead of 'percentage of households with internet access' which is included in the *methodology*, it is recommended that 'Internet access to individuals on a periodic basis' should be considered.

Models, Programs or Schemes which may be adopted and/ or replicated and scaled up:

» ICICI Digital Village (B.24)
» Project Loon (A.15)
» RailTel (B.23)
» BHIM (B.19)

3.1.3: Government's online service index*

a. Policies such as direct transfer of subsidies, especially at state level, can help India improve on transactional presence.
b. The trinity of JAM: 'J' stands for JAN DHAN i.e. opening bank accounts for the hitherto untouched population; 'A' stands for AADHAAR, a 12 digit biometric and demographic based identity that is unique, lifelong, online and authenticable and 'M' stand for MOBILE platform which is used not only as a means of communication but also for effective public service delivery and electronic payment system, which should be effectively implemented.
c. Mobile applications for government online services should be made available to enhance Government's online presence. Digitization of files and records can help expedite the process. Digitize India platform is one of the initiatives which should be encouraged, which will boost the process of digitization.

3.1.4: E-participation index*

a. The Government could further improve online e-participation by providing multi-lingual support.
b. Mobile applications for the websites and services provided by government should be promoted.
c. Since the indicator has a high correlation (0.96) with the Online Service Index (OSI) that is the basis of Government's online service, this indicator could be dropped. If continued, it should capture social media presence as well.

3.2: General infrastructure

Despite a small improvement in India's score, the rank for ***General infrastructure*** has gone down from 43 to 52 in 2016. While the score for *Electricity output, kWh/cap* has increased in 2016, the scores for both *Logistics performance* and *Gross Capital Formation (%GDP)* indicators have

decreased. However, India has been improving at a rapid rate due to initiatives like online documentation, declaration, etc., which is expected to reflect favourably in India's future rankings.

S. No	Indicator	Rank in 2015	Rank in 2016
3.2	**General Infrastructure**	**43**	**52**
3.2.1	Electricity output	94	91
3.2.2	Logistics performance	52	52
3.2.3	Gross Capital Formation	14	18
3.1.4	E-participation	40	40

RECOMMENDATION

3.2.1: Electricity output

[kWh per capita][a]

a. Issues need to be addressed both from the supply side– to reduce high distribution losses (~22%) and thereby increase available domestic supply- as also from the demand side- to increase reach of electrification network across the country.
b. The latest technologies should be adopted to avoid losses during transmission of power.

Models, Programs or Schemes which may be adopted and/ or replicated and scaled up:

» Deendayal Upadhyaya Gram Jyoti Yojana (B.25)

3.2.2: Logistics performance index*[a]

a. India's *Logistics performance* can be bettered by reducing lead time. Decreasing the number of agencies and documents, improving physical inspection rates and licensed customs brokers are few of the effective ways to do it.
b. There is also a need for high quality maintenance checks and for the promotion of initiatives like online documentation, declaration in the segment of logistics.
c. Infrastructure for storage and transportation in Maritime sector lacks in India. Initiatives like Sagarmala Project need to be accelerated to reduce Turnaround time, ultimately logistic costs.
d. An innovation challenge for Indian Railways is a remarkable step towards encouraging innovation and technological advancement. This will help to reduce challenges like problems of shortage for carrying cold storage goods in Goods Train and also to minimize the duration taken for the delivery of the goods.
e. Innovation challenge for Indian Railways should also be adopted and effectively implemented by other logistic sectors to give an impetus towards generation of innovation. Hyperloop is good example of breakthrough innovation, which will transform future transportation system.
f. Programs and Initiatives like Make in India, Smart Cities across the country, Industrial Corridor etc. Which are launched by Indian government will give a positive impact towards generation of new and innovative logistics means in India.

Models, Programs or Schemes which may be adopted and/ or replicated and scaled up:

» Innovation challenge for Indian Railways (B.4)
» Smart City Mission (B.29)
» Make in India (B.30)
» Industrial Corridor (B.28)

3.2.3: Gross capital formation

[% of GDP]

India needs to make the right balance between investment and social spending. Gross capital formation will stay almost constant till 2020 (as per IMF). It will be accompanied by increase in other parameters as investment is realized.

3.3: Ecological sustainability

The Ecological sustainability sub-pillar improved by eight places from 2015 to 2016, owing to better rankings in all three indicators, *GDP/unit of energy use, PPP$/ kg oil eq, Environmental Performance* and *ISO 14001 Environmental Certificates/ bn PPP$ GDP.*

S. No	Indicator	Rank in 2015	Rank in 2016
3.3	**Ecological sustainability**	**117**	**109**
3.3.1	GDP/unit of energy use	65	63
3.3.2	Environmental Performance	126	110
3.3.3	ISO 14001 Environmental Certificates	70	66

RECOMMENDATION

3.3.1: GDP/unit of energy use

[2005 PPPS per kg of oil equivalent]

a. There is a need to cut transmission losses which stand at 18% vs 8% for China & Brazil, by upgrading with latest technologies available.
b. We need to replace less energy efficient fuels like coal with natural gas.

3.3.2: Environmental performance

[Environmental Performance Index]*

a. Air quality can be improved by taking immediate action to bring down PM2.5 exposure by moving factories away from cities and by applying stringent norms at construction sites.
b. Water resources can be developed by expediting nationally important missions like Ganga Action Plan.
c. Carbon intensity can be kept at check by quick implementation of initiatives in green energy generation.
d. Household air quality can be boosted by providing Subsidies to replace firewood & coal with natural gas.
e. Principle of Sustainable Development should be promoted which basically implies that technology and environment should go hand in hand in hand so that none should suffer at the cost of other and environment gets conserved.
f. Intensify India's ongoing efforts for rapid and massive deployment of LEDs, enhanced usage of solar energy and enforcement of stricter emission norms like Bharat Stage IV.
g. Ensure adoption of BS VI norms by 2020.

3.3.3: ISO 14001 Environmental Management Systems

[Requirements with guidance for use: Number of certificates issued (per billion PPP$ GDP)[a]]

a. ISO 14001 Environmental Certificates/ bn PPP$ GDP is a redundant metric and should be excluded.
b. Introducing a carbon credit/ tax system will give firms, financial incentives to adopt ISO 14001 certification.

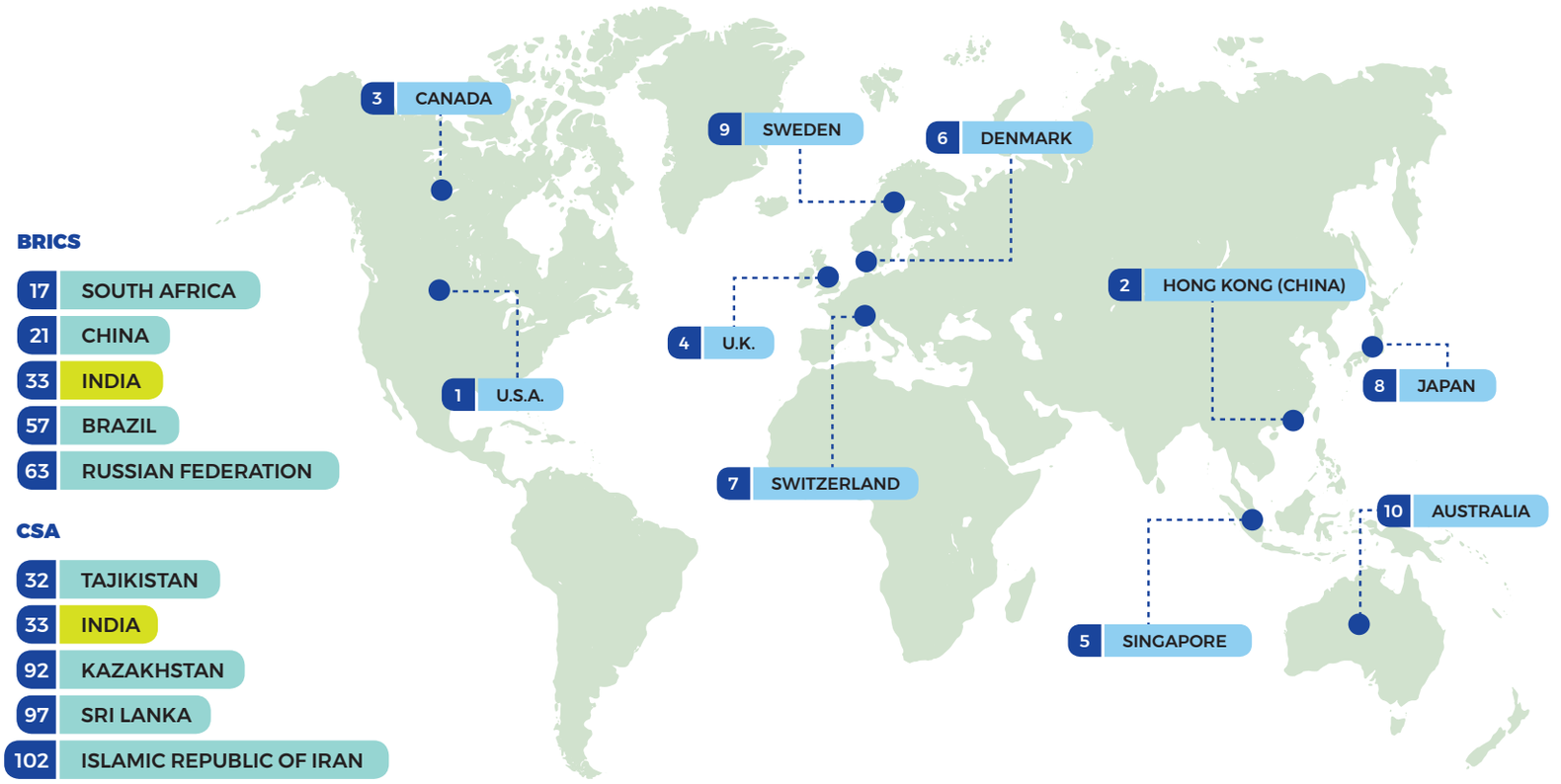
4 MARKET SOPHISTICATION

India ranked 33 out of 128 economies in the **Market sophistication** pillar in Global Innovation Index 2016, performing better than Brazil and Russia from the BRICS economies whereas Indonesia and Philippines among the other Asian economies. With respect to its own rank in 2015, India improved by 39 places.

The pillar comprises of three sub-pillars, namely ***Credit, Investment*** and ***Trade, Competition and Market Scale*** with a total of ten individual indicators. The following table gives the change in rank compared to 2015. The significant jump in rank seems to have been driven by the ***Trade, Competition and Market Scale*** sub-pillar.

S. No	Indicator	Rank in 2015	Rank in 2016
4	MARKET SOPHISTICATION	72	33
4.1	Credit	80	78
4.2	Investment	42	30
4.3	Trade, competition and market scale	104	20

Top Ten Ranking 2016: Market sophistication



4.1: Credit

This sub-pillar has seen a gradual improvement in the rank, largely on account of the *microfinance institution's gross loan portfolio* indicator.

S. No	Indicator	Rank in 2015	Rank in 2016
4.1	**Credit**	**80**	**78**
4.1.1	Ease of getting credit	34	39
4.1.2	Domestic credit to private sector	64	62
4.1.3	Microfinance gross loans	50	43

RECOMMENDATIONS

4.1: Credit

GII should also consider additional indicators such as *new entrants as a % of top 100* and *new entrants as a % of top 1000 firms,* to better capture the intensity of local competition and thereby market sophistication in a country.

4.1.1: Ease of getting credit

[distance to frontier]*

a. Integrated legal framework for secured transactions that extends to the creation, publicity and enforcement of fiduciary transfers of title; financial leases; assignments or transfers of receivables; and sales with retention of title to security interests in movable assets
b. Introduction of bankruptcy code, 2016 will give power to the creditor to assess the debtor business viability before declaring insolvency and the gives the safe exit to the business which are failed. Bankruptcy code, 2016 will help India to increase the rank in this indicator.
c. Develop a collateral registry in operation for both incorporated and unincorporated entities, that is unified geographically and by asset type, with an electronic database indexed by debtor's name.

4.1.2: Domestic credit to private sector

[% of GDP]

a. Methodology used for these pillars considers higher credit as positive and penalizes low domestic credit to GDP ratio. It is unclear why a high credit ratio is seen as unilaterally positive for an economy, Probably, this is not an appropriate measure for innovation strength and should be removed.

4.1.3: Microfinance institutions: Gross loan portfolio

[% of GDP]

Schemes like Kisan Credit Card, Jandhan Yojna should be linked with micro-finance institutes like, cooperative banks in order to further increase rank in this indicator.

4.2: Investment

This sub-pillar has seen India's rank improve to 30 in the world in 2016 compared to 42 in 2015. India ranks very high in the *ease of protecting minority investors* indicator, although the rank did slip by one notch in 2016. The other indicators that include *market capitalization*, *total value of stocks traded* and *venture capital deals* have all seen a steady improvement in India's ranking, thus contributing to an overall improvement for this sub-pillar.

S. No	Indicator	Rank in 2015	Rank in 2016
4.2	**Investment**	**42**	**30**
4.2.1	Ease of protecting (minority) Investors	7	8
4.2.2	Market capitalisation	24	21
4.2.3	Total value of stocks traded	25	21
4.2.4	Venture Capital deals	35	32

RECOMMENDATIONS

4.2.1: Ease of protecting minority Investors

*[distance to frontier]**

a. Although the rank remains high, the focus on ease of protecting minority investors should be maintained. In this direction government should take steps to formulate a better policy.

4.2.2: Market capitalisation of listed companies

[% of GDP][a]

& 4.2.3: Stocks Trades, Total Value

[% of GDP][a]

a. Instead of year-end data, average market capitalization and value of stocks traded should be considered.
b. A focus on structural reforms and other measures that continue to improve investor confidence should be maintained.

4.2.4: Venture Capital per investment location: Number of deals

[per billion PPP$ GDP] [a]

a. Several Indian Start-ups were registered outside India, to work around FDI and Tax implications etc.
b. With regulations easing up on both FDI and taxation front for Startups (through the Startup India initiative), India's ranking on this metric is expected to improve.
c. While tracking of startups, by operating location would be preferred, this metric would be hard to gather. Hence, India should continue to ease regulations, so that investors prefer to register startup companies operating in India.
d. Going forward, tracking change in % of startups choosing to register in India, India should also provide an indication on the impact of recent and future interventions.

4.3: Trade, competition, & market scale:

There was a significant jump in India's ranking for this sub-pillar, from 104 in 2015 to 20 in 2016. This was largely possible because a new indicator, *domestic market scale*, was introduced by the Global Innovation Index in 2016. India ranks 3rd in the world for domestic market scale.

S. No	Indicator	Rank in 2015	Rank in 2016
4.3	**Trade, competition and market scale**	**104**	**20**
4.3.1	Applied tariff rate, weighted mean	109	99
4.3.2	Intensity of local competition	88	96
4.3.3	Domestic market scale	n/a	3

RECOMMENDATIONS

4.3.1: Tariff rate, weighted mean, all products

[%] [a, b]

a. India's average applied tariff is amongst the highest in world and there is complexity of custom tariff system and lack of transparency in determining net effective rates[1]
b. Steps must be taken towards evaluation for reduction of tariffs and simplification of tariff systems should also be undertaken.
c. For GII 2016, data needed to rank countries in this indicator is 2013 but the data provided by India in this indicator is outdated. The data must be coordinated and updated.

4.3.2: Intensity of local competition Average answer to the survey question: In our country, how intense is competition in the local markets?

[1=not intense at all; 7= extremely intense] [ta]

a. It is not sufficient to track this indicator purely on the basis of an executive opinion survey, as is currently being done. Instead, a quantifiable indicator, such as the Herfindahl-Hirschman Index (HHI), could be considered to measure industrial concentration and competition.

4.3.3: Domestic market size as measured by GDP, bn PPP$

a. The macro-economic policies steps being pursued by India have already placed India at 3rd rank on this parameter. We need to continue in the same direction to ensure a healthy growth.

[1] http://www.cppr.in/wp-content/uploads/2015/01/Trade-Report.pdf

5. BUSINESS SOPHISTICATION

India ranked 57 out of 128 economies in the **Business sophistication** pillar in GII 2016, performing better than Indonesia among the Asian economies. India showed remarkable improvement with respect to its own rank in 2015, by jumping 59 places in 2016.

The pillar comprises of three sub-pillars, namely ***Knowledge workers, Innovation linkages*** and ***Knowledge absorption*** with a total of fifteen individual indicators. The following table gives the change in rank compared to 2015. The significant jump in rank seems to have been driven both by the ***Knowledge workers*** and ***Knowledge absorption*** sub-pillars.

S. No	Indicator	Rank in 2015	Rank in 2016
5	**BUSINESS SOPHISTICATION**	116	57
5.1	Knowledge workers	132	86
5.2	Innovation linkages	52	43
5.3	Knowledge absorption	99	66

Top Ten Ranking 2016: Business sophistication

5.1: Knowledge workers

The ranking for the ***knowledge workers*** sub-pillar has improved substantially. The term 'knowledge worker' encompasses anyone from managers to technicians to clerical workers. The indicator that has largely been responsible for the improvement in this sub-pillar is *firms offering formal training.*

S. No	Indicator	Rank in 2015	Rank in 2016
5.1	**Knowledge workers**	**132**	**86**
5.1.1	Employment in knowledge-intensive services	n/a	n/a
5.1.2	Firms offering formal training	98	42
5.1.3	GERD performed by business enterprise	43	45
5.1.4	GERD financed by business enterprise	n/a	n/a
5.1.5	Females employed with advanced degrees	n/a	n/a

RECOMMENDATIONS

5.1: Knowledge workers

a. It is found that for certain indicators such as *employment in knowledge intensive sectors*, *GERD financed by business* enterprise as well as *females employed with advanced degrees,* either data did not exist for India or were not being reported. Where possible, proxies or data sources that could provide some detail with respect to the missing data should be provided.

b. Add new indicators such as "publications per GDP per capita" and "citations per GDP per capita".

5.1.1: Employment in knowledge-intensive services

[% of workforce]

a. There is no data on 'employers in knowledge intensive services'. The way to improve in this area is to do better collection of demographic information on the actual number of people in professional jobs which are defined as knowledge-intensive according to the ILO's classifications. The Government of India at present collects data as part of the Census B-Series General Economic Tables on 'occupational classification of main workers other than cultivators and agricultural labourers'. It might be worthwhile to establish a concordance between this data and the ILO classification so that this indicator can be reported by India for GII rankings.

b. Various initiatives of the government like "National Skill Development Mission", "Pradhan Mantri Kaushal Vikas Yojana (PMKVY) " and the "Skill Loan scheme" under the campaign of Skill India need to be expanded to cater to more people, as also capture this data.

c. Industry should participate in the Government of India's National Policy for Skill Development and the National Vocational Education Qualifications framework. Industry bodies can take a lead in publicizing and ensuring sustainable quality of the program.

Models, Programs or Schemes which may be adopted and/ or replicated and scaled up:

- » Skill India (B.27)
- » IIT Madras Research Park (B.2)
- » Society for Innovation and Entrepreneurship (B.7)

5.1.2: Firms offering formal training (% of firms):

a. Incentives like recognition by government of the companies having policies of formal training for their employees can increase the trend for training programs and further better our ranking for the indicator "Firms offer formal training, %firms".

b. Conduct a quantitative audit of the corporate sector in India to assess the actual numbers in this regard: there may be issues of wrong classification of training programmes as informal or data not being captured.

5.1.3: GERD: Performed by business enterprise

[% of GDP][a]

& 5.1.4: GERD financed by business enterprise

a. For GII 2016,the base year to rank countries in indicator, GERD performed by business is 2014, but the data provided by India in this indicator is outdated.

b. Initiative like Japan Innovation Network (JIN) can be thought of in India to boost R&D and innovation in big MNCs.

c. Program like the 'Small Business Innovation and Research Program' (SBIR) in USA that encourages the small business and nonprofit institutions in USA to engage in R&D that can be commercialized,

can be adopted in India targeting the MSMEs engaging them in R&D for boosting commercialization.

d. Adopting Program like the 'Small Business Technology Transfer' (STTR) in USA will provide funding opportunities in R&D to start ups and will bridge the gap between the innovators and the research institutes in India.

e. Channelling CSR funds to R&D
   - In order to promote R&D expenditure by companies, there is a need to create awareness about R&D being considered as a CSR activity. Communication to companies about this provision would go a long way towards increasing the financial commitment on R&D efforts. There could be special notification in this regard issued by the Ministry of Corporate Affairs. Social media would play a key role in disseminating information on this aspect.
   - Funding programs like Society for Innovation and Entrepreneurship, IIT Mumbai should be created by companies and R&D labs, research associations, universities for channelling CSR funds to R&D.

f. 200 percent weighted deduction on R&D expenses should be maintained in order to incentivize
   - According to the Income Tax Act, Section 35, 1 (i) - sum paid to a research association which has as its object the undertaking of scientific research or to a university, college- the weighted deduction is currently 175%. This should be increased to 200%. This would promote R&D expenditure and also support R&D by universities and colleges.

g. Continue R&D incentives and redefine private sector's R&D to include translation of research outputs to commercial production including design and procurement of IP under 35 (2AA) and (2AB) of Income Tax Act.
   - Current estimates of private sector investment into R&D are generally limited to those incurred for direct research in a laboratory in the form of plant and machinery, manpower, consumables and utilities. They do not cover costs relating to translation of R&D like test-bed, design and development, standardization, field costs, etc., as well as pre-commercialization trial production. These are not currently considered as R&D investment by industry while providing Income Tax benefits. R&D spends of the private sector should be redefined to include translation of research outputs to commercial production including design and procurement of IP under sections 35 (2M) and (2AB) of Income Tax Act.

h. Ease accreditation of private sector's "in-house R&D" by a professional accrediting agency or self-declaration should be implemented
   - Currently Indian industry needs to be recognized by government as "in-house R&D units" to avail benefits. However, the process of such recognition is often cumbersome and complex. This is crucial to provide a hassle free environment for private sector to invest in R&D and create innovative products from India for domestic and global markets. There should be ease accreditation of private sector's "in-house R&D units" by a professional accrediting agency or self-declaration.
   - Department of Revenue should consider providing the applicable incentives u/s 35(2AB) of IT Act, 1961 for R&D.

i. Reintroduce Section 80-1B (8A) of Income Tax Act, to encourage setting up "R&D firms" and "Design firms"
   - Currently manufacturing companies who have government-recognized R&D units get income tax benefits on expenditure on R&D and design. In the past, there used to be a special benefit to firms who used to do only R&D, not manufacturing. This benefit saw a surge successful Indian R&D firms who in turn started manufacturing activities. This special benefit has been repealed by the government.
   - With the advent of many dynamic and qualified youth developing innovative products and services, reintroduction of that will benefit a lot. Section 80-IB (8A) of Income Tax Act should be reintroduced to encourage setting up non-manufacturing "R&D firms" and "Design firms".

j. An amount of Rs 6,787.08 crores as R&D Cess (levied @ not more than 5% on all import of technologies as per the R&D Cess Act, 1986) has been collected since 1996-97 through 2015-16. Technology Development Board (TDB) was created under the TDB Act, 1995 on 1st September, 1996 to spend the funds generated as R&D Cess. So far however, only Rs 579.17 crores (about 9 %) has been made available to TDB till 2015-16. It should be ensured that all funds collected as R&D Cess be spent for the desired purpose.

k. Under the Finance Act 2017, the R&D Cess Act stands repealed. Even while the balance amount needs to be made available for the express purpose, it is vital to make necessary provisions for budgetary support for R&D.

l. The above budgetary support should not be spent through only TDB, but also be available for academic institutions, research parks, design parks etc.
m. Translation of basic research to practical application is vital for the lifecycle of an innovation. Hence, Collaboration and cooperation between academia and industry is the need of the hour.
n. The R&D institutions and innovators should work in the direction of finding solutions to the challenges faced by society and industry so that the probability of commercializing their R&D output will increase.
o. Enabling valuation of IP rights as intangible assets by application of appropriate methodologies and guidelines facilitating securitization of IP rights and their use as collateral by creation of enabling legislative, administrative and market framework.
p. Research institutions should be allowed access to TKDL for further R&D, while the possibility of using TKDL for further R&D by private sector may also be explored, provided necessary safeguards are in place to prevent misappropriation.
q. Expired patent can be of great use to increase productivity of industries economically; they should be explored and utilized.

r. Dynamic Utilities allows the stakeholders to conduct searches on the granted and published patent databases, conduct searches to ascertain the status of patent, access the desired information on a real-time basis, search the patent information using combination of various search parameters, access on real-time basis the examination reports issued by the office. Same should be leveraged by the R&D centres.
s. Institutionalize industry led research with Government R&D/ Academic institutions including in PPP mode needs to be replicated in larger scale.

Models, Programs or Schemes which may be adopted and/ or replicated and scaled up:

- » IMP³rove (A.1)
- » EU Horizon 2020 (A.2)
- » SBIR (A.3)
- » STTR (A.4)
- » Japan Innovation Network (A.6)
- » Callaghan Innovation Institute (A.12)
- » Enterprise Europe Network (A.11)
- » Knowledge Transfer Partnership (A.10)
- » Pfizer-IIT Delhi Innovation and IP Program (B.1)
- » IIT Madras Research Park (B.2)
- » Innovation Challenge for Indian Railways (B.4)
- » India Innovation Initiative (B.5)
- » FICCI Lockheed Martin Model (B.6)
- » National Innovation Foundation (B.8)
- » NMITLI (B.37)

5.1.5: Females employed with advanced degrees, % total employed

[25+ years old][a]

a. The indicator *Females employed w/ advanced degrees* can be substantiated with better data collection and analysis of census and sample data. The indicator '*Graduates in science and engineering*' shows India is ranked 8th in the world, and this also implies higher female inclusion.

Models, Programs or Schemes which may be adopted and/ or replicated and scaled up:

- » KIRAN (B.12)
- » PM Fellowship scheme for doctoral research (B.35)

5.2: Innovation linkages

The improved ranking for the ***Innovation linkages*** sub-pillar can be attributed to an improvement in the *joint venture/strategic alliance* indicator deals where India currently ranks 37 in the world as well the indicator on *patent families filed in at least two offices*. It must be noted however that for the latter indicator, There was a change in the methodology adopted in GII report 2015, taking into account patent applications filed by residents in at least two IP Offices (as opposed to patent applications filed in at least three IP offices considered in 2015), scaled by bn PPP$ GDP.

S. No	Indicator	Rank in 2015	Rank in 2016
5.2	**Innovation linkages**	**52**	**43**
5.2.1	University/Industry Research Collaboration	48	49
5.2.2	State of cluster development	25	28
5.2.3	GERD financed by abroad	n/a	n/a
5.2.4	Joint Venture/strategic alliance deals	51	37
5.2.5	Patent families filed in two offices	52	37

RECOMMENDATIONS

5.2: Innovation Linkages

a. While data on *GERD financed from abroad* is not being currently reported, it should be possible to capture this data on a regular basis through various industry groups.
b. New indicators that should be considered under this sub-pillar are *efficiency of research done in the higher education sector (publications per $billion)* and *patent collaboration statistics.*

5.2.1: University/Industry Research Collaboration

Average answer to the survey question: In your country, to what extent do people collaborate and share ideas in between companies and universities/research institutions? [1 = not at all; 7 = to a great extent]†[a]

a. This indicator is ranked based on open survey which does not give the true reflection of country; instead methodology with quantitative parameter should be used.
b. University-industry research collaboration suffers from the lack of defined incentives for faculty to commercialize R&D-based IPRs, or to reach out to industry for problem statements. A mechanism for sabbaticals that will work both ways, from academia to industry and vice versa, would be useful for promoting successful collaborations.
c. In addition, incentives for entrepreneurship development or IPR development at par with incentives for publishing papers would also be helpful. Initiatives such as these may need intervention at the UGC/AICTE level.
d. The university-industry research collaboration indicator could get a boost if all IITs and other universities in India were to replicate the 'IIT Madras Research Park' model that promotes R&D by the institute in partnership with industry. This would help create a collaborative environment between the institute and industry.
e. A model where industry and academia collectively support innovators and start-ups, and which could be replicated is the Pfizer-IIT Delhi Innovation and IP Program. This program is an incubation accelerator that facilitates funds, resources, expertise and infrastructure to give a boost to health care innovations. The program could also be extended support more areas other than the ones already being supported.
f. Channelizing CSR funds towards R&D is one of the best ways possible to create a win-win situation to enhance university-industry research collaboration. An example of this is the Society for Innovation and Entrepreneurship at IIT Mumbai Incentives for entrepreneurship development or IPR development at par with incentives for publishing papers will help to encourage innovation
g. Institutionalize industry led research with Government R&D/ Academic institutions, including in PPP mode and scale it up.
h. The Government should mandate university-industry collaborations as a criterion to access some of the funds allocated for research and also to use strategic intellectual property as a metric of success on these projects.

Models, Programs or Schemes which may be adopted and/ or replicated and scaled up:

- » Knowledge Transfer Partnership (A.10)
- » Pfizer-IIT Delhi Innovation and IP Program (B.1)
- » IIT Madras Research Park (B.2)
- » FICCI Lockheed Martin Model (B.6)
- » Society for Innovation and Entrepreneurship (B.7)

5.2.2: State of Cluster Development

Average answer to the survey question on the role of clusters in the economy: In your country, how widespread are well-developed and deep clusters (geographic concentrations of firms, suppliers, producers of related products and services, and specialized institutions in a particular field)? [1 = nonexistent; 7 = widespread in many fields]†:

a. This indicator is ranked based on open survey which does not give the true reflection of country; instead methodology with quantitative parameter should be used.

b. This data point is completely assessed by the executive opinion survey; the methodology should be based on quantifiable metrics, like the actual number of clusters etc.
c. Project like Industrial corridors are planned industrial development projects which recognize the interdependence of various sectors of the economy and offer effective integration between industry and infrastructure, leading to overall economic and social development. Thus, Industrial Corridors will help in developing well-planned Clusters.
d. Even though clusters grow organically, a National Innovation Policy can help identify sunrise sectors and accordingly designate areas for developing clusters. An example would be to create an aerospace cluster where ISRO case a defined set of its components to a local supply chain. The example of Silicon Valley, which grew organically as a result of US federal government investment in aerospace, is especially instructive. Industrial corridors are an ambitious and good initiative to promote industrial growth.

Models, Programs or Schemes which may be adopted and/ or replicated and scaled up:

» Industrial Corridors (B.28)
» Smart City Mission (B.29)

5.2.3: GERD: Financed by abroad

[% of total GERD]

a. No data is available on GERD financed from abroad. However, given the number of patents produced by employees of MNCs in India (e.g. General Electric), this metric is a low-hanging fruit. The data exists, and it is only a matter of collecting it through industry groups such as CII, NASSCOM, and FICCI etc.

Models, Programs or Schemes which may be adopted and/ or replicated and scaled up:

» Knowledge Transfer Partnership (A.10)

5.2.4: Joint ventures/strategic alliances: Number of deals, fractional counting

[per billion PPP$ GDP][a]

a. Open Challenges like those posed by Google Impact, Mahindra Rise can help in commercialization of innovations.
b. Platform for commercialization and open innovation like InnoCentives, yet2 etc. is need of the hour.
c. Startup India is helping to create an ecosystem for incubation and venture deals. This initiative is to be taken forward zealously and in mission mode.
d. A significant amount of joint venture/strategic alliance deals are intended to take advantage of Indian engineering talent for R&D. Increased joint venture/strategic alliance deals going forward can also contribute to improving the ranking on GERD financed by abroad.
e. The grand challenge model like New Millennium Indian Technology Leadership Initiative (NMITLI) based on public private partnership (see Annexure B.37) should be promoted.

Models, Programs or Schemes which may be adopted and/ or replicated and scaled up:

» Knowledge Transfer Partnership (A.10)
» Pfizer-IIT Delhi Innovation and IP Program (B.1)
» IIT Madras Research Park (B.2)
» FICCI Lockheed Martin Model (B.6)
» Society for Innovation and Entrepreneurship (B.7)
» Small Business and Research Program (A.3)
» Small Business Technology Transfer Program (A.4)
» Kick Starter (A.5)
» Stanford Technology Transfer Office (A.7)
» yet2.com (A.9)
» InnoCentive (A.14)
» Callaghan Innovation Institute (A.12)
» Innovation Challenge for Indian Railways (B.4)
» Society for Innovation and Entrepreneurship (B.7)
» NMITLI (B.37)

5.2.5: Number of patent families filed by residents in at least two offices

[per billion PPP$ GDP][a]

a. Continue R&D incentives and redefine private sector's R&D to include translation of research outputs to commercial production, including design and procurement of IP under 35 (2AA) and (2AB) of Income Tax Act.
b. Schemes like Start-up Intellectual Property Protection and Scheme for "Building Awareness on Intellectual Property Rights" (IPR) for

the Micro, Small & Medium Enterprises (MSME) under National Manufacturing Competitiveness Program (NMCP) need to be given a boost and strengthened further.

c. SIPP scheme should be extended to MSMEs and the facilitators under the scheme be also allowed to provide services to MSMEs.

d. The TISC platform presents an opportunity to move forward, value and appreciate local and international innovations as well as IP information. To further strengthen and boost innovation in the R&D centres, Patent Information Centers and IP Facilitation Centers, TISC can be established in these institutes, and establish a network of TISCs.

e. Centers like Patent information centres (PIC) by DST and Intellectual property Information Centre (IPFC) by MSME should be strengthened and further replicated in all the districts; IP Cells need to be established in all Universities in India.

f. A dedicated platform with backend support is needed that will connect existing IP holder/seller, IP intermediaries and IP buyer, so that there can be a one-stop-point to facilitate innovators.

Models, Programs or Schemes which may be adopted and/ or replicated and scaled up:

- » Intellectual Property Facilitation Centre (IPFC) (B.11)
- » KIRAN (B.12)
- » Pfizer-IIT Delhi Innovation and IP Program (B.1)
- » IIT Madras Research Park (B.2)
- » Small Business and Research Program (A.3)
- » Small Business Technology Transfer Program (A.4)

5.3: Knowledge absorption

India's rank for the ***Knowledge absorption*** sub-pillar has gone up by 33 places from 99 to 66. The ranking in 2016 would have benefited from the reporting of a new indicator for India, namely *research talent in business enterprise*, where India ranks 31 as per data from 2010. This sub-pillar largely tests whether there is technology transfer into India. The answer is yes, and there seems be a fairly high level of technology transfer into India. For example, India ranks 32 in the world for *intellectual property payments*, which also suggests that India is successfully utilizing IPRs developed elsewhere. It was also noted that there was a name change for this indicator from *royalty and license fees* in GII 2015, while the methodology was also changed from the Extended Balance of Payments Services Classification (EBOPS) 2002 to EBOPS 2010. The flip side to the high level of technology transfer to India however is that relatively little new technology is being developed in India. A new indicator reported for the first time in 2016, *full-time equivalent researchers in industry* (that includes government, higher education, business and nonprofits) has seen India do well given the vast number of people engaged in research, in India. Efforts need to be made so as to update this data (beyond 2010) and to ensure its collection on a continuous basis.

S. No	Indicator	Rank in 2015	Rank in 2016
5.3	**Knowledge absorption**	**99**	**66**
5.3.1	Intellectual property payments	42	32
5.3.2	High-tech imports	70	66
5.3.3	ICT services imports	74	70
5.3.4	Foreign Direct Investment net inflows	98	86
5.3.5	Research talent in business enterprise	n/a	31

5.3.1: Charges for use of intellectual property i.e., payments

[%, total trade][a]

a. India's rank of 32 on the % of IP payments seems to be appropriate. The rank may be further improved by laying emphasis on patent licensing and sale. IP royalties and licenses of residents and non-residents for the authorised use of intangible non produced, nonfinancial assets and proprietary rights such as patent, trademarks, copyrights, processes, techniques, designs, manufacturing rights etc., and the use, through licensing agreements of produced originals or prototypes of films, manuscripts also needs to be emphasised further.

Models, Programs or Schemes which may be adopted and/ or replicated and scaled up:

- » Small Business Technology Transfer Program (A.4)
- » Stanford Technology Transfer Office (A.7)

5.3.2: High-tech net imports

[% of total trade]

India's rank of 66 for the high-tech imports indicator seems appropriate, as it suggests an adequate amount of technology-based equipment is imported (defined as aerospace, computers and office machines, electronics, telecommunications, pharmacy, scientific equipment, armaments, etc.). Increasing Indian imports of electronics and weapons should see the ranking for the high-tech imports indicator continue to improve. However, it is also an indicator of poor local manufacturing in these particular areas.

5.3.3: Telecommunications, computers, and information services imports

[% of total trade]

ICT services imports have India ranked at 70, which appears to be somewhat surprising given the large ICT services exports, where India is ranked 1 in the world. Presumably India's ranking for *ICT services imports* will improve over time as India's services increase in sophistication, and the poor performance in this indicator is no cause for concern at the moment.

5.3.4: Foreign direct investment (FDI), net inflows

[% of GDP]

India's ranking in the foreign direct investment, net inflows indicator should improve going forward from its relatively low standing of 86 currently. This indicator is not something that can be affected by innovation policies alone, and depends much more significantly on market potential and government policies, as also the overall investment clime of a country.

a. The Make in India initiative was launched with an aim to promote India as an important investment destination and a global hub for manufacturing, design and innovation. During October 2014 to May 2016, FDI equity inflow has increased by 46 per cent i.e. from $42.31 billion to $61.58 billion in comparison to previous 20 months (February 2013 to September 2014),"To further boost investment environment and bring in foreign capital, the government should take various measures like opening up FDI in many sectors, carrying out FDI related reforms and improving ease of doing business...

Models, Programs or Schemes which may be adopted and/ or replicated and scaled up:

» Make in India (B.30)

5.3.5: Researchers in business enterprise, per thousand populations (%)

a. This is a new metric for this year: FTE researchers in the entire industry, including government, higher education, business and non-profits. Given the vast number of people engaged in research, India should do well and it's a matter of collecting the data.
b. In GII 2016, base year for data needed to rank countries in this indicator was 2014, but the data provided by India in this indicator is outdated. We need to provide updated information.

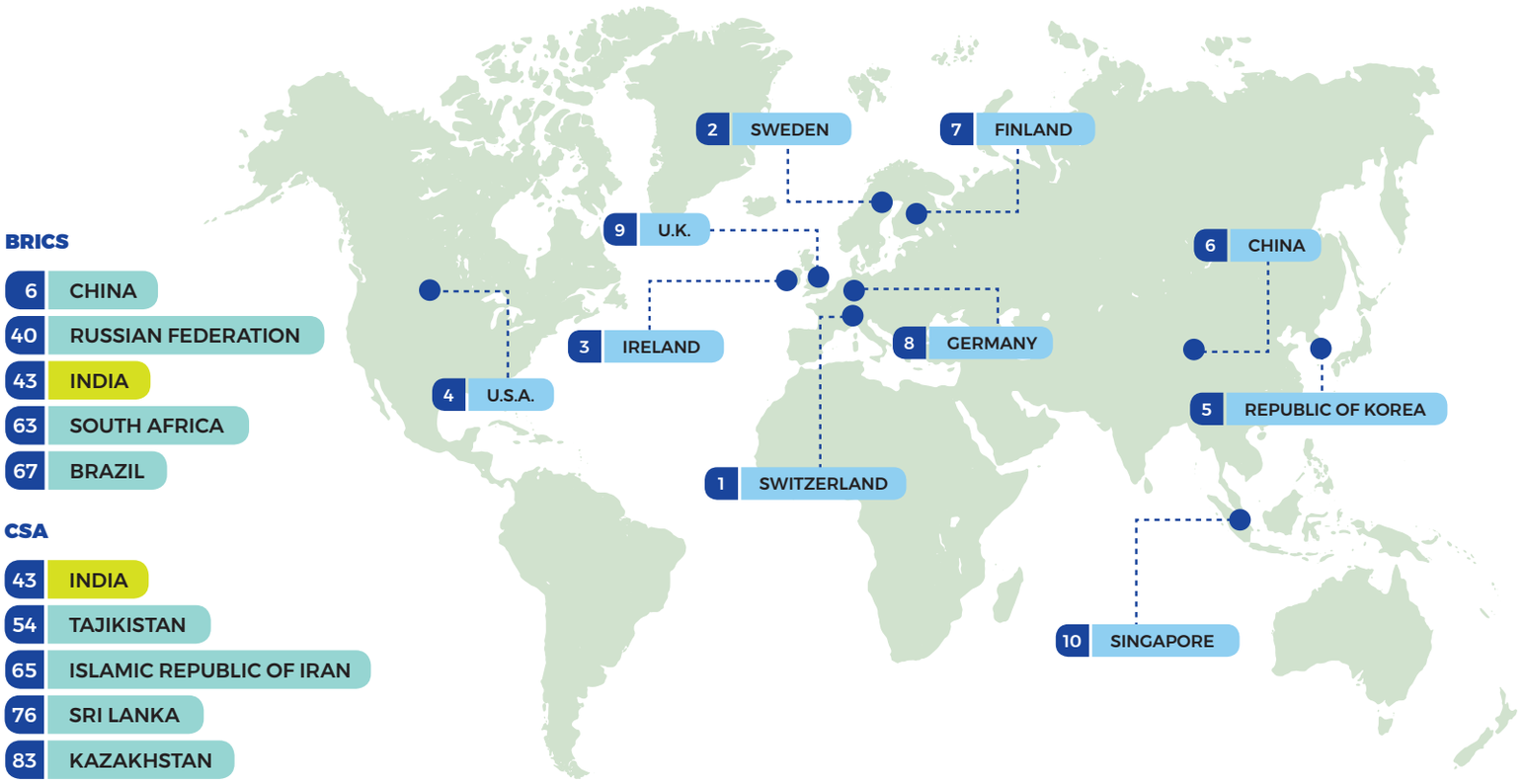
6 KNOWLEDGE AND TECHNOLOGY OUTPUTS

India ranked 43 out of 128 economies in the Knowledge and technology outputs pillar in GII 2016, performing better than Brazil among the BRICS nations, and Indonesia among the Asian economies.

The pillar comprises three sub-pillars, namely ***Knowledge creation, Knowledge impact*** and ***Knowledge diffusion*** with a total of fourteen individual indicators. The following table gives the change in rank compared to 2015. There was a further improvement over its own rank in 2015 by 6 places, primarily driven by the ***Knowledge impact*** sub-pillar.

S. No	Indicator	Rank in 2015	Rank in 2016
6	**KNOWLEDGE AND TECHNOLOGY OUTPUTS**	**49**	**43**
6.1	Knowledge creation	59	57
6.2	Knowledge impact	84	48
6.3	Knowledge diffusion	34	26

Top Ten Ranking 2016: Knowledge and technology outputs



6.1: Knowledge creation

The Knowledge creation sub-pillar and its constituent indicators have mostly maintained a stable rank from 2015 to 2016. Apart from the indicator *Utility models by origin* which is not applicable for India, the ranks for the other four indicators have not seen any significant change, even as the score for *Scientific and technical articles/ bn PPP$ GDP* has decreased from 7.5 to 7 and that of *Citable documents H index* has somewhat increased from 341 to 383.

In order to promote innovation, the education system must be inclusive, promote all-round capabilities, and produce the next generation of innovators who can overcome the hand-mind-market barrier. Graduate programs should be revamped for research excellence with a mix of fundamental and applied research. A critical avenue for graduate program excellence is enhanced industry-university partnerships.

The Government of India has recently announced key programs that mandate/encourage industry participation to support India's innovation capabilities: Uchchatar Avishkar Yojana (UAY), Impacting Research, Innovation, and Technology (IMPRINT). The outcomes of these programs should be monitored with clear metrics on intellectual property creation.

While measures like 'high-tech exports' try and evaluate India's technological prowess, the question still remains of how do we address some of India's bold, first to the world innovations – for example, the world's most rapid and largest financial inclusion happened in India through Jan Dhan, Aadhar and mobile internet. At the same time, Mars Orbiter Mission succeeded in the first effort at one-tenth the conventional cost. ISRO set a world record by launching 104 satellites. The indicators need to reflect these ground-breaking efforts.

S. No	Indicator	Rank in 2015	Rank in 2016
6.1	**Knowledge creation**	**59**	**57**
6.1.1	Patents by origin	53	54
6.1.2	PCT patent application	49	51
6.1.3	Utility models by origin	n/a	n/a
6.1.4	Scientific and technical articles	77	77
6.1.5	Citable documents H index	23	22

RECOMMENDATIONS

6.1: Knowledge Creation

a. In order to promote innovation, the education system must be inclusive, promote all-round capabilities, and produce the next generation of innovators who can overcome the hand-mind-market barrier.
b. Graduate programs should be revamped for research excellence with a mix of fundamental and applied research.
c. A critical avenue for graduate program excellence is enhanced industry-university partnerships.
d. The Government of India has recently announced key programs that mandate/encourage industry participation to support India's innovation capabilities: Uchchatar Avishkar Yojana (UAY), Impacting Research, Innovation, and Technology (IMPRINT). The outcomes of these programs should be monitored with clear metrics on intellectual property creation.
e. In knowledge creation, only the knowledge created by formal systems has been considered. This is simply because resource poor people are considered as sinks and not sources. As National Innovation Foundation (nif.org.in) has shown, minds on the margin are not marginal minds. They create vast amount of knowledge through grassroots innovation. There must be a way to include this valuable source of knowledge, as also building a link between the formal and informal systems, so that the socio-economic benefits ultimately reach and benefit the humanity as a whole.

6.1.1: Number of resident patent applications filed at a given national or regional patent office

[per billion PPP$ GDP] [a]

& 6.1.2: Number of International patent applications filed by residents at the Patent Cooperation Treaty

[per billion PPP$ GDP] [a]

a. The R&D institutions and innovators should work in the direction of finding solutions to the challenges faced by society and industry so that the probability of commercializing their R&D output will increase.
b. Collaboration linkages in innovation between Industry-Academia segments are still in the progressing stage in India. Analysis of the patents published in India indicates less than 1% collaboration

between these segments. Steps must be taken for increasing Industry-Academia collaboration, Pfizer-IIT Delhi Innovation and IP Program, IIT Madras Research Park are the model example of such collaborations.

c. Push must be given towards creation of an IP creation and commercialization cell in the Universities with a mandate to provide dedicated attention to innovation, commercialization and to act as an interface with the industry
d. The average pendency for a patent application to be granted in India is more than five years. This is not acceptable in a world of rapid innovation. To promote intellectual property, the Patent (Amendment) Rules, 2016 provide expedited patent examination on certain grounds. The newly added rule aims to reduce the application period from the prevailing 5-7 years to 18 months by March 2018 for Tatkaal applications, which is an excellent initiative.
e. Indian Patent Office databases need to be made more comprehensive and searchable. The data available to the public on the working of patents is a good example of digitization by the India Patent Office
f. Additional resource allocation to grant intellectual property rights in time and proper enforcement of the law is the need of the hour. All groundwork including novelty searches may be outsourced
g. Make necessary provisions, through a *sui generis* legislation if required, to promote commercialization of publicly funded research done at academic institutions. Incentive schemes to protect the IPs in the name of such institutions will be a first step in this direction.
h. The Government must create support structures for creating Indian leadership in science based innovation. That requires financial resources as well as investments in capacity building. Skills in patent related endeavours are very special. For example, interpreting patent data for identifying the areas, where there is a freedom to operate, writing patent claims professionally so that the competitors will not easily bypass them, assessing the potential current and future value of an intellectual property, etc. are all highly professional jobs. We cannot expect our top class scientific inventors to either master or spend time on these. The same is the case with technology transfer and licensing offices, which should be staffed with professionals. They may be incentivized suitably, for instance by linking their variable pay to their performance in successful technology transfer and licensing.
i. We need to ensure that different components that comprise and influence the innovation ecosystem need to synergize together as an `integrated whole'. For instance, an audit system. The current audit systems are unsuitable for science, technology and innovation, where due to the very nature of exploration, failure is more common than guaranteed success in meeting a rigorously defined end objective. An audit system that insists that each patent should be commercialized, would inhibit the patenting initiative. On the other hand, an overdrive on patenting systems will lead to unwarranted secrecy amongst the scientific community in free idea exchange, which is the hallmark of true spirit behind open science.

Models, Programs or Schemes which may be adopted and/ or replicated and scaled up:

- » Intellectual Property Facilitation Centre (B.11)
- » Uchchatar Avishkar Yojana (B.31)
- » Impacting Research, Innovation, and Technology (B.32)
- » Pfizer-IIT Delhi Innovation and IP Program (B.1)
- » IIT Madras Research Park (B.2)
- » Society for Innovation and Entrepreneurship (B.7)

6.1.3: Number of utility model applications filed by residents at the national patent office

[per billion PPP$ GDP]

Utility Model application is not applicable in India

6.1.4: Number of scientific and technical journal articles

[per billion PPP$ GDP][a]

a. As found by the research at National Science Library [1], Indian researchers submit articles and papers to international journals and since affiliation of authors is not always tracked in the sources used to derive this metric, the resultant rankings may not be accurate
b. As stated in the same paper [4], indices should incorporate information on affiliation of authors which in turn help determine contributions by a country.
c. Only eligible sources/indices based on the above criterion should be selected for calculation of this metric

[1] http://www.currentscience.ac.in/Volumes/110/07/1135.pdf

6.1.5: The H index is the economy's number of published articles (H) that have received at least H citations in the period 1996-2014*[a]

India should consider targeted brand support for domestic scientific journals to enhance their reputation and accessibility worldwide – and hence improve the H index.

6.2: Knowledge impact

The improvement in the ***Knowledge impact*** sub-pillar seems to have been driven by the *Growth rate of GDP per person engaged (constant 1990 PPP$).*

When it comes to Knowledge impact, there is a deeper need for a cultural and regulatory framework to create awareness among the various stakeholders on opportunities that could be availed of through government funding or partnerships with Central and State institutions. We also need to leverage markets in order to deregulate, as appropriate, to handle the scale of the problem in energy, water, transportation, healthcare and food security.

S. No	Indicator	Rank in 2015	Rank in 2016
6.2	**Knowledge impact**	**84**	**48**
6.2.1	Growth rate of GDP per person engaged	38	6
6.2.2	New businesses density	99	101
6.2.3	Computer software spending	68	62
6.2.4	ISO 9001 Quality certificates	57	59
6.2.5	High- and medium-high-tech output	32	36

RECOMMENDATIONS

6.2: Knowledge Impact

a. A national pride advertisement campaign could be conducted on work ethic, respect for artisans and hands-on work, gender diversity and women in engineering.
b. Industry partnerships with State and National bodies such as the Central Manufacturing Technology Institute and other equivalent Government of India societies could be revitalized. It would be important to create clearly articulated success measures and monitor effectiveness of these partnerships.
c. It is essential to map State or Centre funded institutes in different parts of the country, that are mandated to boost industry and entrepreneurship in a particular region through R&D and other knowledge services (these institutes could be universities or any of the CSIR labs or state funded entities like Entrepreneurship Development Institutes). These bodies should additionally be recognized as Innovation Centres and their funding should be restructured based on their linkages and collaborations with industry for driving industrial projects.
d. The above-mentioned innovation centres should help in facilitating the effective utilization of Government R&D funds.
e. At present, the entrepreneurs eligible for this fund are either not aware of such a fund or do not know how to tap it for their benefit. The distribution of Government R&D funds among innovators/ entrepreneurs should be made very transparent and the innovation centres should ensure this transparency.
f. The national innovation fund needs to be created, along with the establishment of a proper mechanism for utilization of the fund to generate more jobs and wealth.
g. It is important to identify a funded roadmap for initiatives such as reaching projected capacity for electricity generation and T&D, handling the water needs of India, providing affordable healthcare to all sections of society and developing affordable supplements of food for rural population to provide the required caloric and balanced intake. Organizations such as the Center for Food Technologies Research Institute and other premier institutes with a PPP model for developing technologies can be leveraged for the same. Technologies should also be developed to improve India's food grain storage situation.

6.2.1: Growth rate of GDP per person engaged

[constant 1990 PPP$]

a. Smart city project will be an extension of a large city which signifies not only improved infrastructure and housing amenities through reduction of funding hassles, revision of FDI regulations in real estate and banking liberalization for infrastructure projects, but also connection via an advanced transportation, electronic and technological platform. This will result in complementary

advancement of infrastructure, real estate, IT, banking and various other sectors

b. Programs and Initiative like Make in India, Smart Cities across the country, Industrial Corridor etc. Launched by government will give a positive impact to GDP growth in India.

c. There is a need to promote a conducive and lucrative business environment in the economy, projects like e-visas, uniform Know Your Customer norms, single operating Demat Account and single window clearances, which the government is targeting at implementing by the end of the year, will improve the business environment in the economy.

Models, Programs or Schemes which may be adopted and/ or replicated and scaled up:

- » Innovation challenge for Indian Railways (B.4)
- » Smart Cities (B.29)
- » Make in India (B.30)
- » Industrial Corridor (B.28)

6.2.2: New businesses density

[new registrations per thousand population 15-64 years old][a]

a. There is need to promote a conducive and lucrative business environment across the country. With introduction of GST, Bankruptcy code and reforms in ease of doing business the rank in this data point is most likely to improve.

b. Models like Make in India, Start up India helps to promote new businesses and novice entrepreneurs can be motivated.

6.2.3: Total Computer software spending

[% of GDP]

a. To promote legitimate use of software there is a need to provide such software at controlled rate so that common man gets easy access.

b. Serious steps needs to be taken by government to stop piracy. There is need for spreading awareness and sensitization amongst professionals and students to stop piracy.

c. Common software which is useful and necessary for organisations (School, colleges and offices) should be made available to them so that such organisations can use it without paying any exorbitant amount which will not help only in capacity building but also help to curb piracy.

d. Where government provide facilities like free laptops, tablets etc. to underprivileged students of the society, students welfare software should be pre- installed in such devices which help them in curricular as well as help to stop piracy.

e. Schemes like Bharat Net, BSNL Net, RailTel, and ICICI Digital Village directly and promote the usage of software. This would lead to digitalization of activities in India and help us to promote in global ranking.

6.2.4: ISO 9001 Quality management systems-Requirements: Number of certificates issued

[per billion PPP$ GDP][a]

ISO 9001 certification should be promoted for following benefits:

a. Customer feels satisfied and which ultimately leads to derive their loyalty and also help the business to achieve a well-known status.

b. Customer can rest assured about the quality of product or service which is provided by the company.

c. It also helps to improve competitiveness and productivity in the market.

6.2.5: High- tech and medium-high-tech output

[% of total manufactures output][a]

a. India reported outdated data (2011) on this indicator for GII 2016 vis-à-vis the required data (2012).

b. It is interesting to note that as per data provided by the Ministry of Statistics and Program Implementation (MoSPI) in the Annual Survey of Industries Summary Results 2013-14 (2-digit NIC), the share of High-tech and medium-high-tech output as a percentage of total manufactured output is 35.58% in terms of the Net Value Added and 28.22% in terms of output. While updating this data for GII 2017, it might be worth re-examining the definition of the indicator in the Indian context to ensure that the sectors being included in the high-tech and medium-high-tech classification are in line with the Organisation for Economic Co-operation and Development (OECD) classification of the Technology Intensity Definition, which is itself based on the appropriate International Standard Industrial Classification ISIC Revision.

6.3 Knowledge diffusion

The improvement in ranking in the ***Knowledge diffusion*** sub-pillar for 2016 was primarily driven by *FDI net outflows, % GDP,* defined as "net outflows of investment to acquire a lasting management interest (10% or more of voting stock) in an enterprise operating in an economy other than that of the investor." This indicator improved in rank by 32 places from a score of 0.1 in 2015 to 0.5 in 2016. It must also be noted that the methodology and name for the indicator *Intellectual Property Receipts* was changed in GII 2016 (earlier Royalty and License fees) from Extended Balance of Payments Services Classification (EBOPS) 2002 to EBOPS 2010. India maintained its lead in terms of *ICT services exports as a % of total trade*, further improving the score from 10.1% to 10.7%.

S. No	Indicator	Rank in 2015	Rank in 2016
6.3	**Knowledge diffusion**	**34**	**26**
6.3.1	Intellectual Property Receipts	57	45
6.3.2	High tech exports	39	37
6.3.3	ICT services exports	1	1
6.3.4	FDI net outflows	92	60

RECOMMENDATIONS

6.3.1: Charges for use of intellectual property i.e., receipts

[%, total trade][a]

a. Platform like, innocentives, Yet2.com helps in commercialization of IP's. Use of this type of platform by the new business and Start-ups will help them to grow faster and exploit their intellectual properties.
b. IP protection should be increased in India. Awareness and sensitization amongst SME's and MSME's should be conducted for recognition and filing of IP's.

Models, Programs or Schemes which may be adopted and/ or replicated and scaled up:

- » Yet2.com (A.9)
- » InnoCentives (A.14)
- » KIRAN (B.12)
- » Pfizer- IIT Delhi Innovation and IP Program (B.1)

6.3.2: High tech net exports

[% of total trade][a]

India's ranking on this metric is expected to improve with the implementation of the "Make in India" initiatives

6.3.3: Telecommunications, computers and information services exports

[% of total trade] [a]

Despite the steady rise in the rank when it comes to high tech exports (less re-exports) as a % of total trade, going forward, a greater emphasis should be laid on increasing manufacturing for high-tech industry in line with India's goal of raising the share of manufacturing to 25% of output, which should see an improvement in this indicator. This is particularly important in light of concerns around increasing automation that could threaten India's rank in ICT services exports.

6.3.4: Foreign direct investment (FDI), net outflows

[% of GDP]

a. Global downturn coupled with positive sentiment on domestic investments has impacted this metric which is calculated as % GDP. However, India performs better on magnitude of FDI outflows and value of net purchases.
b. A balanced measure of overall FDI outflows and magnitude of FDI deals should be considered
c. While a robust domestic market is a healthy economic indicator in itself, India should continue its efforts to increase the Outward FDI as indicated during the Prime Minister's recent visit to Africa

7. CREATIVE OUTPUTS

India ranked 94 out of 128 economies in the **Creative outputs** pillar in GII 2016, lower than the other BRICS economies and as well as select Asian economies. With respect to its own rank in 2015, India improved marginally by one place, and in fact, deteriorated in terms of score by 3.4 points.

The pillar comprises three sub-pillars, namely ***Intangible assets, Creative goods & services,*** and ***Online Creativity*** with a total of thirteen individual indicators. The following table gives the change in rank compared to 2015. There was a major fall in rank and score for the ***Online Creativity*** sub-pillar.

S. No	Indicator	Rank in 2015	Rank in 2016
7	CREATIVE OUTPUTS	95	94
7.1	Intangible assets	101	98
7.2	Creative goods & services	77	72
7.3	Online creativity	78	101

Top Ten Ranking 2016: Creative outputs

7.1: Intangible assets

The small improvement in rank for ***Intangible assets*** was primarily driven by the *ICTs and organisation model creation* indicator which is a survey-based indicator, derived from the Executive Opinion Survey. *Trademark application class count by origin/ bn PPP$ GDP* improved in rank despite a constant score while the *ICTs and business model creation* indicator deteriorated in score as well as rank. India also reported data for *Industrial designs by origin/ bn PPP$ GDP* for the first time in GII 2016.

Beyond technology innovations, other non-technological innovations which can have a huge impact must be counted. These include business model, system delivery, workflow, and process and policy innovations. JAM for example, is a combination of technology, business model, workflow and policy innovations.

S. No	Indicator	Rank in 2015	Rank in 2016
7.1	**Intangible assets**	**101**	**98**
7.1.1	Trademark application class count by origin	75	72
7.1.2	Industrial designs by origin	n/a	72
7.1.3	ICTs and business model creation	84	87
7.1.4	ICTs and organisation model creation	86	64

RECOMMENDATIONS

7.1.1: Trademark application class count by Origin

[Number of trademark applications issued to residents at a given national or regional office (per billion PPP$ GDP)]

a. To improve Trademark application class count by origin/ bn PPP$ GDP, the simplified and revised fees structure under the Trade Marks Rules, 2017 will encourage higher trademark filings.
b. Awareness must be created amongst MSMEs and Startups to file for trademarks. To this end, the 50% rebate provided in the Trade Marks Rules, 2017 to MSMEs and startups should give a fillip to their filings.
c. Seamless adoption of Madrid trademark filing system must be promoted.
d. IPFCs and PICs should expand their reach to SMEs and MSMEs to promote filing of trademarks.

Models, Programs or Schemes which may be adopted and/ or replicated and scaled up:

» Intellectual Property Facilitation Centre (B.12)
» Pfizer-IIT Delhi Innovation and IP Program (B.1)
» KIRAN (B.13)
» Start up India and SIPP Scheme

7.1.2: Industrial designs by origin

[Number of design contained in industrial design applications filed at a given national or regional office (per billion PPP$ GDP)[a]]

a. Awareness regarding identification, recognition and registration of Industrial Designs amongst SMEs, MSMEs and Startups, should be promoted.
b. Innovation and Design Park should be established at National Institutes of Design (NID) on the lines of Research Park at IIT Madras; to start with, the first one could be set up at NID Ahmedabad.
c. IPFCs and PICs should expand their scope to promote filing of industrial designs amongst industry.

Models, Programs or Schemes which may be adopted and/ or replicated and scaled up:

» Intellectual Property Facilitation Centre (B.12)
» Pfizer-IIT Delhi Innovation and IP Program (B.1)
» KIRAN (B.13)
» Start up India and SIPP Scheme

7.1.3: ICTs and business model creation

[Average answer to the question: In your country, to what extent do ICT's enable new business models? (1= not at all; 7= to a great extent)+]

a. This indicator is ranked based on open survey which may not be a true reflection of innovation in a country; instead, methodology with quantitative parameters should be used.
b. Given the fact that India is ranked 1st in indicator ICT service export, clearly the rank of India in this indicator is not reflecting the true potential of India. Quantitative methodology like number of industries with an ICT– based business model in the country per thousand industries can be considered.

7.1.4: ICTs and organizational model creation

[Average answer to the questions: In your country, to what extent do ICT's enable new organizational models (e.g., virtual teams, remote working, and telecommuting) with companies? (1= not at all; 7= to a great extent)+]

a. This indicator is ranked based on open survey which may not be a true reflection of innovation in the country; instead, methodology with quantitative parameter should be used.
b. Given the fact that India is ranked 1st in indicator ICT service export, clearly the rank of India in this indicator is not reflecting the true potential of India. Quantitative methodology like measuring number of organisations having a structural model based on ICT per thousand industrial organisations may be considered.

7.2 Creative goods and services

The ***Creative good and services*** sub-pillar has seen improvement in rank for the indicator *Cultural & creative services exports % total trade* notwithstanding a constant score, while the indicators National *feature films/ mn. Pop. 15-69* and *Creative goods exports, % of total trade* improved both in score as well as rank from 2015 to 2016.

S. No	Indicator	Rank in 2015	Rank in 2016
7.2	**Creative goods & services**	**77**	**72**
7.2.1	Cultural & creative services exports	59	45
7.2.2	National feature films produced	65	54
7.2.3	Global entertainment & media market	58	59
7.2.4	Printing and publishing manufactures	84	84
7.2.5	Creative goods exports	18	16

RECOMMENDATIONS:

7.2.1: Cultural and creative services exports

[% of total trade][a]

a. Steps should be taken towards encouraging India's participation in exhibitions and events conducted worldwide in this regard.
b. India should come up with an e-platform, exclusively for showcasing Indian culture via movies, songs, images etc. This platform can also facilitate e-marketplace for indigenous artistic creatives.
c. More Cultural centres of India should be established abroad. In this regard, embassies of India can organize cultural programs, competitions etc.

7.2.2: National feature films produced

[Number of national feature films produced (per million population 15-69 years old)[a]*]*

a. Though India produces the maximum number of films in a year, yet the denominator of this indicator drags India's rank. This indicator should be measured only for those countries that produce at least a minimum number of films in a year, say 100.
b. The number of cinema screens in the country is woefully low. Having more screens will give an incentive to produce more films. Thus, steps must be taken towards opening of new screens across the country, especially in the remote areas and smaller cities: these would include steps by State Governments to incentivise new screens as also conversion of single screen theatres into multi-screen complexes.
c. Akin to citations of scientific publications, this indicator should also include the number of viewers, apart from the number of films.

7.2.3: Global entertainment and media market

*[per thousand population 15-69 years old]**[a]

a. The Indian Media and Entertainment industry is on an impressive growth path. The revenue from advertising is expected to grow at a CAGR of 13 per cent and will exceed Rs 81,600 crores (US$ 12.24 billion) in 2019 from Rs 41,400 crore (US$ 6.21 billion) in 2014. We need to ensure that this healthy growth is maintained.
b. Government new move on digitising the cable distribution sector to attract greater institutional funding, increasing FDI limit from 74 per cent to 100 per cent in cable and DTH satellite platforms, and granting industry status to the film industry for easy access to institutional finance will further strengthen the India's position worldwide in this Indicator.
c. Digital India and Smart City initiatives are working towards

increasing internet accessibility to remote areas, which will further increase the entertainment market in India.

7.2.4: Printing and Publishing

[manufactures output (% of manufactures total output)]

a. In GII 2016, base year for data needed to rank countries in this indicator was 2012; however, data provided by India in this indicator was even further outdated. Updated data should be made available.

7.2.5: Creative goods Exports

[% of total trade]:

a. Creative goods export can be promoted via shows, festivals, fairs, trade missions, cultural exchange programs and other export-related events and activities; as well as support from inter-regional cooperation.

7.3: Online creativity

India has seen an improvement in rank for both *Generic Top-level domains (TLDs)/ th. Pop. 15-69* and *Country-code TLDs/ th. Pop. 15-69* indicators, as also in terms of *Wikipedia edits/ mn.* Despite a constant rank for *Video uploads on YouTube/pop. 15-69,*

S. No	Indicator	Rank in 2015	Rank in 2016
7.3	**Online creativity**	**78**	**101**
7.3.1	Generic Top-level domains (TLDs)	104	98
7.3.2	Country-code top-level domains (ccTLDs)	92	84
7.3.3	Wikipedia monthly edits	102	96
7.3.4	Video uploads on YouTube	68	68

RECOMMENDATIONS

7.3.1: Generic Top-level domains (gTLDs)

[per thousand population 15-69 years old]

& 7.3.2: Country-code top-level domains (ccTLDs)

[per thousand population 15-69 years old]

a. Initiatives like Digital India and Smart cities are working towards increasing the internet coverage nationwide, which will give a positive push towards registration of new domains.

b. Initiatives like Startup India and Skill India are helping in promoting new businesses and skills, which will indirectly help in improving the rank in these indicators

7.3.3: Wikipedia monthly page edits

[per million population 15-69 years old]

a. Wikipedia edits is just one of the many ways to promote creativity and knowledge; there are various other websites, applications and online services which are available for the same. So the methodology used for this indicator should also consider other websites, applications like quora, personal blogs, etc.

7.3.4: Number of Video uploads on YouTube

[scaled by population 15-69 years old]

a. Video Services like DailyMotion, Vimeo having a global presence and new service providers like Hotstar, TVF Play having huge viewership worldwide too should be considered, as YouTube videos alone cannot be an accurate parameter for measuring 'online creativity'; the methodology should thus also consider other service providers.

Appendix "A"

Innovation Models and Schemes in other countries

APPENDIX A.1
IMP³ROVE

IMP³rove– European Innovation Management Academy emerged from the European Commission’s flagship program. It offers innovation management related assessment, training and consulting services on a global scale. They have a holistic approach to innovation management, value-creating innovation management assessments, unique databases and international networks to offer. The systematic training and certification schemes, consulting and support services in innovation management and advanced research helps public and private clients to enhance innovation management practices for growth.

It is perceived world-wide as the knowledge hub that continuously and significantly contributes to the wealth and competitiveness in Europe and beyond. They are advisors to World Economic Forum, partners of Global Innovation Index, Convener of ISO and CEN and also the founder of the international award- IMP³rove Award.

IMP³rove: The European Innovation Management Academy, 2016

APPENDIX A.2
EU Horizon 2020

EU Horizon 2020 is the biggest EU Research and Innovative programme ever with nearly € 80 billion of funding available over 7 years (2014 to 2020) – in addition to the private investment that this money will attract. It promises more breakthroughs, discoveries and world- firsts by taking great ideas from the lab to the market.

Horizon 2020 is the financial instrument implementing the Innovation Union, a Europe 2020 flagship initiative aimed at securing Europe’s global competitiveness. Seen as a means to drive economic growth and create jobs, Horizon 2020 has the political backing of Europe’s leaders and the Members of the European Parliament. They agreed that research is an investment in their future and so put it at the heart of the EU’s blueprint for smart, sustainable and inclusive growth and jobs.

By coupling research and innovation, Horizon 2020 is helping to achieve this with its emphasis on excellent science, industrial leadership and tackling societal challenges. The goal is to ensure Europe produces world-class science, removes barriers to innovation and makes it easier for the public and private sectors to work together in delivering innovation.

Horizon 2020 is open to everyone, with a simple structure that reduces red tape and time so participants can focus on what is really important. This approach makes sure new projects get off the ground quickly – and achieve results faster.

The EU Framework Programme for Research and Innovation will be complemented by further measures to complete and further develop the European Research Area. These measures will aim at breaking down barriers to create a genuine single market for knowledge, research and innovation.

https://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020

APPENDIX A.3
The Small Business Innovation and Research program

The Small Business Innovation Research (SBIR) program is a highly competitive program that encourages domestic small businesses to engage in Federal Research/Research and Development (R/R&D) that has the potential for commercialization. Through a competitive awards-based program, SBIR enables small businesses to explore their technological potential and provides the incentive to profit from its commercialization. By including qualified small businesses in the nation’s R&D arena, high-tech innovation is stimulated and the United

States gains entrepreneurial spirit as it meets its specific research and development needs.

SBIR Mission and Program Goals

The mission of the SBIR program is to support scientific excellence and technological innovation through the investment of Federal research funds in critical American priorities to build a strong national economy.

The program's goals are four-fold:

- Stimulate technological innovation.
- Meet Federal research and development needs.
- Foster and encourage participation in innovation and entrepreneurship by socially and economically disadvantaged persons.
- Increase private-sector commercialization of innovations derived from Federal research and development funding.

The SBIR Program is structured in three phases

Phase I- The objective of Phase I is to establish the technical merit, feasibility, and commercial potential of the proposed R/R&D efforts and to determine the quality of performance of the small business awardee organization prior to providing further Federal support in Phase II. SBIR Phase I awards normally do not exceed $150,000 total costs for 6 months.

Phase II- The objective of Phase II is to continue the R/R&D efforts initiated in Phase I. Funding is based on the results achieved in Phase I and the scientific and technical merit and commercial potential of the project proposed in Phase II. Only Phase I awardees are eligible for a Phase II award. SBIR Phase II awards normally do not exceed $1,000,000 total costs for 2 years.

Phase III- The objective of Phase III, where appropriate, is for the small business to pursue commercialization objectives resulting from the Phase I/II R/R&D activities. The SBIR program does not fund Phase III. Some Federal agencies, Phase III may involve follow-on non-SBIR funded R&D or production contracts for products, processes or services intended for use by the U.S. Government.

https://www.sbir.gov/about/about-sbir#sbir-program

APPENDIX A.4
The Small Business Technology Transfer Program

The Small Business Technology Transfer (STTR) is another program that expands funding opportunities in the federal innovation research and development (R&D) arena. Central to the program is expansion of the public/private sector partnership to include the joint venture opportunities for small businesses and nonprofit research institutions. The unique feature of the STTR program is the requirement for the small business to formally collaborate with a research institution in Phase I and Phase II. STTR's most important role is to bridge the gap between performance of basic science and commercialization of resulting innovations.

STTR Mission and Program Goals

The mission of the STTR program is to support scientific excellence and technological innovation through the investment of federal research funds in critical American priorities to build a strong national economy.

The programs' goals are to:

- Stimulate technological innovation.
- Foster technology transfer through cooperative R&D between small businesses and research institutions.
- Increase private sector commercialization of innovations derived from federal R&D.

Three-Phase Program

The STTR Program is structured in three phases:

Phase I- The objective of Phase I is to establish the technical merit, feasibility, and commercial potential of the proposed R/R&D efforts and to determine the quality of performance of the small businesses prior to providing further Federal support in Phase II. STTR Phase I awards normally do not exceed $150,000 total costs for 1 year.

Phase II- The objective of Phase II is to continue the R/R&D efforts initiated in Phase I. Funding is based on the results achieved in Phase I and the scientific and technical merit and commercial potential of the Phase II project proposed. Only Phase I awardees are eligible

for a Phase II award. STTR Phase II awards normally do not exceed $1,000,000 total costs for 2 years.

Phase III- The objective of Phase III, where appropriate, is for the small business to pursue commercialization objectives resulting from the Phase I/II R/R&D activities. The STTR program does not fund Phase III. In some Federal agencies, Phase III may involve follow-on non-STTR funded R&D or production contracts for products, processes or services intended for use by the U.S. Government.

https://www.sbir.gov/about/about-sttr#sttr-program

APPENDIX A.5
The KickStarter Platform

Kickstarter is an enormous global community built around creativity and creative projects. It is a global crowdfunding platform focused on creativity. They fund all creative projects – movies, games, music, arts, design, technology, etc.

A benefit organization

Kickstarter's measure their success as a company by how well they achieve that mission, not by the size of their profits. That's why they reincorporated Kickstarter as a Benefit Corporation in 2015.Benefit Corporations are for-profit companies that are obligated to consider the impact of their decisions on society, not only shareholders. Radically, positive impact on society becomes part of a Benefit Corporation's legally defined goals. When a company becomes a Benefit Corporation, it can choose to make further commitments.

Kickstarter's mission is to help bring creative projects to life. Kickstarter will create tools and resources that help people bring their creative projects to life, and that connect people around creative projects and the creative process. Kickstarter will care for the health of its ecosystem and integrity of its systems. They will engage beyond its walls with the greater issues and conversations affecting artists and creators.

Kickstarter applies a 5% fee on the total amount of the funds raised. Their payments processor applies an additional 3–5% fee. Unlike many forums for fundraising **or** investment, Kickstarter claims no ownership over the projects and the work they produce. The web pages of projects launched on the site are permanently archived and accessible to the public. After funding is completed, projects and uploaded media cannot be edited or removed from the site.

Focus as a Funding platform

To maintain its focus as a funding platform for creative projects, Kickstarter has outlined three guidelines for all project creators to follow:

- Creators can fund projects only;
- Projects must fit within one of the site's 13 creative categories;
- Creators must abide by the site's prohibited uses (including charity, fraud like (Ohio Ghost Towns where Blackfork was not named until 1902 and not 1818 as claimed by fraud.) and awareness campaigns).

Kickstarter has additional requirements for hardware and product design projects. These include:

- Banning the use of photorealistic renderings and simulations demonstrating a product
- Banning projects for genetically modified organisms.
- Limiting awards to single items or a "sensible set" of items relevant to the project (e.g., multiple light bulbs for a house)
- Requiring a physical prototype
- Requiring a manufacturing plan

The guidelines are designed to reinforce Kickstarter's position that people are backing projects, not placing orders for a product. To underscore the notion that Kickstarter is a place in which creators and audiences make things together, creators across all categories are asked to describe the risks and challenges a project faces in producing it. This educates the public about the project goals and encourages contributions to the community.

Since their launch, on April 28,2009, 12 million people have backed a project, $2.9 billion has been pledged, and 1,19,341 projects have been successfully funded.

https://www.kickstarter.com/about?ref=about_subnav

APPENDIX A.6
Japan Innovation Network (JIN)

Japan Innovation Network (JIN) is an accelerator for large and medium-sized companies to spur innovation in companies and overcome the widely held belief that "large companies cannot be innovative". JIN was formed in 2013 from the Ministry of Economy, Trade and Industry (METI) "Frontier HR Research Committee *" to implement the key finding of the need for a "two-layered management", the systematic approach to manage creativity and productivity in parallel. Using this methodology, they aim to create 100 innovative companies in Japan and turn Japan into an "INNOVATION NATION". They tackle these issues via three approaches.

- ***Innovation Management-*** Innovation is the top management's job. This is the key finding from discussions of the Innovation 100 Committee, made up exclusively by CEOs. Innovation does not only spring from special individuals, it is a management issue. Any large organisation can create innovation with the right systematic approach in place. JIN closely cooperates with the economy ministry to spread this innovation management thinking, working with leaders from government, business, and academic communities. JIN also organises workshops for executives and cultivates next-generation innovation managers.

- ***Innovation Projects-*** To accelerate innovation projects, they put cutting edge innovation management thinking to work in order to create successful innovation best practice. They regularly update their methodology based on insights from their projects.

- ***Innovation Platform-*** To accelerate open & innovation, JIN is building multiple open innovation platforms by partnering with global peers. Based on the collaborations with their global partners, they construct and manage a platform to discover innovation opportunities and business solutions for tackling complicated and high impact social challenges.

https://ji-network.org/en/

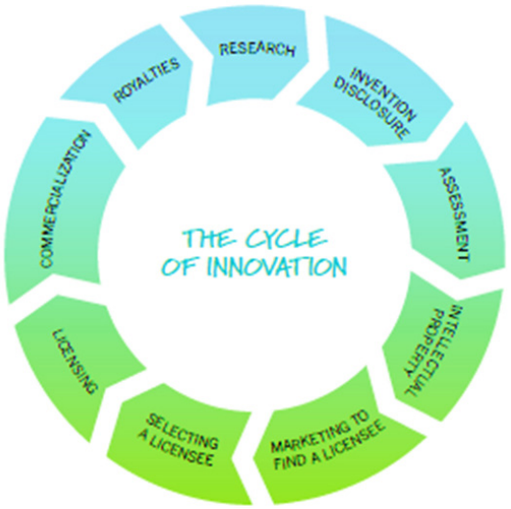
APPENDIX A.7
Stanford Technology Transfer Office

What is Technology Transfer?

Technology Transfer is the movement of knowledge and discoveries from the University to benefit the general public. It occurs in many ways: through research publications, exchanges at scientific conferences, and informal and formal relationships with industry.

At Stanford University, the Office of Technology Licensing (OTL) licenses intellectual and tangible property to industry bodies.

Breakdown of the process of transferring the technology is given below



Research

Observations noted during research activities often lead to discoveries and inventions.

Invention and Technology Disclosure (ITD)

It is a confidential document, fully describing the new aspects of innovation, shared with OTL, in the form of a written notice, starting the process of transfer of technology. The Disclosure should typically lists all sources of support and includes information necessary to begin pursuing protection and commercialization activities.

Students are encouraged to submit an ITD for all inventions and developments that they feel may solve a significant problem and/or have a significant value.

Assessment
Review of ITD, analysis of market and competitive technologies to assess commercialization of technology.

The Licensing Specialists, at OTL, examine each invention disclosure to review the licensability of an invention. They evaluate on the basis of patentability of the invention, commercialization of potential products or services, relationship related to Intellectual Property (IP), time and money required for scalability, any pre-existing rights associated with the IP, and potential competition from other products/technologies.

Intellectual Property Protection
Patent protection, begins with filing of a patent application with the U.S. Patent and Trademark Office (PTO) or foreign patent office, depending on the location.

OTL uses outside firms for IP protection which assure access to patent specialists in diverse technology areas. Inventors work with the specialists in drafting the patent applications and responses to patent office and prosecution transactions. The licensing specialists will select the patent practitioners and oversee the patent prosecution.

There are two types of patent applications: Provisional and Non-Provisional

Foreign patent protection is subject to laws of each individual country, although in a general sense the process works much the same as it does in the United States.

Marketing
Create a marketing overview of the technology, and, identify and connect with potential licensees.

OTL licensing specialists use many sources to identify potential licensees. In addition, OTL examines other comparable technologies and agreements to assist the students.

Selection of Licensee
In the case of multiple interested parties, OTL will assess them and grant the license to a company with the best commercialization usage of the invention.

Faculty involvement with the licensee company, usually involves a Conflict-of-Interest (COI) review before the license is approved. The University defines COI whenever a divergence occurs between an individual's private interests and his or her professional obligations to the University. It usually depends on the situation, and not on the character or actions of the individual.

"Ad Hoc" disclosures are called for whenever a current or prospective relationship creates the potential for COI

Licensing
Negotiation and execution of a licensee agreement is done under this stage.

Commercialization
The licensee company typically makes significant business investments to commercialize the product at this stage. The signing of a License Agreement is usually the beginning of a long term relationship. Most licensees continue to develop an invention to enhance the technology, reduce risk, prove reliability, and satisfy the market requirements for adoption by customers.

Royalties
Distribution of royalties by the University to investors, departments, and schools has to be done. OTL is responsible for managing the patents expenses and license royalties associated with each technology.

According to Stanford's Policy, revenues from license fees, royalties and equity – minus OTL's Administrative Fee and any unreimbursed expenses – are shared with the investors.

Reinvest
Investing the royalties received to foster the creation of next generation of research and innovators.

OTL shares the royalties it generates with Stanford inventors, schools

and departments, as well as with partnering institutions. In turn these are reinvested in additional research and education. In particular, licensing proceeds support the Graduate Fellowship Fund and the OTL Research Incentive Fund, administered by the Dean of Research.

Every year, OTL builds relationships with Stanford investors and licensees while assisting in the transfer of Stanford-generated knowledge and technology to the private sector.

APPENDIX A.8
Technology Innovation Support Centre Program

Why is it useful

- TISC programs provides Host Institutions with access to Technological Information, high quality technology information and related services, helping them to exploit their innovative potential and to create, protect, and manage their intellectual property (IP) rights.
- The end-state vision of TISC is to fully-integrated technological information to eliminate the repetition of existing researches and technologies.
- Through TISC initiative, it will also spot the technology gaps in the maze of patent information so that research resources could be optimally used for filling these gaps
- The TISC platform presents an opportunity to move forward, value and appreciate local and international innovations as well as IP information.

The Technology and Information Support Center (TISC) Network shall:

- offer users search services for patent databases and other sources of technical information through direct personal assistance;
- identify technical issues in terms of enterprises and research topics within universities and research institutes;
- provide information on the state of the art in various technological fields;
- take part in awareness-raising activities concerning industrial property rights, in particular patents;
- participate in the development of research results; and
- identify opportunities in terms of technology transfer.

Services Provided by The TISC Network

The services provided by the TISC Network are designed according to a modular concept, with network and assistance and guidance services, which may be further strengthened depending on user needs.

A. NETWORK SERVICES:

i. Thematic search:

This service makes it possible to view the level of technical development reached within a given technological sector prior to any new development.

ii. Technology watch:

This service makes it possible to monitor innovative activities in a given sector on a regular basis and/or to follow technical developments in potential sectors.

iii. Technological trends:

This service allows users to identify at a given moment the technical fields that will become more important in the near future.

iv. Patent map:

Using this service, it is possible to create a patent map, produced through collection and analysis of information on patents relating to a specific technological field.

v. Freedom to exploit:

This service makes it possible to identify the patents in a given sector which are not protected in the host country, or which have fallen into the public domain and which may be freely exploited.

vi. Bibliographical search:

Through this service, users are provided with the bibliographical data concerning patents, including in particular deposit and priority dates, patent numbers, names of patent holders and inventors, the classification of patents granted, information on the legal status of patents which allows users to find out whether protection is still in force or has been cancelled, information on patents and patent applications published outside of the host country.

vii. Statistics search:
Through this service it is possible to analyze data contained in patent databases, in order to identify scientific and technological developments. The information obtained from this analysis may be used to highlight:

- the leading companies in terms of a specific technology and the intellectual property (IP) strategies they employ
- the R&D strategy of potential actors in a given sector
- the position of competitors in terms of a given technology

viii. Patent validity:
Through this service it is possible to determine the geographical territory covered by the protection offered by a patent, as well as its legal soundness in the case of a license to exploit a patent or the acquisition of or investment in a given technology.

ix. Prior art search:
Through this service it is possible to check whether an idea or invention is new and inventive and thus to determine whether it is worth filing a patent application(assessment of patentability criteria), as well as to gather ideas on how to draft patent applications.

x. Patent infringement:
Through this service it is possible to assess the risk of patent infringement prior to the development, manufacture and marketing of a product, with the aim of avoiding costly infringement claims.

B. ASSISTANCE AND GUIDANCE SERVICES

- Assistance in the search for scientific and technical information contained in free or commercial patent databases.
- Assistance in the search for technical information contained in free or commercial scientific and technical review (non-patent literature) databases.
- Guidance towards advisory tools concerning the innovation process as a whole, from the conception of an idea to the marketing of the product based on that idea.
- Guidance towards innovation protection tools, for example the use of patents.

APPENDIX A.9
YET2.COM

***Yet2* are experts at harnessing Open Innovation to drive corporate innovation within your business growth strategy.**

- Commercially, technically and IP- astute consultants with almost 20 years' global experience across technology scouting, IP, business development & ventures.
- Trusted partners with strong networks and relationship building skills enabling us to integrate and navigate corporate hurdles to deliver uniquely tangible impact
- They understand the nuances of both small and large company deal making and how to buy and sell technology, ensuring strong effective articulation of needs and technology value propositions.

Established in 1999, *yet2* are a global open innovation and technology scouting services company with offices in the US, Europe and Asia.
From their roots as an open innovation marketplace (the original crowdsourcing platform) *yet2* have evolved to become expert Open Innovation consultants with proven services and methodologies for enabling clients to execute Open Innovation successfully.Privately owned and managed, *yet2* deliver for clients on a global scale and offer a bespoke service to the specific regions, enabling global companies of all industries to collaborate on a variety of technology transfer initiatives supporting their business growth through external collaboration.

Yet2 works across a range of company sizes and engages with: Global 1000, Small/Medium Enterprises, Venture Capitalists, Incubators, Accelerators, Research Institutions and Technology Brokers.

***Yet2* have knowledge of working across all sectors but have a pedigree in the following specialisms:**

- FMCG (Personal Care, Homecare, Food & Beverage)
- Automotive/Aerospace
- Healthcare & Life sciences
- Electronics
- Sustainable and Natural Materials
- Chemicals
- Oil & Gas
- Digital

- Manufacturing & automation with a team of skilled and experienced professionals, *yet2* understands the nuances of external collaborations between different types of organizations, the critical importance of internal preparations, articulating technology needs or technology value propositions well and how to set deal expectations.

Utilizing their global network of over 150,000 marketplace users, syndication partners, 800 global brokers, online technical networks, social media and other promotional platforms *yet2* find and foster unique collaborations that are normally beyond the reach of most clients.

APPENDIX A.10
Knowledge Transfer Partnership

The Knowledge Transfer Partnership (KTP) scheme helps businesses to innovate and grow. It does this by linking them with a university and a graduate to work on a specific project.

Each KTP is a three-way partnership between a business, an academic institution and a graduate. The academic institution employs the recently-qualified graduate who works at the company. The graduate, known as the 'associate', brings new skills and knowledge to the business. A KTP can last between 12 and 36 months depending on the project and the needs of the business. It is part-funded by a grant. The amount businesses need to contribute is different for SMEs and larger companies.

The benefits of taking part in a KTP:
Businesses achieve an average increase in annual profit of more than £1 million after taking part. They also create around 2 new jobs.

Academic partners produce on average more than 3 new research projects and 2 research papers for each project.

Around 60% of associates are offered a permanent job in the company when the project ends.

https://www.gov.uk/guidance/knowledge-transfer-partnerships

APPENDIX A.11
Enterprise Europe Network

The Enterprise Europe Network is the world's largest support network for small and medium sized business (SMEs) with international ambitions. It has 3,000 experts across 600 member organizations in more than 60 countries. Member organizations include chambers of commerce and industry, technology centers, and research institutes. The Network helps ambitious SMEs innovate and grow internationally. It provides international business expertise with local knowledge across a range of targeted services:

- Partnership
- Advisory
- Innovation support.

http://een.ec.europa.eu/

APPENDIX A.12
Callaghan Innovation Institute

A government agency that supports high tech end businesses in New Zealand in commercializing innovations by connecting over to the innovations sector and the business. They provide a single front door to the innovation journey – from startups to the most experienced R&D performers.

Core areas of focus:

- Access to experts
- Technology and product development
- Innovation Skills
- Business Collaborations
- R&D Grants

https://www.callaghaninnovation.govt.nz/

APPENDIX A.13
The Jumpstart Our Business Startups Act (JOBS ACT)

JOBS Act is a law intended to encourage funding of small businesses in the United States by easing many of the country's securities regulations. Also known as the CROWDFUND Act has drawn the most public attention because it creates a way for companies to use

crowdfunding to issue securities, something that was not previously permitted.

https://www.sec.gov/spotlight/jobs-act.shtml

APPENDIX A.14
InnoCentive

It is a Waltham, Massachusetts-based crowd sourcing company that accepts by commission research and development problems in engineering, computer science, math, chemistry, life sciences, physical sciences and business. The company frames these as “challenge problems” for anyone to solve. It gives cash awards for the best solutions to solvers who meet the challenge criteria.

https://www.innocentive.com/

APPENDIX A.15
Project Loon

Many of us think of the internet as a global community. But two-thirds of the world’s population does not yet have internet access. Project Loon is a network of balloons traveling on the edge of space, designed to connect people in rural and remote areas, help fill coverage gaps, and bring people back online after disasters.

Since launching this balloon in New Zealand in 2013 Project Loon have flown millions of test kilometers around the world trying to learn what it will take to provide connectivity to everyone, anywhere, with balloons.

Project Loon balloons float in the stratosphere, twice as high as airplanes and the weather. In the stratosphere, there are many layers of wind, and each layer of wind varies in direction and speed. Loon balloons go where they’re needed by rising or descending into a layer of wind blowing in the desired direction of travel. By partnering with Telecommunications companies to share cellular spectrum Project Loon have enabled people to connect to the balloon network directly from their phones and other LTE-enabled devices. The signal is then passed across the balloon network and back down to the global internet on Earth.

https://x.company/projects/loon/

APPENDIX A.16
SOSA, Israel

SOSA brings together early stage tech startups and Influential industry participants such as major global corporations, seeking to invest in the Israeli market as well as leading local investors and veteran entrepreneurs.

SOSA is solving a major challenge in the accelerated world where disruption is changing entire industries – With an increasingly massive number of different stakeholders dealing with innovation, SOSA directly connects advanced technologies with global leading corporations by curating creative communities and business interactions between the Academy, Startups, Investors and Corporations.

SOSA is the “town square” of the Israeli tech ecosystem. Built for the industry, by the industry, it serves the innovator’s community and is in a vintage building in south Tel Aviv, designed to promote unique interactions. Their model involves aggregating the entire ecosystem through their partners and working with curated startups, corporates and governments, who are looking to tap into the Israeli innovation ecosystem. Example: The Govt of Australia has partnered with SOSA to start an Australian Startup launchpad. Through this launchpad, Australian entrepreneurs work at SOSA premises and get assistance from SOSA to take their ideas/ventures to the next level.

It has a network of 2,500 startups, 400 partners and members, 45 professional investors and receives around 150 global delegations annually.

http://sosa.co/

APPENDIX A.17
BaseCamp Innovation Centre

BaseCamp Innovation Center’s mission is to identify leading-edge ideas and research, transform them into ventures and support them on their way to become successful start-ups. It programs provides support through: mentors, business development, funds & startup international exchange programs.

BaseCamp is a for profit initiative with participation from the Ben

Gurion University of Negev. The entity is focussed on scouting innovations at Universities and research labs, assessing commercial potential and working with the innovator to build a business model around it. BaseCamp also helps the innovator hire co-founders and scout technical and business partners. To do so, BaseCamp relies on its network of Investors, Mentors, Corporates and Academicians to help take innovations/inventions to a viable business model. BaseCamp was started in early 2016 and since then it has evaluated hundreds of innovations/technologies and helped create 9 Startups.

https://www.baseca.mp/

APPENDIX A.18
Get in the Ring

The Get in the Ring Foundation started in 2012 with the mission to reduce the failure rate of talented entrepreneurs and potential world changing innovations. They believe too many startups fail (9 out of 10) because they don't have access to funding, lack a product/market fit and the right people. By connecting startups to (for them) hidden opportunities to grow, they can reach our goal to reduce the failure rate to 8 out of 10.

The Get in the Ring Foundation is active in 100+ countries with 150+ events. They aim to connect 10,000 startups per year to opportunities they need to start, grow and scale up and make impact. Every startup is welcome, whether you are in robotics, software, agriculture or medtech. They do however prefer startups that are aiming to make a positive impact in this world.

https://getinthering.co/foundation/

Appendix A.19
Global Innovation Fund

The Global Innovation Fund invests in social innovations that aim to improve the lives and opportunities of millions of people in the developing world. Through grants and risk capital, they support breakthrough solutions to global development challenges from social enterprises, for-profit firms, non-profit organisations, researchers, and government agencies.

http://www.globalinnovation.fund/

Appendix A.20
Global Innovation Initiative

The Global Innovation Initiative is a joint effort of the United States and the United Kingdom to strengthen global multilateral collaboration through grants to university consortia focusing on science, technology, engineering, and mathematics (STEM)-related issues of global significance that foster cutting-edge multinational research and strengthen institutional international partnerships. India is one of emerging economies as designated country for the Global Innovation Initiative.

http://www.iie.org/Programs/Global-Innovation- Initiative#.WNTAWtKGPIU

Appendix A.21
European Institute of Innovation and Technology

The European Institute of Innovation and Technology (EIT) is an independent EU body. It has been formed to enhance Europe's ability to innovate by nurturing entrepreneurial talent and supporting new ideas. The EIT Regional Innovation Scheme (EIT RIS) is a structured outreach scheme to support the integration of the Knowledge Triangle and increase the innovation capacity in areas and regions in Europe

https://eit.europa.eu/

Appendix "B"

Innovation Models and Schemes in India

APPENDIX B.1
Pfizer-IIT Delhi Innovation and IP Program

The Pfizer-IIT Delhi Innovation and IP Program is a collaborative incubation accelerator - co-created by Pfizer and Foundation for Innovation and Technology Transfer (FITT) at the Indian Institute of Technology Delhi (IIT Delhi). This was founded in 2015. This unique partnership model is designed to provide funding, resources, expertise and infrastructure to propel India's healthcare innovations from idea to IP. The program envisages active support for incubation and intellectual property (IP) creation. The unique feature of the funding support is that it is unencumbered. The program is being implemented at IIT Delhi by Foundation for Innovation and Technology Transfer (FITT) – country's foremost industry interface organisation from academia.

The National Call for proposals for Pfizer-IIT Delhi Innovation and IP Program awards happens twice a year.

1. Program Components

There are two components of the Pfizer IIT Delhi Innovation & IP Program (PIDIIP):

i. For innovators seeking comprehensive support to translate their healthcare ideas into new business opportunities, the Program provides:
   - Resident incubation at IIT Delhi's bio-incubator for a period of up to 2 years.
   - Funding of up to INR 50 lakhs for each innovator to take ideas through proof of concept to IP.
   - Mentoring support from IIT Delhi's faculty and FITT nominated experts.
   - Access to infrastructure, prototyping laboratories and space for setting up an office.
   - IP facilitation services.
   - Guidance from Pfizer's global experts.
   - Access to venture capitalists and other industry linkages

ii. For innovators who already have a proof of principle/ concept are only looking for IP related support, the program provides:
   - Access to IP counselling services at FITT.
   - Funding support of up to INR 3 lakhs to cover patenting expenses.

2. What is supported

Technology ideas in the following areas are supported under the program:

- Medical/ Health biotechnology
- Biomaterials
- Nutraceuticals
- Computational biology
- Medical devices
- Diagnostics
- Bioinformatics

3. Implementation Mechanism

Before initiating the program, well thought-out guidelines were formulated by the partners to ensure transparency and smooth implementation of the award program. The implementation scheme is a well-structured workflow to ensure that best proposals get identified and selected for needful support.

The process involves the following steps:

a. Inviting applications –The online application window is open for 6 weeks from the date of first advertisement. Applications are invited through national promotion :
   - Advertisements in print and digital media
   - Road shows and awareness programs at various institutions
   - Mailers to Network leaders in the Innovation ecosystem

b. Initial screening – Eligibility check is done by FITT as per the program guidelines

c. Technical Screening - Eligible applications both for innovation and IP award are technically evaluated by Experts who look at innovation, novelty, team strength and commercialization plan as key qualifying parameters.

d. Presentation Round – The shortlisted candidates are then invited for a presentation to an expert committee comprising experts from Industry and Academia who shortlist them further on basis of feasibility, commercialization plan and market need.

e. Technology Business Incubation Unit (TBIU) Screening Committee –The TBIU Screening Committee of IIT Delhi finally chooses the winners who receive the support on the strength of their business plan. To ensure excellence of the program, the committee has the power to not award any applicant, if applications are found unsatisfactory.

4. Key Takeaways

This engagement model is ideal for replication and allows for the collective strengths of the corporate and the academia to be utilized for supporting innovators and startup ecosystem.

APPENDIX B.2
IIT Madras Research Park

IIT Madras Research Park is an independent company promoted by IIT Madras and its alumni and was incorporated under Section 25 of the Companies Act 1956. The IIT Madras Research Park facilitates the promotion of research and development by the institute in partnership with industry, assisting in the growth of new ventures, and promoting economic development.

The IIT Madras Research Park assists companies with a research focus to set up a base in the park and leverage the expertise available at IIT Madras.

The "knowledge and innovation ecosystem", the Research Park breaks down the traditional, artificial barriers of innovation through its connectivity and collaborative interaction. This helps the industry to create, integrate, and apply advancements in knowledge. The resulting synergy leads to matchless technological innovation and transfer.

The basic principles of the Park are:

- Creating a collaborative environment between industry and academia through joint research projects and consulting assignments
- Developing a self-sustaining and technologically fertile environment
- Encouraging and enabling the alignment of R&D activities to potential needs of the industry
- Providing world class infrastructure for R&D activities
- Enabling development of high quality personnel and motivating researchers to grow professionally within organizations through part time Masters and PhD Programs
- Aiding technology and business skills sharing between the university and industry tenants

The ongoing technology transformation is opening up vast vistas of innovation and entrepreneurial opportunities.

Their Mission is to create a Knowledge and Innovation Ecosystem through collaboration between the industry and academia to enable, encourage and develop cutting edge technology and innovation that exceed the global standard.

IIT Madras Research Park provides high quality infrastructure for companies to set up an R&D base. The Park will facilitate a collaborative relationship between tenants/ clients and IIT Madras. IIT Madras has always been on the forefront in collaborating with industry and the Research Park is expected to enhance this relationship further. Tenants will have the opportunity to tap the into the research wealth of one of the leading technological institutions in the country. The IIT Madras Research Park will enable the industry to leverage the specialized expertise of the faculty, utilize their research facilities, while providing part time employment and experience to the students.

One of the major barriers of innovation is a lack of innovation culture. IITM and the Research Park are not only home to such a culture but they promote it through entrepreneurship which is spearheaded by the Incubation Cell. The Incubation Cell along with its sister incubators: Rural Technology Business Incubator, Bio-incubator, and Med-tech incubator have over 100 incubated companies to their credit. Incubated companies are offered space, seed funding, branding, mentoring, networking and business support services.

http://respark.iitm.ac.in/about_us.php

APPENDIX B.3
Vadodara Innovation Council

Program Brief

Vadodara Innovation Council (VIC)is the first and the only city-based Innovation Council in India, associated with National Innovation Council. VIC is aimed "To build Innovative, Curious and Questioning Society in Vadodara region". VIC is run by volunteers including Industrialist, Businessman, Doctor, Engineer, Lawyer, Advocate, Educationalist, Student, Housewife, Layman, etc- from all walks of life.

By conducting an innovation workshop of 10,000 school students in a short span of 8 months, it got commendable recognition at national level. The model is to be replicated in 1,000 cities of India.In its first phase 31 schools including 11 municipal (government) schools were covered. The theme was 'Promoting Innovation Consciousness', conducted in English as well as in Gujarati.

The vision of Vadodara Innovation Council is to make Vadodara an Innovative City and to enhance the culture of Innovation and provide a platform to innovators in and around Vadodara.

List of Activities at VIC

- **Socho Hatke School Program-**Under the initiative of Innovation awareness in Schools, VIC has designed a school students program – Socho Hatke for 5th to 12th standard students on – How to be Curious, Questioning and Innovative, and has so far trained more than 15,000 students from 30+ schools ranging from municipal to GSEB-CBSE schools of English and Gujarati Medium. VIC has trained some volunteers on "Socho Hatke" program for students and the trainer would visit the school and conduct the free seminar of 90 minutes to unleash the mindset of the students.
- **Tod-Fod-Jod School Program-** Further to socho hatke– to give these school students the hands on experience and confidence to play with real objects, VIC started Tod-Fod-Jod (TFJ) program for 9-10-11th standard school students on day to day objects like Fan, Computer, Cycle, with a practical approach to explain: concepts, principles, material, technologies, evolution, different applications, future related to that object.

Highlighted events

- **An innovation partner for Vibrant VICCI Expo 2014**
  Vadodara Chamber of Commerce & Industries (VCCI) Expo 2014 was organized at Vadodara during 27th November 2014 to 1stDecember 2014. The expo partnered with Vibrant Gujarat 2015. Innovation being core of "Make in India", a separate dome was designated for Innovation. Vadodara Innovation Council (VIC), being an Innovation partner for Innovations and Innovators, took the responsibilities to administer the dome and its activities.

Showcased

- 115 innovations in 56 stalls
- 83 innovators from 14 academic institutes
- 12 individual Innovators and 10 companies.

Innovations were from the diverse fields of Energy, Medical, Social, IT/ ITes, Biotech, Nanotech, Agriculture, Food, Sports, Robotics, Home Appliance, Automobile, Art & Fashion, Civil, Mechanical, Electrical, Electronics, Management, etc.

An advisory panel discussed individually with each innovator about technology, patent, laws applicable to their innovations, product development, commercialization and funding other similar aspects. The Panel found most of the academic innovators stuck at demo level or prototype level for want to technical or financial support. The panel also found lack of knowledge among innovators for project report generation and restricted overall vision.

http://www.vicindia.org/

http://www.vicindia.org/activites/

APPENDIX B.4
Innovation Challenge

(i) Innovation Challenge for Indian Railways

The Challenge is open to all Indian Resident Nationals and Companies/ Institutions. These challenges were announced by Hon'ble Minister for Railways in Railway Budget 2016 under the 'Navrachna' initiative for setting up of 'Innovation grants to employees, start-ups and small businesses'.

In response to Hon'ble Prime Minister's clarion call for innovation in Indian Railways under the Navrachna Initiative, Indian Railways has decided to conduct a public competition for:

- 'Design of Wagons for efficient loading and transportation of new commodities'
- 'Easy Accessibility to Trains from Low Level Platforms of Indian Railways
- 'New Idea/ Suggestion to improve the working of Indian Railways'
- 'Increasing Passenger Carrying Capacity of Coaches of Indian Railways'.

- 'Developing new Digital Capabilities at the Stations of Indian Railways'.

Six awards will be given to the finalists of each Innovation Challenge as per details given below:

First Award	:	06 Lakh (Maximum)
Second Award	:	03 Lakh (Maximum)
Third Award	:	02 Lakh (Maximum)
Three Consolation Prizes (Maximum)	:	01 Lakh each (Maximum)

(ii) Innovate for Digital India Challenge 2.0

The INTEL & DST - INNOVATE FOR DIGITAL INDIA CHALLENGE 2.0 is an initiative of Intel and the Department of Science and Technology (Govt. of India) anchored by T-Hub Foundation (T-Hub). The Challenge is an initiative to drive grassroots innovation based on Intel® architecture to create products & solutions that are scalable and relevant for India, thus addressing problems faced by its citizens

https://innovate.mygov.in/ifdic2/index.php?mode=terms

(iii) Grand Innovation Challenge by NITI Aayog

NITI Aayog launched the first phase of the 'Grand Innovation Challenge' to seek citizens inputs on the key developmental challenges facing India. The 'Grand Innovation Challenge' is being launched on the MyGov portal, to involve citizens at the very first stage in innovating for India's development. The idea is to work together with the States and every citizen as Team India to ensure progress. leaving no one behind. The focus is on the social sector, the most vulnerable sections and to involve citizens in crowd sourcing ideas to address challenges facing India's development.

http://pib.nic.in/newsite/PrintRelease.aspx?relid=138710

(iv) Smart India Hackathon 2017

Smart India Hackathon was organized by MHRD, conducted on 1st April 2017. The event was a pan-India 36 hour non-stop programming competition to find sustainable digital solutions to real time challenges faced by the nation. The challenges have been identified by various Ministries and shared as "problem statements" with students. As part of the event, Hon'ble Prime Minister Shri Narendra Modi interacted live with the students over Video Conference and also responded to questions posed by students.

7500+ teams from tier 2,3 cities participated in the 36 hour non-stop digital programming event across 26 locations in India

40,000+ students, 29 Govt. Depts. and 598 Problem Statements were part of Smart India Hackathon

APPENDIX B.5
India Innovation Initiative

Program Brief:

India Innovation Initiative (i3) is a national-level competition organized by the Confederation of Indian Industry (CII) in partnership with the Department of Science and Technology (DST) and All India Council for Technical Education (AICTE), Government of India with the principal aim of communicating and promoting science, technology and innovation among Indian citizens, and facilitating commercialization of most promising innovations.

The focus of India Innovation Initiative is:

Reach out to innovators, from all walks of life,having novel and high impact solutions for industrial and social challenges.

Enhance understanding and raise awareness about the innovation and entrepreneurial ecosystem among all stakeholders especially innovators.

Connect the most promising innovators to the ecosystem of mentors, incubators and investors to help them translate their innovations into viable commercial ventures.

Methodology:

A significant part of the entire exercise also aims to assist innovators understand the nuances of areas such as intellectual property and patenting, commercialization and doing business by organizing workshops/ lecture series with specialists and providing them mentorship with top venture capitalists and angel investors. The mentorship support is funded through resources generated from industry members, by CII. Every year the aim is to broaden the mentorship and incubation support to more and more innovators so that many more ideas are translated into commercially viable products and services.

APPENDIX B.6

Department of Science and Technology (DST)-Lockheed Martin Corporation India Innovation Growth Programme

The India Innovation Growth Programme is a joint initiative of the Department of Science and Technology, Govt. of India; Lockheed Martin Corporation; Indo-US Science and Technology Forum, Federation of Indian Chambers of Commerce and Industry; Stanford Graduate School of Business and the IC2 Institute at the University of Texas. The aim of this programme is to accelerate innovative Indian technologies into the global markets.

Program Partners

- Department of Science and Technology, Govt of India
- Federation of Indian Chambers of Commerce and Industry (FICCI)
- Lockheed Martin Corporation
- INDO-U.S. Science and Technology Forum
- Stanford Graduate School of Business
- The University of Texas at Austin, IC2 Institute & Global Commercialization Group (GCG)
- TiE Silicon Valley

About the Programme:

The India Innovation Growth Program is the only program of its kind, because of its focus on using world-class commercialization strategies and the business development assistance provided.

During the first phase of the programme, the project team comprising of subject matter experts from FICCI will select 100 innovative technologies from a wide range of sectors such as aeronautics, agriculture, biotechnology, chemistry, communications, computing, defence, electronics, environment, healthcare, information technology, manufacturing, materials, life sciences, nanotechnology, petrochemical, semiconductors and transportation.

FICCI approved applications and technologies will be evaluated and ranked by a joint team comprising all programme partners. Predefined parameters (such as development status, patent status, funding required to technology development, etc.) will be used to select the most appropriate technology companies to go forward in the programme. The assessment will be done in two phases. During the first phase, evaluators review and offer constructive feedback on the technical and commercialization potential of the application submissions. In the second phase refined applications are scored based on predefined parameters and evaluator feedback to select the top 50.During the second phase of the program, the selected 50 innovators will be given week long advanced training in basic principles of product commercialization, readiness for market, business models, IP rights, competitive positioning, and mechanisms for revenue by experienced faculty members from the Stanford Graduate School of Business. The Entrepreneurship Workshop is organized to provide training to the innovators and also prepare them to participate in an Innovator's Competition. The top 50 innovators will then present their innovations to a panel of judges comprising renowned technologists and commercialization experts from India and the United States. At the end of the competition, 30 best innovations will be awarded. Thereafter, the top 50 innovators will receive professional business development assistance from FICCI and top 8 both by FICCI and the IC2 Institute, University of Texas. The business development managers at FICCI and IC2 Institute work towards assisting the winners in commercializing their technological innovations and finding them suitable business partners in India as well as global markets.

The programme process is outlined below:

http://www.indiainnovates.in/aboutprogram.aspx

APPENDIX B.7
Society for Innovation and Entrepreneurship

SINE- Overview:

SINE is a non-profit entity; it is registered as a society under the Societies Registration Act 1860.

- SINE was incorporated in Jan 2004. Prior to setting up of SINE, IT incubator was set up at IIT Bombay. Thus the incubator has a track record of a decade and half.
- SINE is a technology business incubator approved by the Department of Science and Technology's National Science and Technology Entrepreneurship Development Board (DST-NSTEDB), Ministry of S&T, Govt of India.
- SINE has also been supported by funding from Technology Development (TDB) Board and Department of Electronics and Information Technology (DEITY).
- SINE has an infrastructure of over 10000 sq ft, which can accommodate about 20 companies at a time.
- SINE has an infrastructure of over 10000 sq ft, which can accommodate about 20 companies at a time.
- So far about 82 companies got incubated through the incubator.

CSR funding:

SINE shall accept CSR contribution from corporate for the purposes that are within the objective of SINE. SINE will generally not accept CSR contribution from corporate for the purpose defined by them, which is not within SINE's broad objective. Corporate can contribute under their CSR initiatives in two ways:

- Contribution to the corpus: Under this, corporate can contribute to a continuing program. The corpus remains an asset of SINE.
- Project or program funding: In this form of contribution, corporate can focus on specific, limited term projects with clear milestones.

Corporate can support the following activities under their CSR initiative:

1.	Seed fund (including impact fund)	>Rs.30 Lakh	Seed support for incubatees to help with their initial operational expenses. Funding for social start ups – products/ services that help improve human and environmental well being.
2.	Accelerator/ Boot camp fund	>Rs.70 Lakh*	Specialized fund for helping a group of start-ups (usually more than10) jump start their business and is given for a short period (usually 3-4 months).
3.	Infrastructure fund	>Rs.50 Lakh*	Fund for supporting creation of additional space, shared facilities, equipment, components and raw materials.
4.	Capacity building and resource center	~Rs.10 Lakh*	For supporting market research, proof of concept, training and workshop, lecture series, events, product development, cost for IP protection cost of experts, mentors, consultants etc.
5.	Fellowships/ internships fund	~Rs.10 Lakh*	Supporting interns, Entrepreneur in residence (EIR) etc.

*Amounts are indicative.

Once the corporate decides to contribute CSR for any of the above activities, SINE shall use the fund for any specific purpose or for any specific project within the decided activity. Contributing corporate shall not claim any veto power in SINE's decision. Seed fund would be as per SINE's investment policy.

Benefit for CSR contributors:

SINE shall mention the CSR contributors on its website.
Naming rights will be given provided:

i. In case of any of the above listed activities, the CSR contribution is not less than 50% of its operation costs for a specific number of years.
ii. In case of infrastructure, the CSR contribution is not less than 50% of its infrastructure cost.

CSR Reporting:

SINE shall provide periodic reports on the following aspects to help the corporate meet its annual reporting requirements under CSR rules.

- Activities undertaken
- Utilization of funds/ financial report against planned budget
- Impact of activities undertaken against pre-decided impact metrics

http://sineiitb.org/sine/home/

APPENDIX B.8
National Innovation Foundation

National Innovation Foundation (NIF) – It is an autonomous body of the Department of Science and Technology (DST), Government of India. It was set up in February 2000 at Ahmadabad, Gujarat to provide institutional support for scouting, spawning, sustaining and scaling up the grassroots innovations across the country. NIF is a national initiative to serve the knowledge-rich, economically poor people of the country. It is committed to making India innovative by documenting, adding value, protecting the Intellectual Property Rights (IPRs) of the contemporary, unaided technological innovators as well as of outstanding traditional knowledge holders and disseminating them on a commercial as well as non-commercial basis.

NIF conducts a biennial national competition for grassroots green technologies, developed by farmers, mechanics, artisans and others, through their own genius, without any recourse to professional help. NIF then gets these innovations validated with the help of experts and ascertains the novelty in these innovations by conducting Prior Art Search (PAS). If the innovation is deemed novel, NIF files a patent on behalf of the innovator in his/ her name. NIF also funds value-addition initiatives in these innovations to upscale them and make them more useful for a larger segment of people.

To determine the feasibility of the commercializing of technology, NIF conducts market research and test marketing. The technologies which are found to be commercially viable are licensed to willing entrepreneurs. A Micro Venture Innovation Fund (MVIF), sponsored by Small Industries Development Bank of India (SIDBI) in 2003, supports the activities of prototype development, test marketing and pilot production.

Being organized since 2008, IGNITE is an annual competition for student's ideas and innovations conducted by NIF in partnership with the Central Board of Secondary Education (CBSE). Some state education boards also partner in the same. All students up to Standard 12 from any school (and of the same age group but out of school) in India are eligible to participate in the competition. The IGNITE awards are announced on October 15, the birthday of Bharat Ratna Dr A P J Abdul Kalam, the former President of India, which is celebrated as the Children's Creativity and Innovation Day by NIF. In 2015, IGNITE competition was renamed as Dr. A P J Abdul Kalam IGNITE competition in the memory of Dr. Kalam so that the creative children continue to draw inspiration from his spirit.

NIF has proved that Indian innovators can match anyone in the world when it comes to solving problems creatively. Where they perform better than the rest is in generating greater sustainable alternatives by using local resources frugally. The Grassroots-to-Global (G2G) model that NIF is propagating is all set to change the way the world looks at the creativity and innovations at the grassroots.

Vision

To make India innovative and adding value to India's outstanding traditional knowledge base

Mission

To help India become inventive and creative, and to become a global leader in sustainable technologies without social and economic handicaps affecting the evolution and diffusion of green grassroots innovations

The primary objectives are:

- To help India become innovative and creative, and to become a global leader in sustainable technologies by scouting, spawning and sustaining grassroots innovations.
- To ensure evolution and diffusion of green grassroots innovation on a selective, time-bound and mission-oriented basis so as to meet the socioeconomic and environmental needs of our society.
- To provide institutional support in scouting, spawning, sustaining and scaling up grassroots green innovations as well as outstanding traditional knowledge and helping their transition to self-supporting activities.
- To seek self-reliance through competitive advantage of innovation-based enterprises and/ or application of "people-generated sustainable technologies" at grassroots level
- To build linkage between excellence in formal scientific systems and informal knowledge systems and create a knowledge network to link various stakeholders through application of information technology (IT) and other means
- To promote wider social awareness and possible applications of the know-how generated as a result of these initiatives in

commercial or social spheres and encourage its incorporation in educational curriculum, developmental policies and programs.

http://nif.org.in/aboutnif

APPENDIX B.9
National Scheme of Apprenticeship Training

The National Scheme of Apprenticeship Training is implemented through four Regional Boards of Apprenticeship/ Practical (BOATs/ BOPT) at Mumbai, Kanpur, and Chennai & Kolkata. The Scheme of Apprenticeship Training provides opportunities for practical training to graduate engineers, diploma holders (Technicians) and 10+2 Vocational pass outs in about 10,000 industrial establishments/ organizations as per the policies and guidelines laid down by the Central Apprenticeship Council(CAC), which is an apex Statutory Body constituted under the Apprentices Act, 1961. The four Regional BOATs/ BOPT which are fully funded autonomous organizations of MHRD have been entrusted with the responsibility to implement the Scheme of Apprenticeship Training under Apprentices Act, 1961 as amended from time to time in their respective regions.

The basic objective of the Scheme is to fulfill/ match, any gap, insofar practical/ hands on experience of fresh Graduate Engineers, Diploma holders and 10+2, vocational, passouts and also to enhance their technical skills for making their suitability in job absorption as per the needs of the Industry.

The period of Apprenticeship Training under the Act is one year. The apprentices are paid monthly stipend which is shared between the Central Government and the Employer on 50: 50 basis. The existing rates of stipends as effective from 19th December,2014 for Engineering Graduate, Technicians and 10+2 Vocational passouts are Rs. 4984/-, Rs. 3542/-, and Rs. 2758/- per month respectively as approved in March, 2011. The full stipend is paid by the industrial establishments/ organizations to the apprentices undergoing Apprenticeship Training at the first instance and later on they claim 50% reimbursement from Central Government through respective BOATs/ BOPT.

http://mhrd.gov.in/technical-education-13

APPENDIX B.10
National Programme for Technology Enhanced Learning (NPTEL)

In order to enhance learning effectiveness in the field of technical education by using technology, the MHRD, in 2003, initiated the Project – National Programme for Technology Enhanced Learning (NPTEL) to enhance quality engineering education in the country by developing curriculum based video courses (at least 100) and web based e-courses (at least 115) to be prepared by seven IITs at Delhi, Bombay, Madras, Kanpur, Kharagpur, Guwahati, Roorkee and IISc, Bangalore as participating institutions with a total outlay of Rs. 20.47 crores.

In the first phase of the NPTEL, the Project had covered core courses of undergraduate curriculum in five major engineering branches, namely, Civil, Computer Science, Electrical, Electronics & Communication and Mechanical Engineering. These were supplemented by the core science and management programme, languages and other basic courses such as electronics, numerical methods etc. which are mandatory for all engineering students. The model AICTE curricula in engineering adapted by major affiliating universities, such as Anna University, Vishveshwarya Technical University and Jawaharlal Nehru Technological University were used to design the course content.

More than 500 faculties are expected to participate in the Project and the beneficiaries of the Programme will be all engineering and physical sciences under-graduates/ post graduates in the country; all teachers/ faculties in science and engineering Universities in India. The goal of the Project is to build on the programme launched on 03.09.2006 in NPTEL Phase-I and create on-line course contents and interactions between faculty members in science and engineering using the best academics in India.

http://mhrd.gov.in/technical-education-13

APPENDIX B.11
Intellectual Property Facility Centre (IPFC)

IPR protection plays a key role in gaining competitive advantage in terms of technological gains for achieving higher economic growth in a market driven economy. It is felt that IPR requires greater understanding and attention by the industry, particularly the MSME sector in India. The "National Manufacturing Competitiveness Council (NMCC)" which visualized a National Manufacturing Competitiveness Programme (NMCP) to enhance the competitiveness of the SMEs sector. One of the components of the NMCP is "Building Awareness on Intellectual Property Rights (IPR)" for the MSME. Accordingly, to enable the MSME sector face the present challenges of liberalization, various activities on IPR are proposed under this scheme. Intellectual Property (IP) refers to creations of the mind: inventions, literary and artistic works, and symbols, names, images, and designs used in commerce.

Mission

The Centre, while aiming to strengthen in general the competitiveness of MSMEs so that they can become a part of the global business community, will specifically endeavor to build greater awareness among MSMEs about IPR issues and provide insights to them on the complex mechanism of creation, ownership, and protection of Intellectual Property.

Vision

To become the coadjutor of choice for MSMEs if they want to create, manage and protect their IP portfolios so as to successfully tackle the challenges posed by the rules and regulations of international trade stemming from such bodies and frameworks as the WTO and TRIPS.

http://www.ipfc4msme.in/about-Us.php

APPENDIX B.12
Knowledge Involvement in Research Advancement through Nurturing (KIRAN)

In the year 2014, Department has restructured all the women specific programs under one umbrella known as "KIRAN" (Knowledge Involvement in Research Advancement through Nurturing). KIRAN is addressing various issues related with women scientists (e.g. unemployment, relocation etc.) and aimed to provide opportunities in research (WOS-A), technology development/ demonstration (WOS-B), and self-employment (WOS-C) etc. KIRAN is also actively involved in taking proactive measures, under the name CURIE (Consolidation of University Research for Innovation and Excellence in Women Universities) to develop state-of-the-art infrastructure in women universities in order to attract, train and retain promising girls students in S&T domain.

In continuation of this, another landmark programme, named as, "Mobility Scheme" has been just launched under KIRAN which will address relocation issue of women scientists working in regular position in Government Organizations. The Mobility Scheme is aimed to provide an opportunity to women scientists who are facing difficulties in their present job due to relocation (marriage, transfer of husband to any other location within the country, attending ailing parents, and accompanying children studying in different city) and will act as filler while searching other career option at new place. The initiative intends to provide a harmonious environment during early phases of women scientists where they would like to stay active in research in addition to attending and fulfilling other responsibilities in the domestic front. It offers a contractual research award to women scientists and enables them for independent research.

Women Scientists Scheme

Women are an important section of the workforce, more particularly in the science & technology (S&T) domain. However, a large number of well-qualified women get left out of the S&T activities due to various circumstances which are usually typical to the gender. The challenges faced by them are several but most often the "break in career" arises out of motherhood and family responsibilities. To address such issues, Department of Science and Technology (DST) launched "Women Scientists Scheme (WOS)" during 2002-03. This initiative primarily aimed at providing opportunities to women scientists and technologists between the age group of 27-57 years who had a break in their career but desired to return to mainstream.

Through this endeavor of the Department, concerted efforts have been

made to give women a strong foothold into the scientific profession, help them re-enter into the mainstream and provide a launch pad for further forays into the field of science and technology.

Category of Fellowships:
Under this scheme, women scientists are being encouraged to pursue research in frontier areas of science and engineering, on problems of societal relevance and to take up S&T-based internship followed by self-employment. Following three categories of fellowships, with research grants, are available for Indian citizen:

- Women Scientist Scheme-A(WOS-A): Research in Basic/ Applied Science
- Women Scientist Scheme-B (WOS-B): S&T interventions for Societal Benefit
- Women Scientist Scheme-C (WOS-C): Internship in Intellectual Property Rights (IPRs) for the Self-Employment

Under the scheme, the Union Ministry of Science & Technology will build leadership positions for women. Such a scheme would be beneficial for women who face unavoidable interruptions in their careers owing to numerous reasons.

http://dst.gov.in/scientific-programmes/scientific-engineering-research/women-scientists-programs

APPENDIX B.13
Beti Bachao Beti Padhao

The Census (2011) data showed a significant declining trend in the Child Sex Ratio (CSR), calculated as number of girls for every 1000 boys between age group of 0-6 years, with an all time low of 918 in 2011 from 976 in 1961. The decline in CSR has been unabated since 1961. This is an alarming indicator for women disempowerment. It reflects both pre birth discrimination manifested through gender biased sex selection, and post birth discrimination against girls. The decline is widespread across the country and has expanded to rural as well as tribal areas.

Alarmed by the sharp decline, the Government of India has introduced "Beti Bachao, Beti Padhao (BBBP)" programme to address the issue of decline in CSR in 100 gender critical districts. Coordinated & convergent efforts are needed to ensure survival, protection and education of the girl child.

The Overall Goal of the Beti Bachao, Beti Padhao (BBBP) Scheme is to celebrate the Girl Child & Enable her Education. The objectives of the Scheme are as under:-

- Prevent gender biased sex selective elimination.
- Ensure survival & protection of the girl child.
- Ensure education of the girl child.

The Beti Bachao Beti Padhao (BBBP) initiative has two major components.

i) Mass Communication Campaign.
ii) Multi-sectoral action in 100 selected districts (as a pilot) with adverse CSR, covering all States and UTs.

(a) Mass Communication Campaign on Beti Bachao Beti Padhao
The campaign aims at ensuring girls are born, nurtured and educated without discrimination to become empowered citizens of this country. The Campaign interlinks National, State and District level interventions with community level action in 100 districts, bringing together different stakeholders for accelerated impact.

(b) Multi-Sectoral interventions in 100 Gender Critical Districts covering all States/ UTs:-
Coordinated & convergent efforts are undertaken in close coordination with MoHFW and MoHRD to ensure survival, protection and education of the girl child. The District Collectors/ Deputy Commissioners (DCs) lead and coordinate actions of all departments for implementation of BBBP at the District level. Multi -sectoral interventions includes:

i) **Ministry of WCD:** Promote registration of pregnancies in first trimester in Anganwadi Centers (AWCs); Undertake training of stakeholders; Community mobilization & sensitization; Involvement of gender champions; Reward & recognition of institutions & frontline workers.
ii) **Ministry of Health & Family Welfare:** Monitor implementation of Pre-Conception and Prenatal Diagnostic Techniques (PCP & DT) Act, 1994; Increased institutional deliveries; Registration of births; Strengthening PNDT Cells; Setting up Monitoring Committees.

iii) **Ministry of Human Resource Development:** Universal enrolment of girls; Decreased drop-out rate; Girl Child friendly standards in schools; Strict implementation of Right to Education (RTE); Construction of Functional Toilets for girls.

http://wcd.nic.in/BBBPScheme/main.htm

APPENDIX B.14
Jago Grahak Jago

Jago Grahak Jago (Online Upbhokta Forum) takes the complaint directly to the escalation team of the company, which has the **power to resolve your grievance.** We send a well-drafted **letter to the company,** explaining the details of your complaint along with the inconvenience caused to you. Jago Grahak Jago is specially to help consumers to redress their issues and grievances. They ensure to take quick actions on every complaint filed by the customers.

http://www.jagograhakjago.co.in/

APPENDIX B.15
Agastya International Foundation (AGASTYA)

It is an Indian education trust and non-profit organization based in Bangalore, India whose mission is to spark curiosity, nurture creativity and build confidence among economically disadvantaged children and teachers in India. A team of scientists, educators and entrepreneurs led by Ramji Raghavan founded Agastya in 1999. Agastya runs hands-on science and art education programs in rural and semi-urban regions across 18 Indian states. It is one of the largest science education programs that cater economically disadvantaged children and teachers in the world.

http://www.agastya.org/

APPENDIX B.16
Sarva Shiksha Abhiyaan

Sarva Shiksha Abhiyan (SSA) is Government of India's flagship programme for achievement of Universalization of Elementary Education (UEE) in a time bound manner, as mandated by 86th amendment to the Constitution of India making free and compulsory Education to the Children of 6-14 years age group, a Fundamental Right.

SSA is being implemented in partnership with State Governments to cover the entire country and address the needs of 192 million children in 1.1 million habitations.

The programme seeks to open new schools in those habitations which do not have schooling facilities and strengthen existing school infrastructure through provision of additional class rooms, toilets, drinking water, maintenance grant and school improvement grants.

Existing schools with inadequate teacher strength are provided with additional teachers, while the capacity of existing teachers is being strengthened by extensive training, grants for developing teaching-learning materials and strengthening of the academic support structure at a cluster, block and district level.

SSA seeks to provide quality elementary education including life skills. SSA has a special focus on girl's education and children with special needs. SSA also seeks to provide computer education to bridge the digital divide.

APPENDIX B.17
Quality Improvement Program

Under Quality Improvement Program, teachers in engineering institutions get an opportunity to study at IIT under the quality improvement program (QIP). The QIP selections are made centrally and announcement for applications are made each year. Teachers will have to send in their applications through their institutions. The list of applications qualifying for interview/ test is drawn up centrally on our all India basis and the teachers will be interviewed at the IIT of choice indicated by them. Qualification in GATE is not a precondition for selection. Teachers continue to remain as employees of their college during the period of study at IIT. The FIP (Faculty Improvement Program) are similar to QIP but apply to teachers in private engineering institutions.

http://www.qip.iitm.ac.in

APPENDIX B.18
Rashtriya Madhyamik Shiksha Abhiyan (RMSA)

This scheme was launched in March, 2009 with the objective to enhance access to secondary education and to improve its quality. The implementation of the scheme started from 2009-10. It is envisaged to achieve an enrolment rate of 75% from 52.26% in 2005-06 at secondary stage of implementation of the scheme by providing a secondary school within a reasonable distance of any habitation. The other objectives include improving quality of education imparted at secondary level through making all secondary schools conform to prescribed norms, removing gender, socio-economic and disability barriers, providing universal access to secondary level education by 2017, i.e., by the end of 12th Five Year Plan and achieving universal retention by 2020.

Important physical facilities provided under the scheme are:
(i) Additional class rooms, (ii) Laboratories, (iii) Libraries, (iv) Art and crafts room, (v) Toilet blocks, (vi) Drinking water provisions and (vii) Residential Hostels for Teachers in remote areas.

Important quality interventions provided under the scheme are:
(i) appointment of additional teachers to reduce PTR to 30:1, (ii) focus on Science, Math and English education, (iii) In-service training of teachers, (iv) science laboratories, (v) ICT enabled education, (vi) curriculum reforms; and (vii) teaching learning reforms.

Important equity interventions provided in the scheme are:
(i) special focus in micro planning (ii) preference to Ashram schools for up gradation (iii) preference to areas with concentration of SC/ ST/ Minority for opening of schools (iv) special enrolment drive for the weaker section (v) more female teachers in schools; and (vi) separate toilet blocks for girls.

Implementation mechanism of the Scheme
The scheme is being implemented by the State government societies established for implementation of the scheme. The central share is released to the implementing agency directly. The applicable State share is also released to the implementing agency by the respective State Governments.

Revision of certain norms of the Scheme
The Government of India has approved the following revised norms of RMSA, with effect from 01.04. 2013:

- To permit State/ UT Governments to use State Schedule of Rates(SSOR) or CPWD Rate, (whichever is lower) for construction of civil works permissible under the RMSA.
- To increase the Management, Monitoring Evaluation and Research (MMER) from 2.2 percent to 4 percent of the total outlay under the programme, with 0.5 percent of the 4 percent earmarked for national level and the rest of the 3.5 percent as part of the State allocation. In cases of States where even with this enhanced allocation of 3.5 percent MMER would not be adequate and would hamper the activities under the head, within the 3.5 percent of the overall State MMER component; variations across State/ UTs can be approved by the PAB, subject to a maximum of 5 percent of the outlay in any particular State/ UT.
- To subsume the other Centrally Sponsored Schemes of Secondary Education– Information and Communication Technology (ICT) @ School, Girls' Hostel, Inclusive Education for Disabled at Secondary Stage (IEDSS) and Vocational Education (VE) in their existing form under the Umbrella of RMSA.
- To extend the benefits of RMSA to aided Secondary Schools (excluding infrastructure support/ core areas, i.e. Teacher's salary and Staff salary) for quality interventions as per RMSA umbrella schemes components for aided schools.
- To continue existing fund sharing pattern of 72:25 for the remaining of the 12th Plan the period for non-NER States and 90:10 for NER States (including Sikkim).
- To authorize the RMSA Project Approval Board (PAB) of the Ministry of Human Resource Development to consider for approval Integrated Plan of the umbrella scheme of RMSA, including the four subsumed Centrally Sponsored Schemes of Secondary Education.
- To authorize the release of funds to the RMSA State Implementation Society directly for all components of the RMSA umbrella scheme.

http://mhrd.gov.in/rmsa

APPENDIX B.19
Bharat Interface for Money (BHIM) App

Bharat Interface for Money (BHIM) is an app that makes payment transactions simple, easy and quick using Unified Payments Interface (UPI). It enables direct bank to bank payments instantly and collects money using a Mobile number or Payment address. Bharat Interface for Money app is currently available on Android and it is downloadable from Google Play store, for smart phones.

http://www.npci.org.in/

APPENDIX B.20
Digital India Program

The journey of e-Governance initiatives in India took a broader dimension in mid 90s for wider sectoral applications with emphasis on citizen-centric services. Later on, many States/ UTs started various e-Governance projects. Though these e-Governance projects were citizen-centric, they could make lesser than the desired impact. Government of India launched National e-Governance Plan (NeGP) in 2006. 31 Mission Mode Projects covering various domains were initiated. Despite the successful implementation of many e-Governance projects across the country, e-Governance as a whole has not been able to make the desired impact and fulfill all its objectives.

It has been felt that a lot more thrust is required to ensure e-Governance in the country promote inclusive growth that covers electronic services, products, devices and job opportunities. Moreover, electronic manufacturing in the country needs to be strengthened.

In order to transform the entire ecosystem of public services through the use of information technology, the Government of India has launched the Digital India programme with the vision to transform India into a digitally empowered society and knowledge economy.

http://www.digitalindia.gov.in/content/about-programme

APPENDIX B.21
Passport Seva Kendra (PSK)

In recent years, the Government of India has taken many initiatives to usher in an era of e-Governance to improve the delivery of public services. The National e-Governance Plan (NeGP) includes many high impact e-Governance projects that have been identified as Mission Mode Projects (MMP's). One such project focuses on reforming Passport services in India.

A Passport is an essential travel document for those who are traveling abroad for education, tourism, pilgrimage, medical attendance, business purposes and family visits. During the last few years, the growing economy and spreading globalization have led to an increased demand for Passport and related services. The passport demand is estimated to be growing by around 10% annually. This increased demand for passport and related services is coming from both large cities and smaller towns, creating a need for wider reach and availability. To augment and improve the delivery of passport services to Indian citizens, the Ministry of External Affairs (MEA) launched the Passport Seva Project (PSP) in May 2010.

The project has been implemented in a Public Private Partnership (PPP) mode with Tata Consultancy Services, selected through a public competitive procurement process. Under this program, the sovereign and fiduciary functions like verification, granting and issuing of passport have been retained by MEA. The ownership and strategic control of the core assets including data/ information is with MEA.

Passport Seva enables simple, efficient and transparent processes for delivery of passport and related services. Apart from creating a countrywide networked environment for Government staff, it integrates with the State Police for physical verification of applicant's credentials and with India Post for delivery of passports.

http://www.passportindia.gov.in/AppOnlineProject/online/knowPassportSeva

APPENDIX B.22
Aadhaar Card

The Unique Identification Authority of India (UIDAI) is a statutory

authority established under the provisions of the Aadhaar (Targeted Delivery of Financial and Other Subsidies, Benefits and Services) Act, 2016 ("Aadhaar Act 2016") on 12 July 2016 by the Government of India, under the Ministry of Electronics and Information Technology (MeitY).

Prior to its establishment as a statutory authority, UIDAI was functioning as an attached office of the then Planning Commission (now NITI Aayog) dated 28th January, 2009. Later, on 12 September 2015, the Government revised the Allocation of Business Rules to attach the UIDAI to the Department of Electronics & Information Technology (DeitY) of the then Ministry of Communications and Information Technology.

UIDAI was created with the objective to issue Unique Identification numbers (UID), named as "Aadhaar", to all residents of India that is (a) robust enough to eliminate duplicate and fake identities, and (b) can be verified and authenticated in an easy, cost-effective way. The first UID number was issued on 29 September 2010 to a resident of Nandurbar, Maharashtra. The Authority has so far issued more than 111 crore Aadhaar numbers to the residents of India.

Under the Aadhaar Act 2016, UIDAI is responsible for Aadhaar enrolment and authentication, including operation and management of all stages of Aadhaar life cycle, developing the policy, procedure and system for issuing Aadhaar numbers to individuals and perform authentication and also required to ensure the security of identity information and authentication records of individuals.

https://uidai.gov.in/about-uidai/about-uidai.html

APPENDIX B.23
RailTel

RailTel Corporation a "Mini Ratna (Category-I)" PSU is one of the largest neutral telecom infrastructure providers in the country owning a Pan-India optic fiber network on exclusive Right of Way (ROW) along Railway track. The OFC network covers all important towns & cities of the country and several rural areas covering 70% of India's population. RailTel with strong nationwide presence is committed to bring cutting edge technology and offer innovative services to the Indian Telecom market.

RailTel is in the forefront in providing nationwide Broadband Telecom & Multimedia Network in all parts of the country in addition to modernization of Train operations and administration network systems. With its Pan India high capacity network, RailTel is working towards creating a knowledge society at various fronts. Presently, RailTel has created over 45000 RKMs of fiber network connecting over 4500 cities/ towns on the network including several rural areas.

The network is supported by multiple of 10G/ 2.5G based STM-64/ 16 system rings. In addition, RailTel has also provided over 10500 KM of network with DWDM systems with 100G/ 400G capacity which is targeted to be further expanded to additional 14000 KM within a year to cover all major cities of the country. RailTel also has a MPLS network with core on 10G capacity along with NGN system to support various IP enabled services.

Equipped with an ISO 9001:2008 certification, RailTel offers a wide gamut of managed telecom services to Indian Telecom market. The service includes Managed lease lines, Tower collocation, MPLS based IP-VPN, Internet and NGN based voice carriage services to Telecom Operators, Internet Service Providers, MSOs, Enterprises, Banks, Govt. Institutions/ dept., Educational Institutions/ Universities, etc. RailTel is aggressively entering into Enterprise services market with launch of its various services like Data Center, Rail wire, Telepresence etc. Recently RailTel has also acquired Unified License.

In addition, RailTel with its rich experience in the domain of Telecom & ICT field have been selected for implementation of various mission-mode Govt. projects in the telecom field. Under such initiatives, RailTel is rolling out National Knowledge Network (NKN), National Optical Fiber Network (NOFN) and North East OFC project under USOF scheme.

http://www.railtelindia.com/profile/about-us.html

APPENDIX B.24
ICICI Digital Villages

The largest village promotion programme in the country encompassing digitization of transactions & commercial activities in villages, vocational training and credit facility to help villagers earn a sustainable livelihood.

10,000 underprivileged villagers will receive free vocational training within 100 days.

This project is inspired by the success of India's first digital village created by ICICI Bank at Akodara in Sabarkantha district, Gujarat.

ICICI Bank, India's largest private sector bank by consolidated assets, announced that it will transform 100 villages into 'ICICI Digital Villages' in as many days. The announcement is a part of the bank's continuing effort to provide digital ecosystem across the country, including rural India, in the wake of demonetization of high value currencies.

These villages, which will be spread across the length and breadth of the country, will enable villagers to use digital channels for banking and payments transactions. There, villagers will be able to open bank accounts using Aadhaar-based e-KYC and make cashless payments to retail stores through a unique SMS/ USSD-based mobile solution. Additionally, ICICI Bank in association with ICICI Foundation for Inclusive Growth (ICICI Foundation), the CSR arm of the ICICI Group, will impart vocational training to nearly 10,000 underprivileged villagers, especially women, to help them earn a sustainable livelihood. The bank will also extend credit facilities to the trained villagers in a bid to boost self-employment opportunities in the villages.

This is the largest village promotion programme in the country encompassing digitization of transactions & commercial activities, vocational training and credit facility to help villagers earn a sustainable livelihood.

The first dimension is to enhance access to seamless and digital banking. In order to do so:

ICICI Bank will use tablet-based banking and Aadhaar-based e-KYC to help villagers open accounts in few hours without submitting physical documents. All adults in the villages will have saving accounts, which will be linked to Aadhaar to enable direct transfer of government benefits into these accounts. There will be dedicated branch and ATM of ICICI Bank to service these accounts.

The bank will provide a unique SMS & USSD based mobile service which will facilitate the villagers to transfer funds, receive alerts & statements and make payments to retail stores by using their mobile phones. This SMS banking will be available in regional languages and will function on basic mobile phones. The Bank will also set up end-to end merchant infrastructure that will enable the retailers at the village to accept mobile based payments.

The bank will also create a cashless, digital payment ecosystem for the predominant commercial activity of these villages. For example, at Akodara, it has created an end-to-end measuring, tracking and payment solution for the milk cooperative society and its members for sale of milk. This will be replicated in the upcoming ICICI Digital Villages too. Additionally, activities like payments to farmers from mandis and payment from farmers to laborers among others, will be brought under digital payment ecosystem. The bank will also set up Point-of-Sale (POS) machines at seed and fertilizer outlets for cashless transactions using Rupay cards.

The second dimension of the initiative is to impart livelihood training to the villagers. For that:

ICICI Foundation will impart training under its 'ICICI Academy for Skills – Rural Initiative' programme at these 100 villages. It will train 100 people in each village, especially women within as many days. Any underprivileged villager, in the age bracket of 18 to 40 years, is eligible to get the training free of cost. The skill training will be offered in a range of disciplines, which will be identified based on the local economy around a particular village. The list of the disciplines includes agriculture, dairy & vermin composting, agriculture equipment repair, hand embroidery, dress designing and sandstone cutting & finishing among others. These trainings will be for duration of up to 30 days.

ICICI Bank and ICICI Foundation will enable the trained villagers to be self-employed while continuing to reside at their villages. They will also provide assistance for selling of product/ services through their market linkages in the local and nearby catchment areas

The third dimension of the initiative is to provide credit linkages to enhance livelihood opportunities. The key elements are:

ICICI Bank will facilitate formation of Self Help Groups (SHGs) and offer loans to the members. Additionally, ICICI Bank will also extend credit

facilities to the trained villagers in the form of Kisan credit cards, two wheeler loans and farm equipment loans among others.

The bank will sanction and disburse these loans using tablets at the door step of the villagers and SHGs, thus helping them to save time and effort to travel to a nodal branch.

This initiative of Digital Villages is yet another key infrastructural development initiative of the bank. ICICI Bank has played a key role in the development of infrastructure in India over the last two decades. It has financed the creation of substantial power generation capacity, including India's largest private sector hydro power project; ports; roads and highways; airports,including India's first Greenfield airport and its largest airport modernization project; and the roll-out of pan-India telecom networks. Its role in infrastructure has gone beyond that of a financier to assist the government in the development of policies for the sector.

https://www.icicibank.com/aboutus/article.page?identifier=news-icici-bank-to-transform-100-villages-into-icici-digital-villages-in-100-days-20162811174402575

APPENDIX B.25
Deen Dayal Upadhyaya Gram Jyoti Yojana

Deen Dayal Upadhyaya Gram Jyoti Yojana is a Government of India scheme designed to provide continuous power supply to rural India. The initiative is named in honor of Indian political philosopher DeenDayal Upadhyaya. It is one of the key initiatives of the NDA government 2014-2019. The government plans to invest `756 billion (US$12 billion) for rural electrification under this scheme. The scheme will replace the existing Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY). The DDUGJY scheme will enable to initiate much awaited reforms in the rural areas. It focuses on feeder separation (rural households & agricultural) and strengthening of sub-transmission & distribution infrastructure including metering at all levels in rural areas. This will help in providing round the clock power to rural households and adequate power to agricultural consumers'. The earlier scheme for rural electrification viz. Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY) has been subsumed in the new scheme as its rural electrification component.

The Ministry of Power has launched a new app, GARV-II app to provide real-time data of all six lakhs villages of the country. The app is envisaged to ensure transparency in the implementation of rural electrification programme. The new app will also enable the citizens to participate in the developmental works and can give their feedback and inputs related to the rural electrification programme. The participation of Citizens will enable public scrutiny of the rural electrification programs. In addition, the village-wise works sanctioned under Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY) has been mapped to scrutinize the progress of work carried out under the project in each village.

The deadline for the Centre's rural electrification programme was May 2017. However the latest data reveal that the deadline may be missed, as 5150 villages in India are yet to be electrified. Odisha, Jharkhand, Bihar and Chhattisgarh account for the bulk of un-electrified villages

https://en.wikipedia.org/wiki/Deen_Dayal_Upadhyaya_Gram_Jyoti_Yojana

Appendix B.26
Sagarmala Project

The prime objective of the Sagarmala project is to promote port-led direct and indirect development and to provide infrastructure to transport goods to and from ports quickly, efficiently and cost-effectively. Therefore, the Sagarmala Project shall, inter alia, aim to develop access to new development regions with intermodal solutions and promotion of the optimum modal split, enhanced connectivity with main economic centers and beyond through expansion of rail, inland water, coastal and road services.

The Sagarmala initiative will address challenges by focusing on three pillars of development, namely (i) Supporting and enabling Port-led Development through appropriate policy and institutional interventions and providing for an institutional framework for ensuring inter-agency and ministries/ departments/ states' collaboration for integrated development, (ii) Port Infrastructure Enhancement, including modernization and setting up of new ports, and (iii) Efficient Evacuation to and from hinterland.

The Sagarmala Project therefore intends to achieve the broad

objectives of enhancing the capacity of major and non-major ports and modernizing them to make them efficient, thereby enabling them to become drivers of port-led economic development, optimizing the use of existing and future transport assets and developing new lines/ linkages for transport (including roads, rail, inland waterways and coastal routes), setting up of logistics hubs, and establishment of industries and manufacturing centers to be served by ports in EXIM and domestic trade. In addition to strengthening port and evacuation infrastructure, it also aims at simplifying procedures used at ports for cargo movement and promotes usage of electronic channels for information exchange leading to quick, efficient, hassle-free and seamless cargo movement.

For a comprehensive and integrated planning for "Sagarmala", a National Perspective Plan (NPP) for the entire coastline shall be prepared within six months which will identify potential geographical regions to be called Coastal Economic Zones (CEZs). While preparing the NPP, synergy and integration with planned Industrial Corridors, Dedicated Freight Corridors, National Highway Development Programme, Industrial Clusters and SEZs would be ensured. Detailed Master Plans will be prepared for identified Coastal Economic Zones leading to identification of projects and preparation of their detailed project reports.

In order to have effective mechanism at the state level for coordinating and facilitating Sagarmala related projects, the State Governments will be suggested to set up State Sagarmala Committee to be headed by Chief Minister/ Minister in Charge of Ports with members from relevant Departments and agencies. The state level Committee will also take up matters on priority as decided in the NSAC. At the state level, the State Maritime Boards/ State Port Departments shall service the State Sagarmala Committee and also be, inter alia, responsible for coordination and implementation of individual projects, including through SPVs (as may be necessary) and oversight. The development of each Coastal economic zone shall be done through individual projects and supporting activities that will be undertaken by the State Government, Central line Ministries and SPVs to be formed by the State Governments at the state level or by SDC and ports, as may be necessary.

Sagarmala Coordination and Steering Committee (SCSC) shall be constituted under the chairmanship of the Cabinet Secretary with Secretaries of the Ministries of Shipping, Road Transport and Highways, Tourism, Defence, Home Affairs, Environment, Forest & Climate Change, Departments of Revenue, Expenditure, Industrial Policy and Promotion, Chairman, Railway Board and CEO, NITI Aayog as members. This Committee will provide coordination between various ministries, state governments and agencies connected with implementation and review the progress of implementation of the National Perspective Plan, Detailed Master Plans and projects. It will, inter alia, consider issues relating to funding of projects and their implementation. This Committee will also examine financing options available for the funding of projects, the possibility of public-private partnership in project financing/ construction/ operation.

Improvement of operational efficiency of existing ports, which is an objective of the Sagarmala initiative, shall be done by undertaking business process re-engineering to simplify processes and procedures in addition to modernizing and upgrading the existing infrastructure and improved mechanization. Increased use of information technology and automation to ensure paperless and seamless transactions will be an important area for intervention. Under the Sagarmala Project, the use of coastal shipping and IWT are proposed to be enhanced through a mix of infrastructure enhancement and policy initiatives.

The Sagarmala initiative would also strive to ensure sustainable development of the population living in the Coastal Economic Zone (CEZ). This would be done by synergizing and coordinating with State Governments and line Ministries of Central Government through their existing schemes and programs such as those related to community and rural development, tribal development and employment generation, fisheries, skill development, tourism promotion etc. In order to provide funding for such projects and activities that may be covered by departmental schemes a separate fund by the name 'Community Development Fund' would be created.

The Institutional Framework for implementing Sagarmala has to provide for a coordinating role for the Central Government. It should provide a platform for central, state governments and local authorities to work in tandem and coordination under the established principles of "cooperative federalism", in order to achieve the objectives of the Sagarmala Project and ensure port-led development.

A National Sagarmala Apex Committee (NSAC) is envisaged for overall policy guidance and high level coordination, and to review various aspects of planning and implementation of the plan and projects. The NSAC shall be chaired by the Minister in charge of Shipping, with Cabinet Ministers from stakeholder Ministries and Chief Ministers/ Ministers in charge of ports of maritime states as members. This committee, while providing policy direction and guidance for the initiative's implementation, shall approve the overall National Perspective Plan (NPP) and review the progress of implementation of these plans.

At the Central level, Sagarmala Development Company (SDC) will be set up under the Companies Act, 1956 to assist the State level/ zone level Special Purpose Vehicles (SPVs), as well as SPVs to be set up by the ports, with equity support for implementation of projects to be undertaken by them. The SDC shall also get the Detailed Master Plans for individual zones prepared within a two year period. The business plan of the SDC shall be finalized within a period of six months. The SDC will provide a funding window and/ or implement only those residual projects that cannot be funded by any other means/ mode.

In order to kick start the implementation of projects it is proposed to take up identified projects covered in the concept of Sagarmala for implementation forthwith. These identified projects for implementation in the initial phase will be based on the available data and feasibility study reports and the preparedness, willingness and interest shown by the State Governments and Central Ministries to take up projects.

All efforts would be made to implement those projects through the private sector and through Public Private Participation (PPP) wherever feasible. Funds requirement for starting the implementation of projects in the initial phase of Sagarmala Project is projected at Rs. 692 crores for the FY 2015-16. Further requirement of funds will be finalized after completion of Detailed Master Plan for Coastal Economic Zones for future years. These funds will be used for implementation of projects by line ministries in accordance with approvals by the SCSC.

APPENDIX B.27
Skill India

(i) PRADHAN MANTRI KAUSHAL VIKAS YOJNA

Pradhan Mantri Kaushal Vikas Yojana (PMKVY) is the flagship scheme of the Ministry of Skill Development & Entrepreneurship (MSDE). The objective of this Skill Certification Scheme is to enable a large number of Indian youth to take up industry-relevant skill training that will help them in securing a better livelihood. Individuals with prior learning experience or skills will also be assessed and certified under Recognition of Prior Learning (RPL). Under this Scheme, Training and Assessment fees are completely paid by the Government.

Key Components of the Scheme:

1. Short Term Training

The Short Term Training imparted at PMKVY Training Centers (TCs) is expected to benefit candidates of Indian nationality who are either school/ college dropouts or unemployed. Apart from providing training according to the National Skills Qualification Framework (NSQF), TCs shall also impart training in Soft Skills, Entrepreneurship, Financial and Digital Literacy. Duration of the training varies per job role, ranging between 150 and 300 hours. Upon successful completion of their assessment, candidates shall be provided placement assistance by Training Partners (TPs). Under PMKVY, the entire training and assessment fees are paid by the Government. Payouts shall be provided to the TPs in alignment with the Common Norms. Trainings imparted under the Short Term Training component of the Scheme shall be NSQF Level 5 and below.

2. Recognition of Prior Learning

Individuals with prior learning experience or skills shall be assessed and certified under the Recognition of Prior Learning (RPL) component of the Scheme. RPL aims to align the competencies of the unregulated workforce of the country to the NSQF. Project Implementing Agencies (PIAs), such as Sector Skill Councils (SSCs) or any other agencies designated by MSDE/ NSDC, shall be incentivized to implement RPL projects in any of the three Project Types (RPL Camps, RPL at Employers Premises and RPL centers). To address knowledge gaps, PIAs may offer Bridge Courses to RPL candidates.

3. Special Projects

The Special Projects component of PMKVY envisages the creation of a

platform that will facilitate trainings in special areas and/ or premises of Government bodies, Corporate or Industry bodies, and trainings in special job roles not defined under the available Qualification Packs (QPs)/ National Occupational Standards (NOSs). Special Projects are projects that require some deviation from the terms and conditions of Short Term Training under PMKVY for any stakeholder. A proposing stakeholder can be Government Institutions of Central and State Government(s)/ Autonomous Body/ Statutory Body or any other equivalent body or corporate who desire to provide training to candidates.

4. Kaushal and RozgarMela

Social and community mobilization is extremely critical for the success of PMKVY. Active participation of the community ensures transparency and accountability, and helps in leveraging the cumulative knowledge of the community for better functioning. In line with this, PMKVY assigns special importance to the involvement of the target beneficiaries through a defined mobilization process. TPs shall conduct Kaushal and Rozgar Melas every six months with press/ media coverage; they are also required to participate actively in National Career Service Melas and on-ground activities.

5. Placement Guidelines

PMKVY envisages linking the aptitude, aspiration, and knowledge of the skilled workforce it creates with employment opportunities and demands in the market. Every effort thereby needs to be made by the PMKVY TCs to provide placement opportunities to candidates, trained and certified under the Scheme. TPs shall also provide support to entrepreneurship development.

http://www.pmkvyofficial.org

(ii) NATIONAL SKILL DEVELOPMENT MISSION

The National Skill Development Mission will provide a strong institutional framework at the Centre and States for implementation of skilling activities in the country.

The Mission will have a three-tiered, high powered decision making structure. At its apex, the Mission's Governing Council, chaired by the Prime Minister, will provide overall guidance and policy direction. The Steering Committee, chaired by Minister in Charge of Skill Development, will review the Mission's activities in line with the direction set by the Governing Council. The Mission Directorate, with Secretary, Skill Development as Mission Director, will ensure implementation, coordination and convergence of skilling activities across Central Ministries/ Departments and State Governments. The Mission will also run select sub-missions in high priority areas. Further, the National Skill Development Agency (NSDA), the National Skill Development Corporation (NSDC) and the Directorate of Training will function under the overall guidance of the Mission. The Ministry of Skill Development and Entrepreneurship (MSDE) provides a natural home for the Mission, organically linking all three decisions making levels and facilitating linkages to all Central Ministries/ Departments and State Governments.

http://pib.nic.in/newsite/PrintRelease.aspx?relid=122929

(iii) SKILL LOAN SCHEME

Skill Loan Scheme was launched by the Hon'ble Prime Minister on 15th July, 2015 with a view to support youth who wish to go through skill training programs in the Country. This Skill Loan Scheme has replaced earlier Indian Banks Association (IBA) Model Loan Scheme for Vocational Education and Training. The Indian Banks Association (IBA) has already circulated the scheme to the Chief Executives of All Member Banks for implementation of the Scheme.

Any Indian National who has secured admission in a course run by Industrial Training Institutes (ITIs), Polytechnics or in a school recognized by Central or State education Boards or in a college affiliated to recognized university, training partners affiliated to National Skill Development Corporation (NSDC) Sector Skill Councils, State Skill Mission, State Skill Corporation can avail loan for the purpose. Amount of loan varies from Rs. 5,000 to Rs. 150, 000/- depending on the course having a repayment period of 3 to 7 years. Simple rate of interest @ 11% and 12% per annum is charged during the period of study.

Government has set a target of 34 lakhs for Skill Loan for a period of 5 years and the target for 2015-16 is 2 lakhs. As per information provided by Department of Financial Services (DFS) in respect of 27 Banks, 6003 numbers of Skill Loan accounts have been opened till 30.09.2015 and the total amount sanctioned is Rs 38.663 crores. The Skill Loan Scheme does not discriminate against women.

http://pib.nic.in/newsite/mbErel.aspx?relid=133329

APPENDIX B.28
Industrial Corridor

An industrial corridor is a package of infrastructure spending allocated to a specific geographical area, with the intent to stimulate industrial development.

An industrial corridor aims to create an area with a cluster of manufacturing or other industry. Such corridors are often created in areas that have preexisting infrastructure, such as ports, highways and railroads. These modalities are arranged such that an "arterial" modality, such as a highway or railroad, receives "feeder" roads or railways. Concerns when creating corridors including correctly assessing demand and viability, transport options for goods and workers, land values, and economic incentives for companies.[1]

The Government is developing or planning to develop 5 Industrial Corridors in the country, as follows:

i. Delhi Mumbai Industrial Corridor (DMIC) covering the States of Uttar Pradesh, Haryana, Rajasthan, Madhya Pradesh, Gujarat and Maharashtra. Out of 24 investment nodes identified for development, 8 industrial Cities as indicated below, have been taken up for development in the first phase of DMIC Project:

Name of the Node	State
Dadri-Noida-Ghaziabad Investment Region	Uttar Pradesh
Manesar-Bawal Investment Region	Haryana
Khushkhera-Bhiwadi – Neemrana Investment Region	Rajasthan
Pithampur-Dhar-Mhow Investment Region	Madhya Pradesh
Ahmedabad-Dholera Investment Region	Gujarat
ShendraBidkin Investment Region	Maharashtra
Dighi Port Industrial Area	Maharashtra
Jodhpur PaliMarwar Industrial Area	Rajasthan

ii. Chennai Bengaluru Industrial Corridor (CBIC) covers the States of Tamil Nadu, Andhra Pradesh and Karnataka. The nodes namely Ponneri (Tamil Nadu), Krishnapatnam (Andhra Pradesh) and Tumakuru (Karnataka) have been identified during perspective planning.

iii. Bengaluru Mumbai Economic Corridor (BMEC) covers the States of Maharashtra and Karnataka. Dharwad has been identified by Government of Karnataka for further development. Government of Maharashtra has given in-principle approval for development of Sangli/ Solapur.

iv. Amritsar Kolkata Industrial Corridor (AKIC) covers the States of Punjab, Haryana, Uttarakhand, Uttar Pradesh, Bihar, Jharkhand and West Bengal. Rajpura-Patiala (Punjab), Gohna (Haryana), Prag-Khurpia Farms (Uttarakhand), Bhaupur (Uttar Pradesh), Gamhariya (Bihar), Barhi (Jharkhand) and Raghunathpur (West Bengal) have been tentatively identified as the sites for Integrated Manufacturing Clusters (IMCs) for further development.

v. East Coast Economic Corridor (ECEC) covers the States of West Bengal, Odisha, Andhra Pradesh and Tamil Nadu. Vizag to Chennai segment of this Corridor has been taken as phase-1 wherein Visakhapatnam, Machilipatnam, Donakonda and Srikalahasti-Yerpedu (Andhra Pradesh) have been identified for further development.

In DMIC Project, land has been made available at the locations as indicated below:

i. Ahmedabad Dholera Special Investment Region in Gujarat - Activation Area Of 22.5 sq.km.

ii. Shendra Bidkin Industrial Park in Maharashtra - Phase-1 approx. 8.39 sq.km.

iii. Integrated Industrial Township 'Vikram Udyogpuri" near Ujjain, Madhya Pradesh - 1100 acres (approx.); and

iv. Integrated Industrial Township Greater Noida Limited - 747.5 acres (approx.)

For Chennai Bengaluru Industrial Corridor (CBIC) Project, respective State Governments identified land for Ponneri - 4480 acres (approx), Krishnapatnam - 13971 acres (approx.)) and Tumakuru - 13000 acres (approx.).

For Bengaluru Mumbai Economic Corridor (BMEC), land parcel identified for Dharwad node is approximately 9213 acres.

For Amritsar Kolkata Industrial Corridor (AKIC), the land parcels available for IMCs are Uttarakhand (2934 acres), Jharkhand (2597 acres) and West Bengal (2658 acres).

1 https://en.wikipedia.org/wiki/Industrial_corridor

For Visakhapatnam-Chennai Industrial Corridor (VCIC), 1887 acres of land is under possession of Government of Andhra Pradesh and 24056 acres of land is under acquisition/ alienation.

Environment clearance has been obtained for DMIC nodes as indicated below:

S. No.	State	Name of the Node/ Project	Status
1.	Maharashtra	ShendraBidkin Industrial Area (SBIA)	Clearance obtained for Shendra Industrial Park. Clearance sought for Bidkin Industrial Park
2.	Gujarat	Dholera Special Investment Region (DSIR)	Clearance obtained
3.	Uttar Pradesh	Integrated Industrial Township Project in Greater Noida	EIA studies have taken place. Work has started in keeping with overall blanket approval taken by Greater Noida Development Authority.
4.	Madhya Pradesh	Integrated Industrial Township "VikramUdyogpuri" Project in Ujjain	Clearance obtained
5.	Rajasthan	Khushkhera Bhiwadi Neemrana Investment Region (KBNIR) Jodhpur PaliMarwar Industrial Area	Clearance obtained Clearance sought
6.	Haryana	ManesarBawal Investment Region (MBIR)	Clearance obtained

Clearances from other bodies i.e. municipal and/ or local bodies are obtained as part of notification of master plan. For DMIC Corridor, the environment clearances are obtained after due consultation process with various stakeholders that includes all the local and municipal bodies. Implementation works are initiated only after notification of master plans and environment clearance. Other Industrial Corridors are at initial stages of implementation.[2]

APPENDIX B.29
Smart City Mission

The strategic components of area-based development in the Smart Cities Mission are city improvement (retrofitting), city renewal (redevelopment) and city extension (greenfield development) plus a Pan-city initiative in which Smart Solutions are applied covering larger parts of the city. Below given are the three models of Area-based smart city development:

Retrofitting will introduce planning in an existing built-up area to achieve smart city objectives, along with other objectives, to make the existing area more efficient and livable. In retrofitting, an area consisting of more than 500 acres will be identified by the city in consultation with citizens. Depending on the existing level of infrastructure services in the identified area and the vision of the residents, the cities will prepare a strategy to become smart. Since existing structures are largely to remain intact in this model, it is expected that more intensive infrastructure service levels and a large number of smart applications will be packed into the retrofitted smart city. This strategy may also be completed in a shorter time frame, leading to its replication in another part of the city.

Redevelopment will effect a replacement of the existing built-up environment and enable co-creation of a new layout with enhanced infrastructure using mixed land use and increased density. Redevelopment envisages an area of more than 50 acres, identified by Urban Local Bodies (ULBs) in consultation with citizens. For instance, a new layout plan of the identified area will be prepared with mixed land-use, higher FSI and high ground coverage. Two examples of the redevelopment model are the Saifee Burhani Upliftment Project in Mumbai (also called the Bhendi Bazaar Project) and the redevelopment of East Kidwai Nagar in New Delhi being undertaken by the National Building Construction Corporation.

Greenfield development will introduce most of the Smart Solutions in a previously vacant area (more than 250 acres) using innovative planning, plan financing and plan implementation tools (e.g. land pooling/ land reconstitution) with provision for affordable housing, especially for the poor. Greenfield developments are required around cities in order to address the needs of the expanding population. One well known example is the GIFT City in Gujarat. Unlike retrofitting and redevelopment.

Greenfield developments could be located either within the limits of the ULB or within the limits of the local Urban Development Authority (UDA).

2http://pib.nic.in/newsite/PrintRelease.aspx?relid=153692

Pan-city development envisages application of selected Smart Solutions to the existing city-wide infrastructure. Application of Smart Solutions will involve the use of technology, information and data to make infrastructure and services better. For example, applying Smart Solutions in the transport sector (intelligent traffic management system) and reducing average commute time or cost of citizens will have positive effects on productivity and quality of life of citizens. Another example can be waste water recycling and smart metering which can make a huge contribution to better water management in the city.

The smart city proposal of each shortlisted city is expected to encapsulate either a retrofitting or redevelopment or greenfield development model, or a mix thereof and a Pan-city feature with Smart Solution(s). It is important to note that pan-city is an additional feature to be provided. Since smart city is taking a compact area approach, it is necessary that all the city residents feel there is something in it for them also. Therefore, the additional requirement of some (at least one) city-wide smart solution has been put in the scheme to make it inclusive. For North Eastern and Himalayan States, the area proposed to be developed will be one-half of what is prescribed for any of the alternative models - retrofitting, redevelopment or greenfield development.

http://smartcities.gov.in/content/innerpage/strategy.php

APPENDIX B.30
Make In India

The Make in India initiative was launched by Prime Minister in September 2014 as part of a wider set of nation-building initiatives. Devised to transform India into a global design and manufacturing hub, Make in India was a timely response to a critical situation: by 2013, the much-hyped emerging markets bubble had burst, and India's growth rate had fallen to its lowest level in a decade. The promise of the BRICS Nations (Brazil, Russia, India, China and South Africa) had faded, and India was tagged as one of the so-called 'Fragile Five'. Global investors debated whether the world's largest democracy was a risk or an opportunity. India's 1.2 billion citizens questioned whether India was too big to succeed or too big to fail. India was on the brink of severe economic failure.

Make in India was launched by Prime Minister against the backdrop of this crisis, and quickly became a rallying cry for India's innumerable stakeholders and partners. It was a powerful, galvanizing call to action to India's citizens and business leaders, and an invitation to potential partners and investors around the world. But, Make in India is much more than an inspiring slogan. It represents a comprehensive and unprecedented overhaul of outdated processes and policies. Most importantly, it represents a complete change of the Government's mindset – a shift from issuing authority to business partner, in keeping with Prime Minister's tenet of 'Minimum Government, Maximum Governance'.

http://www.makeinindia.com/about

APPENDIX B.31
Uchchatar Avishkar Yojna (UAY)

As the entire world getting digitalized and with the introduction of more and more innovative technologies, the developing countries like India should be well aware of the current scenarios and they supposed to inherit the current technologies so that the citizens would able to enjoy the growth and feasibility of modern technologies. On considering that fact and with the intention of the promoting new modern technologies which are considered to the necessary in terms of industrial aspects the central government of India launched Uchchatar Avishkaar Yojana.

Unlike the other normal schemes and plans which are often released by the governments of India, this Uchchatar Avishkaar Yojana (UAY) is somehow different to those and it mainly focuses the growth of the industrial sectors of the nation. Under this yojana, the industrial sectors are to be improved with the introduction of the modern latest technologies directly into the manufacturing units with respect to the requirements and needs to the respective industries.

The UAY scheme has the solo administration which held by the Higher Education Department of the India, and it is expected that the program is to be launched very soon. Also from the trusted source, it is confirmed that the UAY program will be introduced initially at the premier higher educational institutes of the nation like IITs and so.

Also the UAY administration has requested the higher educational

sectors of the nation to layout the promotional aspects of the program in a successful manner. By distributing the set of guidelines to the premier institutes of the nation, the UAY administrations asked the educational units to follow the protocols for the scheme promotions.

The main motive of the scheme is to introduce the latest and modern technology to the students of the premier educational institutes of nation, as they are the primary target of the manufacturing companies to pick their potential employees. With the introduction of the UAY, the students from those educational institutes able to gain practical knowledge of those modern technologies which ease the process of manufacturing units and industrial plants to boost its growth.

http://www.pmawasyojana.co.in/uchchatar-avishkar-yojana/

APPENDIX B.32
Impacting Research, Innovation and Technology (IMPRINT)

Since time immemorial, necessity and aspiration has always driven mankind to discover, invent or innovate through individual or collective effort. The history of human civilization is replete with examples of how mankind has derived inspiration and learned from nature to overcome various challenges and meet the basic necessities of food-shelter-survival during the stone-age to begin with, and gradually progressed by leaps and bounds to reach the modern age of security and amenities over many centuries and millennia. Undoubtedly this phenomenal development has materialized through firm determination and urge to unravel and seek the truth, learn the art and implement them in practice. Realization of translation of knowledge to useful practices has always been a slow process through decades and centuries, occasionally aided by disruptive paradigm changes brought through unexpected discovery or labored invention, but eventually integrating them all with humanity, converging for societal benefits. Myopic views would brand these pursuits as isolated scientific, engineering or technological interventions, but needless to mention that every such endeavor, individual or collective, emerge seamlessly from certain justified motivation and eventually amalgamate into a greater cause – the needs of the humanity. In the modern era, innovative technological developments that originate from societal demands and make far reaching impact to humanity warrant far more sound foundation in scientific principles and ethical values than before, and hence, pose a much bigger challenge to formulate a strategy and roadmap to attain the desired goal. Adopting engineering and technology as the vehicle to addressing the societal needs and achieving national prosperity, MHRD has drafted a new and catalytic scheme called Impacting Research Innovation and Technology or IMPRINT. IMPRINT is a first-of-its-kind Pan-IIT and IISc joint initiative to develop a (a) new Education Policy, and (b) Roadmap for Research to solve major engineering and technology challenges in selected domains needed by the country. The ten domains represent the most important areas relevant to our country in order to enable, empower and embolden the nation for inclusive growth and self-reliance. The first phase of IMPRINT is dedicated to creating a policy document defining the scope, strategy and mandate for pursuing engineering challenges in the country and not developing a specific technological product or process. The real engineering pursuit will ensue in the second phase.

IMPRINT in its first phase is a policy developing initiative covering pedagogy, teaching, curriculum, technology-benchmarking and infrastructure readiness. IMPRINT is not meant only for IITs and IISc; it is a national movement providing an opportunity for the higher echelon institutes in India to integrate with all grass root level institutes, industry and organizations, mutually complement and deliver what the country demands and aspires. Policy is our immediate mandate; technology (products and processes) development and delivery will eventually follow.

http://imprint-india.org/about-imprint/imprint-overview

APPENDIX B.33
Goods and Services Tax (GST)

The introduction of GST is a single move unifying all the indirect taxes. From the day GST becomes applicable; all other indirect taxes will be abolished. Since our government has a federal structure, three types of GST will be levied – Central GST (CGST), State GST (SGST) and Integrated GST (IGST). GST will ensure the free flow of credits throughout the supply chain as the credit of IGST can be utilized against CGST, SGST and IGST and vice versa. The only restriction in utilisation of credit is that CGST cannot be utilized against SGST and SGST against CGST. However, this does not pose a problem as both CGST and SGST are

applicable on the same transactions. So the CGST and SGST credits can be utilized against their respective output liabilities. This is the main reason why GST has been proposed to be introduced in the economy. Economists predict that due to reduced compliances, free flow of credits and increased ease of doing business, the GDP growth rate can increase by a factor of up to 2 percent. Also, many MNCs which were reluctant to invest in India due to all these issues will now be encouraged. Now when you hear about GST in the news, you'll be able to appreciate all the effort that is being put in for making it a reality and you'll understand what its consequences will be.

https://www.thequint.com/blogs/2017/01/18/post-gst- india-will- see-improvement- in-ease-of-doing- business-

APPENDIX B.34
Startup India

Startup India is a flagship initiative of the Government of India, intended to build a strong eco-system for nurturing innovation and Startups in the country that will drive sustainable economic growth and generate large scale employment opportunities. The Government through this initiative aims to empower Startups to grow through innovation and design.

In order to meet the objectives of the initiative, Government of India announced the Action Plan that addresses all aspects of the Startup ecosystem on 16th January 2016. With this Action Plan the Government hopes to accelerate spreading of the Startup movement. The Action Plan is based on the following three pillars:

- Simplification and Handholding
- Funding Support and Incentives
- Industry-Academia Partnership and Incubation.

http://startupindia.gov.in/pdffile.php?title=Startup%20India%20Action%20Plan&type=Action&q=Action%20Plan.pdf&content_type=Action&submenupoint=action

APPENDIX B.35
PM Fellowship Scheme for Doctoral Research

Public-Private-Partnership (PPP) for human resource capacity building for industrial R&D has been recognized as one of the main deliverables by a Sub-committee of Prime Minister's Council on Trade & Industry. One of the key recommendations that emerged from the Private Sector is to design, develop and implement a Doctoral Research Scheme under PPP for enhancing trust level in academia, research outfits and industry.

A special scheme for 100 'Doctoral Research Fellowships' every year was announced during the Inception Ceremony of the Indian Science Congress Association, in June 2012 in Kolkata. The Prime Minister's Office approved the proposal of naming the 'SERB-CII Doctoral Fellowship Scheme' as Prime Minister's Fellowship Scheme for Doctoral Research. Subsequently, the Prime Minister's Fellowship Scheme for Doctoral Research was formally launched at the 'AICTE-CII University-Industry Congress & 4th Global Higher Education Summit' held in New Delhi.

This scheme is aimed at encouraging young, talented, enthusiastic and result-oriented scholars to take up industry-relevant research. Under this scheme, the full-time PhD scholars get double the money that they would otherwise get for doing research. Maximum government fellowship in India at any academic or research institute is approximately Rs 36,400 per month, including House Rent Allowance (HRA) for SRF category. Under the Prime Minister's Fellowship Scheme for Doctoral Research, the scholars get double the JRF/SRF as scholarship (as per applicable slabs). While one-half of this scholarship comes from the government, the second half comes from a partner company which also works closely with the candidate on the research project. The first batch commenced in 2013. The scheme has been made open-ended since September 2014, allowing aspirants to apply anytime within 14 months from their PhD registration.

Fellowships have been conferred to 79 PM Fellows in the first 3 years with over 30 institutes and more than 50 companies coming together to support the scheme. It is envisaged that this scheme would eventually attract large number of talented students into pursuing PhD and on changing industry's mindset in investing in R&D and recruiting more PhDs.

Apex Council:

The Apex Council is the highest decision-making body of this scheme. It is chaired by former secretary of the Department of Biotechnology, Dr M.K. Bhan and has representation from both industry and academia. The Apex Council vets the proposals received under the scheme and

gives its recommendations on the candidates to be supported under the scheme.

Fellowship – Framework:

- Up to 100 new Fellowships are provided every year
- 50% of the scholarship comes from SERB [being equivalent to the prevailing Government norms for Junior Research Fellow/ Senior Research Fellow (inclusive of HRA)], which can be revised as per the JRF/ SRF norms from time to time
- Rest 50% (matching equivalent of SERB component) comes from the partner company
- Duration of the Fellowship is four years
- If selected to receive the Prime Minister's Fellowship for Doctoral Research, the candidate ceases to receive any other scholarship/ salary from any other organization, which he/ she may be receiving at the time of enrolling into the scheme.

http://www.primeministerfellowshipscheme.in/about-the-scheme

APPENDIX B.36
Science 2.0 and Education 3.0

Science 2.0

Science 2.0 will be driven by massive digital disruption. It will be science that uses information-sharing and collaboration made possible by network technologies and will be inspired by Web 2.0 technology. Science 2.0 will use collaborative tools like wikis, blogs and video journals to share findings, raw data, etc., all online. Data driven discovery will be the norm rather than an exception. There is already an explosion of online tools and platforms available to scientists, ranging from Web 2.0 tools modified or created for the scientific world to Web sites that are doing amazing things. There are thousands of scientific software programs freely available online and tens of millions of science, technology, and math journal articles online. India will have to build the vision and infrastructure to bring together all these extraordinary tools and bring in new players with new mind-sets across this Science 2.0 landscape and demonstrate its prowess.

Education 3.0

What was education 1.0? There was a limited knowledge held by the teachers and there was restricted access to a privileged few. Then came education 2.0. It had to do with broadcast and an assembly line model. There was mass enrolment. There was "one to many" information dissemination. Knowledge was limited to books in the library. Now comes education 3.0 with dramatic paradigm shifts. What are these?First, Information memorisation and brute force recall will be made irrelevant. From `brain as storage' to `brain as an intelligent processor' will become the norm. Collecting the dots will be less important than connecting the dots. Second, humanity's accumulated knowledge will now be freely available on the Internet. It will be indexed and queryable. Third, rich formatted content, flipped classrooms, and research material from the best faculty on a subject will be available for free. Fourth, on demand tutoring, P2P learning, personalised and generative course structure and sequencing to meet the individual needs will be the order of the day. Fifth, there will have be the ability of co-working, co-creation and that too with both men and machine together. Demands of Industry 4.0 will dramatically change the list of top skills that will be needed in future. What will these be? First, dealing with complexity. Second, critical thinking. Third, creativity. Fourth, emotional intelligence. Fifth, cognitive flexibility.

APPENDIX B.37
New Millennium Indian Leadership Initiative

At a national level, in 2000, CSIR conceived and operationalized the New Millennium Indian Technology Leadership Initiative (NMITLI), the key word being 'leadership'. It was a bold public–private partnership, where grand challenges were taken up by the best brains in India in a 'Team India' fashion. For example, a globally competitive, affordable, portable and versatile bioinformatics software package 'Biosuite' was created by Tata Consultancy Services with as many as 19 institutional NMITLI partners in a record time of 18 months! One NMITLI grand challenge was to create 'two orders of magnitude faster liquid crystal display (LCD) device'. With NMITLI support, the Centre for Liquid Crystal Research did create new LCD materials which had two orders of magnitude faster response time. The 26 invention were patented but it did not lead to innovation, as India did not have the innovation ecosystem to capitalize on this breakthrough. NMITLI posed a grand challenge on creating a new molecule that will clear tuberculosis (TB) in 2 months, rather than

the conventional 6–8 months. Lupin and its NMITLI partners created an entirely new molecule having superior anti-mycobacterial activity for treatment of latent TB and treatment of multidrug-resistant TB27, while also achieving the 2-month target. It went successfully until phase II and then some issues have arisen that need to be addressed. But the point is that Indian scientists did rise to the challenge and did discover a new TB molecule after Rifampicin, which was discovered 40 years earlier! NMITLI posed the challenge of creating a breakthrough leather processing technology that was biological (clean) rather than the currently practised chemical (polluting). The challenge was met. A novel enzyme-based leather technology has been demonstrated that can give India global leadership in cleantech leather processing.

NMITLI posed the challenge of creating a novel indigenous fuel cell technology. The challenge was met. It is presently undergoing testing with an industrial partner, who is also a potential user at a truly massive scale across the nation. The key here is that the entire manufacturing ecosystem has been developed with supply of all the components, catalysts, accessories, etc. from within India so that a true ‘make in India’ dream can be realised. Order-of- magnitude cost reductions have been achieved in some critical components. Novel next generation fuel cell component have been invented and globally patented. Although it is early days, India has the potential to lead in this critical fuel cell technology. NMITLI raised the bar on creating products that are globally protected by patents. Bigtec Labs, Bengaluru with NMITLI support, developed unique a micro PCR device Truelab UnoTM for real-time PCR based nucleic acid detection of pathogens. Patents were filed in around 130 countries, and have been already granted in over 70 countries! Was everything in NMITLI successful? No. There were failures too. But that is what happens when you wish to lead and not follow! NMITLI is not just a programme, it is a new spirit, it is a bold message that Indian science will dare to try, unafraid of failure!

Appendix “C”

Source and definition of Indicators

This appendix complements the data tables by providing, for each of the 82 indicators included in the Global Innovation Index (GII) this year, its title, its description, its definition, and its source. For each indicator for each country/economy, the most recent value within the 10-year period 2006–15 was used. The single year given next to the description corresponds to the most frequent year for which data were available; when more than one year is considered, the period is indicated at the end of the indicator's source in parentheses.

Some indicators received special treatment in the computation. A few variables required scaling by some other indicator to be comparable across countries, or through division by gross domestic product (GDP) in current US dollars, purchasing power parity GDP in international dollars (PPP$ GDP), population, total exports, total trade, and so on. Details are provided in this appendix. The scaling factor was in each case the value corresponding to the same year of the particular indicator. In addition, 36 indicators that were assigned half weight are singled out with an 'a'. Finally, indicators for which higher scores indicate worse outcomes, commonly known as 'bads', are differentiated with a 'b' (details on the computation can be found in Appendix IV Technical Notes).

A total of 58 variables are hard data; 19 are composite indicators from international agencies, distinguished with an asterisk (*); and 5 are survey questions from the World Economic Forum's Executive Opinion Survey (EOS), singled out with a dagger (†).

1 Institutions

1.1 Political environment

1.1.1 Political stability and absence of violence/terrorism

Political stability and absence of violence/terrorism index*| 2014

Index that captures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically motivated violence and terrorism. Scores are standardized.

Source: World Bank, World Governance Indicators 2015. (http://info.worldbank.org/governance/wgi/index.aspx#home)

1.1.2 Government effectiveness

Government effectiveness index*| 2014

Index that captures perceptions of the quality of public and civil services and the degree of their independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Scores are standardized.

Source: World Bank, World Governance Indicators 2015. (http://info.worldbank.org/governance/wgi/index.aspx#home)

1.2 Regulatory environment

1.2.1 Regulatory quality

Regulatory quality index*[a] | 2014

Index that captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private-sector development. Scores are standardized.

Source: World Bank, World Governance Indicators 2015. (http://info.worldbank.org/governance/wgi/index.aspx#home)

1.2.2 Rule of law

Rule of law index*[a] | 2014

Index that captures perceptions of the extent to which agents have confidence in and abide by the rules of society, in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. Scores are standardized.

Source: World Bank, World Governance Indicators 2015. (http://info.worldbank.org/governance/wgi/index.aspx#home)

1.2.3 Cost of redundancy dismissal

Sum of notice period and severance pay for redundancy dismissal (in salary weeks, averages for workers with 1, 5, and 10 years of tenure, with a minimum threshold of 8 weeks)[b] | 2015

Doing Business has historically studied the flexibility of regulation of employment specifically as it relates to the areas of hiring, working hours, and redundancy. Over the period from 2007 to 2011 improvements were made to align the methodology for the labour market regulation indicators (formerly the employing workers indicators) with the letter and spirit of the International Labour Organization (ILO) conventions. Redundancy cost measures the cost of advance notice requirements and severance payments due when terminating a redundant worker, expressed in weeks of salary. The average value of notice requirements and severance payments applicable to a worker with 1 year of tenure: a worker with 5 years and a worker with 10 years is also considered. One month is recorded as 4 and 1/3 weeks. If the redundancy cost adds up to 8 or fewer weeks of salary, a value of 8 is assigned but the actual number of weeks is published. If the cost adds up to more than 8 weeks of salary, the score is the number of weeks. Assumptions about the worker: the worker is a cashier in a supermarket or grocery store, age 19, with one year of work experience; is a full-time employee; is not a member of the labour union, unless membership is mandatory. Assumptions about the business: the business is a limited liability company (or the equivalent in the economy); operates a supermarket or grocery store in the economy's largest business city (for 11 economies the data are also collected for the second largest business city); has 60 employees; is subject to collective bargaining agreements if such agreements cover more than 50% of the food retail sector and they apply even to firms that are not party to them; abides by every law and regulation but does not grant workers more benefits than those mandated by law, regulation or (if applicable) collective bargaining agreements.

Source: World Bank, Ease of Doing Business Index 2016: Measuring Regulatory Quality and Efficiency (2014–15). (http://www.doingbusiness.org/reports/global-reports/doing-business-2016)

1.3 Business environment

1.3.1 Ease of starting a business

Ease of starting a business (distance to frontier)* | 2015

The ranking of economies on the ease of starting a business is determined by sorting their distance to frontier scores for starting a business. These scores are the simple average of the distance to frontier scores for each of the component indicators. *Doing Business* records all procedures officially required, or commonly done in practice, for an entrepreneur to start up and formally operate an industrial or commercial business, as well as the time and cost to complete these procedures and the paid-in minimum capital requirement. These procedures include obtaining all necessary licenses and permits and completing any required notifications, verifications, or inscriptions for the company and employees with relevant authorities. To make the data comparable across economies, several assumptions about the business and the procedures are used. The business: is a limited liability company (or its legal equivalent). If there is more than one type of limited liability company in the economy, the limited liability form most common among domestic firms is chosen. Information on the most common form is obtained from incorporation lawyers or the statistical office; operates in the economy's largest business city. For 11 economies the data are also collected for the second largest business city; the business is 100% domestically owned and has five owners, none of whom is a legal entity; has start-up capital of 10 times income per capita; performs general industrial or commercial activities, such as the production or sale to the public of products or services. The business does not perform foreign trade activities and does not handle products subject to a special tax regime, for example, liquor or tobacco. It is not using heavily polluting production processes; leases the commercial plant or offices and is not a proprietor of real estate; does not qualify for investment incentives or any special benefits; has at least 10 and up to 50 employees one month after the commencement of operations, all of them domestic nationals; has a turnover of at least 100 times income per capita; has a company deed 10 pages long. The distance to frontier score shows the distance of an economy to the 'frontier', which is derived from the most efficient practice or highest score achieved on each indicator.

Source: World Bank, Doing Business 2016: Measuring Regulatory Quality and Efficiency. (http://www.doingbusiness.org/reports/global-reports/doing-business-2016)

1.3.2 Ease of resolving insolvency

Ease of resolving insolvency (distance to frontier)* | 2015

The ranking of economies on the ease of resolving insolvency is determined by

sorting their distance to frontier scores for resolving insolvency. These scores are the simple average of the distance to frontier scores for the recovery rate and the strength of insolvency framework index. The recovery rate is recorded as cents on the dollar recovered by secured creditors through reorganization, liquidation, or debt enforcement (foreclosure or receivership) proceedings. The calculation takes into account the outcome: whether the business emerges from the proceedings as a going concern or the assets are sold piecemeal. Then the costs of the proceedings are deducted (1 cent for each percentage point of the value of the debtor's estate). Finally, the value lost as a result of the time the money remains tied up in insolvency proceedings is taken into account, including the loss of value due to depreciation of the hotel furniture. Consistent with international accounting practice, the annual depreciation rate for furniture is taken to be 20%. The furniture is assumed to account for a quarter of the total value of assets. The recovery rate is the present value of the remaining proceeds, based on end-2014 lending rates from the International Monetary Fund's *International Financial Statistics*, supplemented with data from central banks and the Economist Intelligence Unit. If an economy had zero cases a year over the past five years involving a judicial reorganization, judicial liquidation, or debt enforcement procedure (foreclosure or receivership), the economy receives a 'no practice' mark on the time, cost, and outcome indicators. This means that creditors are unlikely to recover their money through a formal legal process. The recovery rate for 'no practice' economies is zero. In addition, a 'no practice' economy receives a score of 0 on the strength of insolvency framework index even if its legal framework includes provisions related to insolvency proceedings (liquidation or reorganization). The strength of insolvency framework index is based on four other indices: commencement of proceedings index, management of debtor's assets index, reorganization proceedings index and creditor participation index. To make the data on the time, cost, and outcome of insolvency proceedings comparable across economies, several assumptions about the business and the case are used: the business is a limited liability company; operates in the economy's largest business city. For 11 economies the data are also collected for the second largest business city; is 100% domestically owned, with the founder, who is also chairman of the supervisory board, owning 51% (no other shareholder holds more than 5% of shares); has downtown real estate, where it runs a hotel, as its major asset; has a professional general manager; has 201 employees and 50 suppliers, each of which is owed money for the last delivery; has a 10-year loan agreement with a domestic bank secured by a mortgage over the hotel's real estate property. A universal business charge (an enterprise charge) is also assumed in economies where such collateral is recognized. If the laws of the economy do not specifically provide for an enterprise charge but contracts commonly use some other provision to that effect, this provision is specified in the loan agreement; has observed the payment schedule and all other conditions of the loan up to now; has a market value, operating as a going concern, of 100 times income per capita or $200,000, whichever is greater. The market value of the company's assets, if sold piecemeal, is 70% of the market value of the business. Refer to indicator 1.3.1 for details regarding the distance to frontier measure.

Source: World Bank, Doing Business 2016: Measuring Regulatory Quality and Efficiency. (http://www.doingbusiness.org/reports/global-reports/doing-business-2016)

1.3.3 Ease of paying taxes

Ease of paying taxes (distance to frontier)* | 2015

The ranking of economies on the ease of paying taxes is determined by sorting their distance to frontier scores for paying taxes. These scores are the simple average of the distance to frontier scores for each of the component indicators, with a threshold and a nonlinear transformation applied to one of the component indicators, the total tax rate. The 'threshold' is defined as the total tax rate at the 15th percentile of the overall distribution of the total tax rate indicator for all years included in the analysis up to and including *Doing Business 2015*. The threshold is set at 26.1%. All economies with a total tax rate below this threshold receive the same score as the economy at the threshold. The threshold is not based on any economic theory of an 'optimal tax rate' that minimizes distortions or maximizes efficiency in an economy's overall tax system. Instead, it is mainly empirical in nature, set at the lower end of the distribution of tax rates levied on medium-size enterprises in the manufacturing sector as observed through the paying taxes indicators. To make the data comparable across economies, several assumptions about the business and the taxes and contributions are used. The business: is a limited liability, taxable company. If there is more than one type of limited liability company in the economy, the limited liability form most common among domestic firms is chosen. The most common form is reported by incorporation lawyers or the statistical office; started operations on January 1, 2013. At that time the company purchased all the assets shown in its balance sheet and hired all its workers; operates in the economy's largest business city. For 11 economies the data are also collected for the second largest business city; the business is 100% domestically owned and has five owners, all of whom are natural persons; at the end of 2013, has a start-up capital of 102 times income per capita; performs general industrial or commercial activities. Specifically, it produces ceramic flowerpots and sells them at retail. It does not participate in foreign trade (no import or export) and does not handle products subject to a special tax regime, for example, liquor or tobacco; at the beginning of 2014, owns two plots of land, one building, machinery, office equipment, computers and one truck and leases one truck; does not qualify for investment incentives or any benefits apart from those related to the age or size of the company; has 60 employees—4 managers, 8 assistants, and 48 workers. All are nationals, and one manager is also an owner. The company pays for additional medical insurance for employees (not mandated by any law) as an additional benefit. In addition, in some economies reimbursable business travel and client entertainment expenses are considered fringe benefits. When applicable, it is assumed that the company pays the fringe benefit tax on this expense or that the benefit becomes taxable income for the employee. The case study assumes no additional salary for meals, transportation, education or others. Therefore, even when such benefits are frequent, they are not added to or removed from the taxable gross salaries to arrive at the labor tax or contribution calculation; has a turnover of 1,050 times income per capita; makes a loss in the first year of operation; has a gross margin (pretax) of 20% (that is, sales are 120% of the cost of goods sold); distributes 50% of its net profits as dividends to the owners at the end of the second year; sells one of its plots of land at a profit at the beginning of the second year; is subject to a series of detailed assumptions on expenses and transactions to further standardize the case. For example, the owner who is also a manager spends 10% of income per capita on traveling for the company (20% of this owner's expenses are purely private, 20% are for entertaining customers, and 60% are for business travel). All financial statement variables are proportional to 2012 income per capita as of and including *Doing Business 2014* (this is an update

from *Doing Business 2013* and previous years' reports, where the variables were proportional to 2005 income per capita). For some economies a multiple of two or three times the income per capita has been used to estimate the financial statement variables. The 2012 income per capita was not sufficient to bring the salaries of all the case study employees up to the minimum wage thresholds that exist in these economies. Assumptions about the taxes and contributions: all the taxes and contributions recorded are those paid in the second year of operation (calendar year 2014). A tax or contribution is considered distinct if it has a different name or is collected by a different agency. Taxes and contributions with the same name and agency, but charged at different rates depending on the business, are counted as the same tax or contribution; the number of times the company pays taxes and contributions in a year is the number of different taxes or contributions multiplied by the frequency of payment (or withholding) for each tax. The frequency of payment includes advance payments (or withholding) as well as regular payments (or withholding). Refer to indicator 1.3.1 for details regarding the distance to frontier measure.

Source: World Bank, Doing Business 2016: Measuring Regulatory Quality and Efficiency. (http://www.doingbusiness.org/reports/global-reports/doing-business-2016)

2 Human capital and research

2.1 Education

2.1.1 Expenditure on education

Government expenditure on education (% of GDP) | 2012

Government operating expenditures in education, including wages and salaries and excluding capital investments in buildings and equipment, as a percentage of gross domestic product (GDP).

Source: UNESCO Institute for Statistics, UIS online database (2006–14). (http://stats.uis.unesco.org)

2.1.2 Government expenditure on education per pupil, secondary

Government expenditure per pupil, secondary (% of GDP per capita) | 2012

Government spending on education divided by the total number of secondary students, as a percentage of GDP per capita. Government expenditure (current and capital) includes government spending on educational institutions (both public and private), education administration, and subsidies for private entities (students/households and other private entities).

Source: UNESCO Institute for Statistics, UIS online database (2006–14). (http://stats.uis.unesco.org)

2.1.3 School life expectancy

School life expectancy, primary to tertiary education (years) | 2013

Total number of years of schooling that a child of a certain age can expect to receive in the future, assuming that the probability of his or her being enrolled in school at any particular age is equal to the current enrolment ratio for that age.

Source: UNESCO Institute for Statistics, UIS online database (2006–14). (http://stats.uis.unesco.org)

2.1.4 Assessment in reading, mathematics, and science

PISA average scales in reading, mathematics, and science[a] | 2012

The Organisation for Economic Co-operation and Development (OECD) Programme for International Student Assessment (PISA) develops three-yearly surveys that examine 15-year-old students' performance in reading, mathematics, and science. The scores are calculated in each year so that the mean is 500 and the standard deviation 100. The scores for China come from Shanghai; those for India from Himachal Pradesh and Tamil Nadu (average); those for the United Arab Emirates from Dubai; and those for the Bolivarian Republic of Venezuela from Miranda. These scores are those from the GII 2015 report.

Source: OECD Programme for International Student Assessment (PISA) (2010–12). (www.pisa.oecd.org/)

2.1.5 Pupil-teacher ratio, secondary

Pupil-teacher ratio, secondary[a,b] | 2014

The number of pupils enrolled in secondary school divided by the number of secondary school teachers (regardless of their teaching assignment). Where the data are missing for some countries, the ratios for upper-secondary are reported; if these are also missing, the ratios for lower-secondary are reported instead.

Source: UNESCO Institute for Statistics, UIS online database (2007–14). (http://stats.uis.unesco.org)

2.2 Tertiary education

2.2.1 Tertiary enrolment

School enrolment, tertiary (% gross)[a] | 2013

The ratio of total tertiary enrolment, regardless of age, to the population of the age group that officially corresponds to the tertiary level of education. Tertiary education, whether or not to an advanced research qualification, normally requires, as a minimum condition of admission, the successful completion of education at the secondary level.

Source: UNESCO Institute for Statistics, UIS online database (2007–14). (http://stats.uis.unesco.org)

2.2.2 Graduates in science and engineering

Tertiary graduates in science, engineering, manufacturing, and construction (% of total tertiary graduates) | 2013

The share of all tertiary graduates in science, manufacturing, engineering, and construction over all tertiary graduates.

Source: UNESCO Institute for Statistics, UIS online database (2006–14). (http://stats.uis.unesco.org)

2.2.3 Tertiary inbound mobility

Tertiary inbound mobility ratio (%)[a] | 2013

The number of students from abroad studying in a given country, as a percentage of the total tertiary enrolment in that country.

Source: UNESCO Institute for Statistics, UIS online database (2006–14). (http://stats.uis.unesco.org)

2.3 Research and development (R&D)

2.3.1 Researchers

Researchers, full-time equivalence (FTE) (per million population) | 2014

Researchers per million population, full-time equivalence. Researchers in R&D are professionals engaged in the conception or creation of new knowledge, products, processes, methods, or systems and in the management of the projects concerned. Postgraduate PhD students (ISCED97 level 6) engaged in R&D are included.

Source: UNESCO Institute for Statistics, UIS online database (2007–14). (http://stats.uis.unesco.org)

2.3.2 Gross expenditure on R&D (GERD)

GERD: Gross expenditure on R&D (% of GDP) | 2014

Total domestic intramural expenditure on R&D during a given period as a percent-

age of GDP. Intramural R&D expenditure is all expenditure for R&D performed within a statistical unit or sector of the economy during a specific period, whatever the source of funds.

Source: UNESCO Institute for Statistics, UIS online database (2007–15). (http://stats.uis.unesco.org)

2.3.3 Global R&D companies, average expenditure top 3

Average expenditure of the top 3 global companies by R&D, mn $US* | 2013

Average expenditure on R&D of the top three global companies. If a country has fewer than three global companies listed, the figure is either the average of the sum of the two companies listed or the total for a single listed company. A score of zero is given to countries with no listed companies.

Source: EU JRC Industrial R&D Investment Scoreboard 2014. (http://iri.jrc.ec.europa.eu/scoreboard14.html)

2.3.4 QS university ranking average score of top 3 universities.

Average score of the top 3 universities at the QS world university ranking* | 2015

Average score of the top three universities per country. If fewer than three universities are listed in the QS ranking of the global top 700 universities, the sum of the scores of the listed universities is divided by three, thus implying a score of zero for the non-listed universities.

Source: QS Quacquarelli Symonds Ltd, QS World University Ranking 2015/2016, Top Universities. (http://www.topuniversities.com/university-rankings/world-university-rankings/2015)

3 Infrastructure

3.1 Information and communication technologies (ICTs)

3.1.1 ICT access

ICT access index* | 2015

The ICT access index is a composite index that weights five ICT indicators (20% each): (1) Fixed telephone subscriptions per 100 inhabitants; (2) Mobile cellular telephone subscriptions per 100 inhabitants; (3) International Internet bandwidth (bit/s) per Internet user; (4) Percentage of households with a computer; and (5) Percentage of households with Internet access. It is the first sub-index in ITU's ICT Development Index (IDI).

Source: International Telecommunication Union, Measuring the Information Society 2015, ICT Development Index 2015. (http://www.itu.int/en/ITU-D/Statistics/Documents/publications/misr2015/MISR2015-w5.pdf)

3.1.2 ICT use

ICT use index* | 2015

The ICT use index is a composite index that weights three ICT indicators (33% each): (1) Percentage of individuals using the Internet; (2) Fixed (wired)-broadband Internet subscriptions per 100 inhabitants; (3) Active mobile-broadband subscriptions per 100 inhabitants. It is the second sub-index in ITU's ICT Development Index (IDI).

Source: International Telecommunication Union, Measuring the Information Society 2015, ICT Development Index 2015. (http://www.itu.int/en/ITU-D/Statistics/Documents/publications/misr2015/MISR2015-w5.pdf)

3.1.3 Government's online service

Government's online service index* | 2014

To arrive at a set of Online Service Index values, research teams assessed each country's national website, including the national central portal, e-services portal, and e-participation portal as well as the websites of the related ministries of education, labour, social services, health, finance, and environment, as applicable. In addition to being assessed for content and features, the national sites were tested for a minimal level of web content accessibility as described in the *Web Content Accessibility Guidelines* of the World Wide Web Consortium. The survey covers four stages of government's online service development, with points assigned for (1) an emerging presence, providing limited and basic information; (2) an enhanced presence, providing greater public policy and governance sources of information, such as policies, laws and regulation, downloadable databases, etc.; (3) a transactional presence, allowing two-way interactions between government and citizens (G2C and C2G), including paying taxes and applying for ID cards, birth certificates, passports, license renewals, etc.; and (4) a connected presence, characterized by G2G, G2C, and C2G interactions; participatory deliberative policy- and decision-making. A citizen-centric approach was followed. It is the first of three components of the E-Government Development Index (EGDI) of the United Nations Public Administration Network (UNPAN), together with components on telecommunication infrastructure and human capital.

Note: The precise meaning of these values varies from one edition of the Survey to the next as understanding of the potential of e-government changes and the underlying technology evolves. Read about the methodology at http://unpan3.un.org/egovkb/en-us/About/Methodology

Source: United Nations Public Administration Network, e-Government Survey 2014. (http://unpan3.un.org/egovkb/Reports/UN-E-Government-Survey-2014)

3.1.4 Online e-participation

E-Participation Index* | 2014

The United Nations E-Participation Index is based on the survey used for the UN Online Service Index. The survey was expanded with questions emphasizing quality in the connected presence stage of e-government. These questions focus on the use of the Internet to facilitate the provision of information by governments to citizens ('e-information sharing'), interaction with stakeholders ('e-consultation'), and engagement in decision-making processes ('e-decision making'). A country's E-Participation Index value reflects how useful these features are and the extent to which they have been deployed by the government compared with all other countries. The purpose of this measure is to offer insight into how different countries are using online tools to promote interaction between citizens and government, as well as among citizens, for the benefit of all. The index ranges from 0 to 1, with 1 showing greater e-participation.

Note: The precise meaning of these values varies from one edition of the Survey to the next as understanding of the potential of e-government changes and the underlying technology evolves. Read about the methodology at http://unpan3.un.org/egovkb/en-us/About/Methodology

Source: United Nations Public Administration Network, e-Government Survey 2014. (http://unpan3.un.org/egovkb/Reports/UN-E-Government-Survey-2014)

3.2 General infrastructure

3.2.1 Electricity output

Electricity output (kWh per capita)[3] | 2013

Electricity production, measured at the terminals of all alternator sets in a station. In addition to hydropower, coal, oil, gas, and nuclear power generation, this indicator covers generation by geothermal,

solar, wind, and tide and wave energy, as well as that from combustible renewables and waste. Production includes the output of electricity plants that are designed to produce electricity only as well as that of combined heat and power plants. Electricity output in KWh is scaled by population.

Source: International Energy Agency (IEA) World Energy Balances on-line data service, 2015 edition (2013–14). (http://www.iea.org/statistics/)

3.2.2 Logistics performance

Logistics Performance Index*[3] | 2014

A multidimensional assessment of logistics performance, the Logistics Performance Index (LPI) compares the trade logistics profiles of 160 countries and rates them on a scale of 1 (worst) to 5 (best). The ratings are based on 6,000 individual country assessments by nearly 1,000 international freight forwarders, who rated the eight foreign countries their company serves most frequently. The LPI's six components include: (1) the efficiency of the clearance process (speed, simplicity, and predictability of formalities) by border control agencies, including customs; (2) the quality of trade- and transport-related infrastructure (ports, railroads, roads, information technology); (3) the ease of arranging competitively priced shipments; (4) the competence and quality of logistics services (transport operators, customs brokers); (5) the ability to track and trace consignments; and (6) the frequency with which shipments reach the consignee within the scheduled or expected delivery time. Details of the survey methodology are in Arvis et al.'s *Connecting to Compete 2014: Trade Logistics in the Global Economy* (2014). Scores are averaged across all respondents.

Source: World Bank and Turku School of Economics, Logistics Performance Index 2014; Arvis et al., 2014, Connecting to Compete 2014: Trade Logistics in the Global Economy. (http://lpi.worldbank.org/)

3.2.3 Gross capital formation

Gross capital formation (% of GDP) | 2015

Ratio of total gross capital formation in current local currency to GDP in current local currency. Gross capital formation or investment is measured by the total value of the gross fixed capital formation and changes in inventories and acquisitions less disposals of valuables for a unit or sector, on the basis of the System of National Accounts (SNA) of 1993. Gross fixed capital formation consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. Fixed assets include land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. Inventories are stocks of goods held by firms to meet temporary or unexpected fluctuations in production or sales and 'work in progress'. Net acquisitions of valuables are also considered capital formation.

Source: International Monetary Fund, World Economic Outlook Database, October 2015 (PPP$ GDP). (http://www.imf.org/external/pubs/ft/weo/2015/02/weodata/weoselgr.aspx)

3.3 Ecological sustainability

3.3.1 GDP per unit of energy use

GDP per unit of energy use (2005 PPP$ per kg of oil equivalent) | 2013

Purchasing power parity gross domestic product (PPP$ GDP) per kilogram of oil equivalent of energy use. Energy use or total primary energy supply (TPES) is calculated as the production of fuels + inputs from other sources + imports – exports – international marine bunkers +/– stock changes. It includes coal, crude oil, natural gas liquids, refinery feedstocks, additives, petroleum products, gases, combustible renewables and waste, electricity, and heat. Domestic supply (also called 'energy apparent consumption') differs from final consumption in that it does not take account of distribution losses. The supply (or use) of energy commodities is converted to kilograms or tons of oil equivalent (koe, toe) using standard coefficients for each energy source.

Source: International Energy Agency (IEA) World Energy Balances on-line data service, 2015 edition (2013–14). (http://www.iea.org/statistics/)

3.3.2 Environmental performance

Environmental Performance Index* | 2015

This index ranks countries on 20 performance indicators tracked across policy categories that cover both environmental public health and ecosystem vitality. These indicators gauge how close countries are to established environmental policy goals. The index ranges from 0 to 100, with 100 indicating best performance.

Source: Yale University and Columbia University Environmental Performance Index 2016. (http://epi.yale.edu/)

3.3.3 ISO 14001 environmental certificates

ISO 14001 Environmental management systems—Requirements with guidance for use: Number of certificates issued (per billion PPP$ GDP)[3] | 2014

ISO 14001:2015 sets out the criteria for an environmental management system and can be certified to. It maps out a framework that a company or organization can follow to set up an effective environmental management system. It can be used by any organization regardless of its activity or sector. Using ISO 14001:2015 can provide assurance to company management and employees as well as external stakeholders that environmental impact is being measured and improved. The ISO survey is published on an annual basis by the International Organization for Standardization (ISO). Only certification bodies accredited by national members of the International Accreditation Forum (http://www.iaf.nu) were used as sources. Certification of conformity with standards is not a requirement and the standards can be implemented without certification, but certification is perceived as adding value and trust. ISO is a network of the national standards institutes of 161 countries, and it is the world's largest developer of voluntary International Standards for business, government, and society, with a portfolio of more than 19,500 standards in almost every sector of economic activity and technology. ISO itself does not perform certification to its standards, does not issue certificates, and does not control certification performed independently of ISO by other organizations. The data are reported per billion PPP$ GDP.

Note: ISO 14001 Environmental Management Systems has recently been revised. Information about the key changes is available at http://www.iso.org/iso/home/standards/management-standards/iso14000/iso14001_revision.htm.

Source: International Organization for Standardization, The ISO Survey of Management System Standard Certifications 2014; International Monetary Fund, World Economic Outlook 2015 database, October 2015 (PPP$ GDP) (2013–14). (http://www.iso.org; http://www.imf.org/external/pubs/ft/weo/2015/02/weodata/weoselgr.aspx)

4 Market sophistication

4.1 Credit

4.1.1 Ease of getting credit

Ease of getting credit (distance to frontier)* | 2015

The ranking of economies on the ease of getting credit is determined by sorting their distance to frontier scores for getting credit. These scores are the distance to frontier score for the sum of the strength of legal rights index (range 0–10); and the depth of credit information index (range 0–8). *Doing Business* measures the legal rights of borrowers and lenders with respect to secured transactions through one set of indicators and the reporting of credit information through another. The first set of indicators measures whether certain features that facilitate lending exist within the applicable collateral and bankruptcy laws. The second set measures the coverage, scope and accessibility of credit information available through credit reporting service providers such as credit bureaus or credit registries. Although *Doing Business* compiles data on getting credit for public registry coverage (% of adults) and for private bureau coverage (% of adults), these indicators are not included in the ranking. Refer to indicator 1.3.1 for details regarding the distance to frontier measure.

Source: World Bank, Doing Business 2016: Measuring Regulatory Quality and Efficiency. (http://www.doingbusiness.org/reports/global-reports/doing-business-2016)

4.1.2 Domestic credit to private sector

Domestic credit to private sector (% of GDP) | 2014

Domestic credit to private sector refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, that establish a claim for repayment. For some countries these daims include credit to public enterprises. The financial corporations include monetary authorities and deposit money banks, as well as other financial corporations where data are available (including corporations that do not accept transferable deposits but do incur such liabilities as time and savings deposits). Examples of other financial corporations are finance and leasing companies, money lenders, insurance corporations, pension funds, and foreign exchange companies.

Source: International Monetary Fund, International Financial Statistics and data files; and World Bank and OECD GDP estimates; extracted from the World Bank's World Development Indicators database (2006–14). (http://data.worldbank.org/)

4.1.3 Microfinance institutions' gross loan portfolio

Microfinance institutions: Gross loan portfolio (% of GDP) | 2014

Combined gross loan balances per microfinance institution (current US$), divided by GDP (current US$) and multiplied by 100.

Source: Microfinance Information Exchange, Mix Market database; International Monetary Fund, World Economic Outlook database, October 2015 (current US$ GDP) (2007–14). (https://reports.mixmarket.org/crossmarket; http://www.imf.org/external/pubs/ft/weo/2015/02/weodata/weoselgr.aspx)

4.2 Investment

4.2.1 Ease of protecting minority investors

Ease of protecting minority investors (distance to frontier)* | 2015

The ranking is the simple average of the distance to frontier scores for the extent of conflict of interest regulation index and the extent of shareholder governance index. The extent of conflict of interest regulation index measures the protection of shareholders against directors' misuse of corporate assets for personal gain by distinguishing three dimensions of regulation that address conflicts of interest: transparency of related-party transactions (extent of disclosure index), shareholders' ability to sue and hold directors liable for self-dealing (extent of director liability index), and access to evidence and allocation of legal expenses in shareholder litigation. The extent of shareholder governance index measures shareholders' rights in corporate governance by distinguishing three dimensions of good governance: shareholders' rights and role in major corporate decisions (extent of shareholder rights index); governance safeguards protecting shareholders from undue board control and entrenchment (extent of ownership and control index); and corporate transparency on ownership stakes, compensation, audits, and financial prospects (extent of corporate transparency index). The index also measures whether a subset of relevant rights and safeguards are available in limited companies. The data come from a questionnaire administered to corporate and securities lawyers and are based on securities regulations, company laws, civil procedure codes, and court rules of evidence. Refer to indicator 1.3.1 for details regarding the distance to frontier measure.

Source: World Bank, Doing Business 2016: Measuring Regulatory Quality and Efficiency. (http://www.doingbusiness.org/reports/global-reports/doing-business-2016)

4.2.2 Market capitalization

Market capitalization of listed companies (% of GDP)[3] | 2014

Market capitalization (also known as 'market value') is the share price times the number of shares outstanding. Listed domestic companies are the domestically incorporated companies listed on the country's stock exchanges at the end of the year. Listed companies do not include investment companies, mutual funds, or other collective investment vehicles.

Note: The methodology was changed for the total value of stocks traded because Standard & Poor's discontinued its *Global Stock Markets Factbook*. The current source of the data, the World Federation of Exchanges (WFE), uses a different methodology. The WFE provides data according to its membership list, available at http://www.world-exchanges.org/home/index.php/members/wfe-members.

Source: World Federation of Exchanges database; extracted from the World Bank's World Development Indicators database (2006–14). (http://data.worldbank.org/)

4.2.3 Total value of stocks traded

Stocks traded, total value (% of GDP)[3] | 2014

The value of shares traded is the total number of shares traded, both domestic and foreign, multiplied by their respective matching prices. Figures are single counted (only one side of the transaction is considered). Companies admitted to listing and admitted to trading are included in the data. Data are end-of-year values.

Note: The methodology was changed for the total value of stocks traded because Standard & Poor's discontinued its *Global Stock Markets Factbook*. The current source of the data, the World Federation of Exchanges (WFE), uses a different methodology. The WFE provides data according to its membership list, available at http://www.world-exchanges.org/home/index.php/members/wfe-members.

Source: World Federation of Exchanges database; extracted from the World Bank's World Development Indicators database (2008–14). (http://data.worldbank.org/)

4.2.4 Venture capital deals

Venture capital per investment location: Number of deals (per billion PPP$ GDP)[a] | 2015

Thomson Reuters data on private equity deals, per deal, with information on the location of investment, investment company, investor firms, and funds, among other details. The series corresponds to a query on venture capital deals from 1 January 2015 to 31 December 2015, with the data collected by investment location, for a total of 13,703 deals in 95 countries in 2015. The data are reported per billion PPP$ GDP.

Source: Thomson Reuters, Thomson One Banker Private Equity database; International Monetary Fund, World Economic Outlook database, October 2015 (PPP$ GDP). (http://banker.thomsonib.com; http://www.imf.org/external/pubs/ft/weo/2015/02/weodata/weoselgr.aspx)

4.3 Trade, competition, and market scale

4.3.1 Applied tariff rate, weighted mean

Tariff rate, applied, weighted mean, all products (%) [a,b] | 2013

Weighted mean applied tariff is the average of effectively applied rates weighted by the product import shares corresponding to each partner country. Data are classified using the Harmonized System of trade at the six- or eight-digit level. Tariff line data were matched to Standard International Trade Classification (SITC) revision 3 codes to define commodity groups and import weights. Effectively applied tariff rates at the six- and eight-digit product level are averaged for products in each commodity group. When the effectively applied rate is unavailable, the most-favoured-nation rate is used instead. To the extent possible, specific rates have been converted to their ad valorem equivalent rates and have been included in the calculation of weighted mean tariffs. World Bank staff estimates use the World Integrated Trade Solution system, based on data from United Nations Conference on Trade and Development's Trade Analysis and Information System (TRAINS) database and the World Trade Organization's (WTO) Integrated Data Base (IDB) and Consolidated Tariff Schedules (CTS) database.

Source: World Bank, based on UNCTAD TRAINS, WTO, IDB, and UN COMTRADE databases; extracted from World Bank World Development Indicators database (2007–13). (http://data.worldbank.org/)

4.3.2 Intensity of local competition

Average answer to the survey question: In your country, how intense is competition in the local markets? [1 = not intense at all; 7 = extremely intense][†a] | 2015

Source: World Economic Forum, Executive Opinion Survey 2014–2015. (http://reports.weforum.org/global-competitiveness-report-2015-2016/)

4.3.3 Domestic market scale

Domestic market size as measured by GDP, bn PPP$ | 2014

The domestic market size is measured by gross domestic product (GDP) based on the purchasing-power-parity (PPP) valuation of country GDP, in current international dollar (billions).

Source: World Bank, International Monetary Fund, World Economic Outlook Database, 2015 (PPP$ GDP). (http://www.imf.org/external/pubs/ft/weo/2015/02/weodata/weoselgr.aspx)

5 Business sophistication

5.1 Knowledge workers

5.1.1 Employment in knowledge-intensive services

Employment in knowledge-intensive services (% of workforce) | 2014

Sum of people in categories 1 to 3 as a percentage of total people employed, according to the International Standard Classification of Occupations (ISCO). Categories included: ISCO-08: 1 Managers, 2 Professionals, and 3 Technicians and associate professionals (years 2006–14); ISCO-88: 1 Legislators, senior officials and managers, 2 Professionals, 3 Technicians and associate professionals (2006–14); ISCO-68: 1 Professional, technical and related workers (category 0 Armed forces is excluded), 2 Administrative and managerial workers, 3 Clerical and related workers (years 2006–08).

Source: International Labour Organization ILOSTAT Database of Labour Statistics (2006–14). (http://www.ilo.org/ilostat/)

5.1.2 Firms offering formal training

Firms offering formal training (% of firms) | 2013

The percentage of firms offering formal training programs for their permanent, full-time employees.

Source: World Bank, Enterprise Surveys (2006–15). (http://www.enterprisesurveys.org/).

5.1.3 GERD performed by business enterprise

GERD: Performed by business enterprise (% of GDP)[a] | 2014

Gross expenditure on R&D performed by business enterprise as a percentage of GDP.

Source: UNESCO Institute for Statistics, UIS online database (2007–14). (http://stats.uis.unesco.org)

5.1.4 GERD financed by business enterprise

GERD: Financed by business enterprise (% of total GERD)[a] | 2014

Gross expenditure on R&D financed by business enterprise as a percentage of total gross expenditure on R&D.

Source: UNESCO Institute for Statistics, UIS online database (2007–15). (http://stats.uis.unesco.org)

5.1.5 Females employed with advanced degrees

Females employed with advanced degrees, % total employed (25+ years old)[a] | 2014

The percentage of females employed with advanced degrees out of total employed. The employed comprise all persons of working age who, during a specified brief period, were in one of the following categories: (1) paid employment (whether at work or with a job but not at work); or (2) self-employment (whether at work or with an enterprise but not at work). Data are disaggregated by level of education, which refers to the highest level of education completed, classified according to the International Standard Classification of Education (ISCE).

Source: International Labour Organization, ILOSTAT Annual Indicators (2009–14); and Statistics Canada, Table 282-0004; Labour Force Survey estimates (LFS) by educational attainment, sex and age group, annual, CANSIM, accessed 11 February 2016. (http://www.ilo.org/ilostat/; http://laborsta.ilo.org/; http://www5.statcan.gc.ca/)

5.2 Innovation linkages

5.2.1 University/industry research collaboration

Average answer to the survey question: In your country, to what extent do people collaborate and share ideas in between companies and universities/research institutions? [1 = not at all; 7 = to a great extent][†a] | 2015

Source: World Economic Forum, Executive Opinion Survey 2014–2015. (http://reports.weforum.org/global-competitiveness-report-2015-2016/)

5.2.2 State of cluster development

Average answer to the survey question on the role of clusters in the economy: In your country, how widespread are well-developed and deep clusters (geographic concentrations of firms, suppliers, producers of related products and services, and specialized institutions in a particular field)? [1 = nonexistent; 7 = widespread in many fields]† | 2015

Source: World Economic Forum, Executive Opinion Survey 2014–2015. (http://reports.weforum.org/global-competitiveness-report-2015-2016/)

5.2.3 GERD financed by abroad

GERD: Financed by abroad (% of total GERD) | 2014

Percentage of gross expenditure on R&D financed by abroad—i.e., with foreign financing.

Source: UNESCO Institute for Statistics, UIS online database (2007–15). (http://stats.uis.unesco.org)

5.2.4 Joint venture/strategic alliance deals

Joint ventures/strategic alliances: Number of deals, fractional counting (per billion PPP$ GDP)[a] | 2015

Thomson Reuters data on joint ventures/strategic alliances deals, per deal, with details on the country of origin of partner firms, among others. The series corresponds to a query on joint venture/strategic alliance deals from 1 January 2015 to 31 December 2015, for a total of 1,512 deals announced in 2015, with firms headquartered in 92 participating economies. Each participating nation of each company in a deal (*n* countries per deal) gets, per deal, a score equivalent to 1/*n* (with the effect that all country scores add up to 1,512). The data are reported per billion PPP$ GDP.

Source: Thomson Reuters, Thomson One Banker Private Equity, SDC Platinum database; International Monetary Fund World Economic Outlook Database, October 2015 (PPP$ GDP). (http://banker.thomsonib.com; http://www.imf.org/external/pubs/ft/weo/2015/02/weodata/weoselgr.aspx)

5.2.5 Patent families filed in two offices

Number of patent families filed by residents in at least two offices (per billion PPP$ GDP)[a] | 2012

A 'patent family' is a set of interrelated patent applications filed in one or more countries or jurisdictions to protect the same invention. Patent families containing applications filed in at least two different offices is a subset of patent families where protection of the same invention is sought in at least two different countries. In this report, 'patent families data' refers to patent applications filed by residents in at least two IP offices; the data are scaled by PPP$ GDP (billions). A 'patent' is a set of exclusive rights granted by law to applicants for inventions that are new, non-obvious, and commercially applicable. A patent is valid for a limited period of time (generally 20 years), during which patent holders can commercially exploit their inventions on an exclusive basis. In return, applicants are obliged to disclose their inventions to the public in a manner that enables others, skilled in the art, to replicate the invention. The patent system is designed to encourage innovation by providing innovators with time-limited exclusive legal rights, thus enabling them to appropriate the returns from their innovative activity.

Source: World Intellectual Property Organization, WIPO Statistics Database; International Monetary Fund, World Economic Outlook Database, October 2015 (PPP$ GDP) (2007–12). (http://www.wipo.int/ipstats/; http://www.imf.org/external/pubs/ft/weo/2015/02/weodata/weoselgr.aspx)

5.3 Knowledge absorption

5.3.1 Intellectual property payments

Charges for use of intellectual property n.i.e., payments (%, total trade)[a] | 2014

Charges for the use of intellectual property not included elsewhere payments (% of total trade) according to the Extended Balance of Payments Services Classification EBOPS 2010—that is, code SH Charges for the use of intellectual property not included elsewhere as a percentage of total trade. 'Total trade' is defined as the sum of total imports code G goods and code SOX commercial services (excluding government goods and services not included elsewhere) plus total exports of code G goods and code SOX commercial services (excluding government goods and services not included elsewhere), divided by 2. According to the sixth edition of the International Monetary Fund's *Balance of Payments Manual*, the item 'Goods' covers general merchandise, net exports of goods under merchanting and nonmonetary gold. The 'commercial services' category is defined as being equal to 'services' minus 'government goods and services not included elsewhere'. Receipts are between residents and nonresidents for the use of proprietary rights (such as patents, trademarks, copyrights, industrial processes and designs including trade secrets, franchises), and for licenses to reproduce or distribute (or both) intellectual property embodied in produced originals or prototypes (such as copyrights on books and manuscripts, computer software, cinematographic works, and sound recordings) and related rights (such as for live performances and television, cable, or satellite broadcast).

Source: World Trade Organization, Trade in Commercial Services database, based on the sixth (2009) edition of the International Monetary Fund's Balance of Payments Manual and Balance of Payments database (2009–14). (http://stat.wto.org/StatisticalProgram/WSDBStatProgramSeries.aspx; http://www.oecd.org/std/its/EBOPS-2010.pdf)

5.3.2 High-tech imports

High-tech net imports (% of total trade) | 2014

High-technology imports minus re-imports (% of total trade). The list of commodities contains technical products with a high intensity of R&D, based on the Eurostat classification, itself based on SITC Rev.4 and the Organisation for Economic Co-operation and Development (OECD) definition. Commodities belong to the following sectors: aerospace; computers & office machines; electronics, telecommunications; pharmacy; scientific instruments; electrical machinery; chemistry; non-electrical machinery; and armament.

Source: United Nations, COMTRADE database; Eurostat, 'High-technology' aggregations based on SITC Rev. 4, April 2009 (2008–14). (http://comtrade.un.org/; http://ec.europa.eu/eurostat/cache/metadata/Annexes/htec_esms_an5.pdf)

5.3.3 ICT services imports

Telecommunications, computers, and information services imports (% of total trade) | 2014

Telecommunications, computer and information services (% of total trade) according to the Extended Balance of Payments Services Classification EBOPS 2010, coded SI: Telecommunications, computer and information services.

Source: World Trade Organization, Trade in Commercial Services database, based on the sixth (2009) edition of the International Monetary Fund's Balance of Payments Manual and Balance of Payments database (2009–14). (http://stat.wto.org/StatisticalProgram/WSDBStatProgramSeries.aspx; http://www.oecd.org/std/its/EBOPS-2010.pdf)

5.3.4 Foreign direct investment net inflows

Foreign direct investment (FDI), net inflows (% of GDP) | 2014

'Foreign direct investment' refers to the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This data series shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors, and is divided by GDP.

Source: International Monetary Fund, International Financial Statistics and data files, and World Bank and OECD GDP estimates; extracted from the World Bank's World Development Indicators database (2011–14). (http://data.worldbank.org/)

5.3.5 Research talent in business enterprise

Researchers in business enterprise, per thousand population (%) | 2014

Full-time equivalence (FTE) researchers in the business enterprise sector refers to 'researchers' as: professionals engaged in the conception or creation of new knowledge, products, processes, methods, and systems, as well as in the management of these projects, broken down by the sectors in which they are employed (business enterprise, government, higher education, and private non-profit organizations). In the context of R&D statistics, the business enterprise sector includes all firms, organizations, and institutions whose primary activity is the market production of goods or services (other than higher education) for sale to the general public at an economically significant price, and the private non-profit institutions mainly serving them; the core of this sector is made up of private enterprises. This also includes public enterprises.

Source: UNESCO Institute for Statistics, UIS online database (2007–14); World Population Prospects: The 2015 Revision (population). (http://stats.uis.unesco.org)

6 Knowledge and technology outputs

6.1 Knowledge creation

6.1.1 Patent applications by origin

Number of resident patent applications filed at a given national or regional patent office (per billion PPP$ GDP)[3] | 2014

'Patent' is defined in the description of indicator 5.2.5. A 'resident patent application' refers to an application filed with an IP office or an office acting on behalf of the state or jurisdiction in which the first-named applicant has residence. For example, an application filed with the Japan Patent Office (JPO) by a resident of Japan is considered a resident application for Japan. Similarly, an application filed with the European Patent Office (EPO) by an applicant who resides in any of the EPO member states, for example, Germany, is considered a resident application for that member state (Germany).

Source: World Intellectual Property Organization, WIPO Statistics Database; International Monetary Fund, World Economic Outlook Database, October 2015 (PPP$ GDP) (2010–14). (http://www.wipo.int//ipstats/; http://www.imf.org/external/pubs/ft/weo/2015/02/weodata/weoselgr.aspx)

6.1.2 PCT international applications by origin

Number of international patent applications filed by residents at the Patent Cooperation Treaty (per billion PPP$ GDP)[3] | 2015

These are the number of Patent Cooperation Treaty (PCT) international patent applications filed through the WIPO-administered Patent Cooperation Treaty in 2015. A 'PCT international application' refers to a patent application filed through the WIPO-administered Patent Cooperation Treaty (PCT) during the international phase outlined by the PCT System. The origin of PCT applications are defined by the residence of the first-named applicant. The PCT System facilitates the filing of patent applications worldwide, making it possible to seek patent protection for an invention simultaneously in each of a large number of countries by first filing a single international patent application.

Source: World Intellectual Property Organization, WIPO Statistics Database; International Monetary Fund, World Economic Outlook Database, October 2015 (PPP$ GDP) (2014–15). (http://www.wipo.int//ipstats/; http://www.imf.org/external/pubs/ft/weo/2015/02/weodata/weoselgr.aspx)

6.1.3 Utility model applications by origin

Number of utility model applications filed by residents at the national patent office (per billion PPP$ GDP) | 2014

These are the number of resident utility model applications filed at a given national or regional patent office in 2014. A 'resident UM application' refers to an application filed with an IP office of or an office acting on behalf of the state or jurisdiction in which the first-named applicant has residence. For example, an application filed with the IP office of Germany by a resident of Germany is considered a resident application for Germany. A utility model grant is a special form of patent right issued by a state or jurisdiction to an inventor or the inventor's assignee for a fixed period of time. The terms and conditions for granting a utility model are slightly different from those for normal patents and include a shorter term of protection and less stringent patentability requirements. A utility model is sometimes referred to in certain countries as 'petty patents', 'short-term patents', or 'innovation patents'.

Source: World Intellectual Property Organization, WIPO Statistics Database; International Monetary Fund, World Economic Outlook Database, October 2015 (PPP$ GDP) (2010–14). (http://www.wipo.int//ipstats/; http://www.imf.org/external/pubs/ft/weo/2015/02/weodata/weoselgr.aspx)

6.1.4 Scientific and technical publications

Number of scientific and technical journal articles (per billion PPP$ GDP)[3] | 2015

The number of scientific and engineering articles published in those fields, including: physics, chemistry, engineering, science technology, environmental sciences ecology, biochemistry molecular biology, mathematics, computer science, cell biology, biotechnology applied microbiology, metallurgy metallurgical engineering, veterinary sciences, meteorology atmospheric sciences, marine freshwater biology, life sciences biomedicine, dentistry oral surgery medicine, construction building technology, mathematical computational biology, evolutionary biology, general internal medicine, research experimental medicine, food science technology, plant sciences, radiology nuclear medicine medical imaging, microbiology, life sciences biomedicine, nuclear science technology, evolutionary biology, reproductive biology, and imaging science photographic technology. Article counts are from a set of journals covered by the Science Citation Index (SCI) and the Social Sciences Citation Index (SSCI). Articles are classified by year

of publication and assigned to each country/economy on basis of the institutional address(es) listed in the article. Articles are counted on a count basis (rather than a fractional basis)—that is, for articles with collaborating institutions from multiple countries/economies, each country/economy receives credit on the basis of its participating institutions. The data are reported per billion PPP$ GDP.

Source: Special tabulations from Thomson Reuters, Web of Science, Science Citation Index (SCI) and Social Sciences Citation Index (SSCI); International Monetary Fund, World Economic Outlook Database, October 2015 (PPP$ GDP). (http://thomsonreuters.com/en/products-services/scholarly-scientific-research.html; http://www.imf.org/external/pubs/ft/weo/2015/02/weodata/weoselgr.aspx)

6.1.5 Citable documents H index

The H index is the economy's number of published articles (H) that have received at least H citations in the period 1996–2014*a | 2015

The H index is an economy's number of published articles (H) that have received at least H citations in the period 1996–2014. It quantifies both country scientific productivity and scientific impact and is also applicable to scientists, journals, etc. The SCImago Journal & Country Rank is a portal that includes journal and economy scientific indicators developed from the information contained in the Scopus® database (Elsevier B.V.). This platform takes its name from the SCImago Journal Rank (SJR), developed by SCImago from the algorithm Google PageRank™. The H index is tabulated from the number of citations received in subsequent years by articles published in a given year, divided by the number of articles published that year.

Source: SCImago (2016) SJR—SCImago Journal & Country Rank. Retrieved February 2016. (http://www.scimagojr.com)

6.2 Knowledge impact

6.2.1 Growth rate of GDP per person engaged

Growth rate of GDP per person engaged (constant 1990 PPP$) | 2014

Growth of gross domestic product (GDP) per person engaged provides a measure of labor productivity (defined as output per unit of labor input). GDP per person employed is GDP divided by total employment in the economy. PPP$ GDP is converted to 1990 US$, converted at Geary Khamis PPPs.

Source: The Conference Board Total Economy Database™ Output, Labor and Labor Productivity, 1950–2015, September 2015. (https://www.conference-board.org/data/economydatabase/)

6.2.2 New business density

New business density (new registrations per thousand population 15–64 years old)[a] | 2014

Number of new firms, defined as firms registered in the current year of reporting, per thousand population aged 15–64 years old.

Source: World Bank, Doing Business 2016, Entrepreneurship (2009–14). (http://www.doingbusiness.org/data/exploretopics/entrepreneurship)

6.2.3 Total computer software spending

Total computer software spending (% of GDP)[a] | 2015

Computer software spending includes the total value of purchased or leased packaged software such as operating systems, database systems, programming tools, utilities, and applications. It excludes expenditures for internal software development and outsourced custom software development. The data are a combination of actual figures and estimates. Data are reported as a percentage of GDP.

Source: IHS Global Insight, Information and Communication Technology Database; International Monetary Fund, World Economic Outlook 2015 Database, October 2015 (current US$ GDP). (https://www.ihs.com/industry/economics-country-risk.html; http://www.imf.org/external/pubs/ft/weo/2015/02/weodata/weoselgr.aspx)

6.2.4 ISO 9001 quality certificates

ISO 9001 Quality management systems—Requirements: Number of certificates issued (per billion PPP$ GDP)[a] | 2014

ISO 9001:2015 sets out the criteria for a quality management system and is the only standard in the family that can be certified to (although this is not a requirement). It can be used by any organization, large or small, regardless of its field of activity. In fact, there are over 1 million companies and organizations in over 170 countries certified to ISO 9001. This standard is based on a number of quality management principles including a strong customer focus, the motivation and implication of top management, the process approach, and continual improvement. These principles are explained in more detail in the ISO 9001 Quality Management Principles. Using ISO 9001:2015 helps ensure that customers get consistent, good quality products and services, which in turn brings many business benefits. Single-site and multiple-site certificates are not distinguished. The data are reported per billion PPP$ GDP. Refer to indicator 3.3.3 for more details.

Note: ISO 9001 Quality Management Systems has recently been revised. Information about the revision is available at http://www.iso.org/iso/home/standards/management-standards/iso_9000/iso9001_revision.htm.

Source: International Organization for Standardization (ISO), The ISO Survey of Management System Standard Certifications, 1993–2014; International Monetary Fund, World Economic Outlook database, October 2015 (PPP$ GDP) (2014). (http://www.iso.org; http://www.imf.org/external/pubs/ft/weo/2015/02/weodata/weoselgr.aspx)

6.2.5 High-tech and medium-high-tech output

High-tech and medium-high-tech output (% of total manufactures output)[a] | 2012

High-tech and medium-high-tech output as a percentage of total manufactures output, on the basis of the Organisation for Economic Co-operation and Development (OECD) classification of Technology Intensity Definition, itself based on International Standard Industrial Classification ISIC Revision 3.

Source: United Nations Industrial Development Organization (UNIDO), Industrial Statistics Database, 3- and 4-digit level of International Standard Industrial Classification ISIC Revision 3 (INDSTAT4 2012); OECD, Directorate for Science, Technology and Industry, Economic Analysis and Statistics Division, 'ISIC REV. 3 Technology Intensity Definition: Classification of Manufacturing Industries into Categories Based on R&D Intensities', 7 July 2011 (2006–12). (http://www.unido.org/statistics.html; http://unstats.un.org/unsd/cr/registry/regcst.asp?cl=27; http://www.oecd.org/sti/ind/48350231.pdf)

6.3 Knowledge diffusion

6.3.1 Intellectual property receipts

Charges for use of intellectual property n.i.e., receipts (%, total trade)[a] | 2014

Charges for the use of intellectual property not included elsewhere receipts (% of total trade) according to the Extended Balance of Payments Services Classification EBOPS 2010—that is, code SH Charges for the use of intellectual property not included elsewhere as a percentage of total trade. 'Total trade' is defined as the sum of total imports code G goods and code SOX commercial services (excluding government goods

and services not included elsewhere) plus total exports of code G goods and code SOX commercial services (excluding government goods and services not included elsewhere), divided by 2. According to the sixth edition of the International Monetary Fund's *Balance of Payments Manual*, the item 'Goods' covers general merchandise, net exports of goods under merchanting and nonmonetary gold. The 'commercial services' category is defined as being equal to 'services' minus 'government goods and services not included elsewhere'. Receipts are between residents and nonresidents for the use of proprietary rights (such as patents, trademarks, copyrights, industrial processes, and designs including trade secrets, franchises), and for licenses to reproduce or distribute (or both) intellectual property embodied in produced originals or prototypes (such as copyrights on books and manuscripts, computer software, cinematographic works, and sound recordings) and related rights (such as for live performances and television, cable, or satellite broadcast).

Source: World Trade Organization, Trade in Commercial Services database, based on the sixth (2009) edition of the International Monetary Fund's Balance of Payments Manual and Balance of Payments database (2007–14). (http://stat.wto.org/StatisticalProgram/WSDBStatProgramSeries.aspx; http://www.oecd.org/std/its/EBOPS-2010.pdf)

6.3.2 High-tech exports

High-tech net exports (% of total trade)[3] | 2014

High-technology exports minus re-exports (% of total trade). See indicator 5.3.2 for details.

Source: United Nations, COMTRADE database; Eurostat, 'High-technology' aggregations based on SITC Rev. 4, April 2009 (2008–14). (http://comtrade.un.org/; http://ec.europa.eu/eurostat/cache/metadata/Annexes/htec_esms_an5.pdf)

6.3.3 ICT services exports

Telecommunications, computers, and information services exports (% of total trade)[3] | 2014

Telecommunications, computer and information services (% of total trade) according to the Extended Balance of Payments Services Classification EBOPS 2010, coded SI: Telecommunications, computer and information services.

Source: World Trade Organization, Trade in Commercial Services database, based on the sixth (2009) edition of the International Monetary Fund's Balance of Payments Manual and Balance of Payments database (2009–14). (http://stat.wto.org/StatisticalProgram/WSDBStatProgramSeries.aspx; http://www.oecd.org/std/its/EBOPS-2010.pdf)

6.3.4 Foreign direct investment net outflows

Foreign direct investment (FDI), net outflows (% of GDP) | 2014

This refers to net outflows of investment to acquire a lasting management interest (10% or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This data series shows net outflows of investment from the reporting economy to the rest of the world and is divided by GDP.

Source: World Trade Organization, Trade in Commercial Services database, based on the sixth (2009) edition of the International Monetary Fund's Balance of Payments Manual and Balance of Payments database (2010–14). (http://stat.wto.org/StatisticalProgram/WSDBStatProgramSeries.aspx; http://www.oecd.org/std/its/EBOPS-2010.pdf)

7 Creative outputs

7.1 Intangible assets

7.1.1 Trademark application class count by origin

Number of trademark applications issued to residents at a given national or regional office (per billion PPP$ GDP) | 2014

The count of trademark applications is based on the total number of goods and services classes specified in resident trademark applications filed at a given national or regional office in 2015. Data refer to trademark application class counts—the number of classes specified in resident trademark applications—and include those filed at both the national office and the regional office, where applicable. Data are scaled by PPP$ GDP (billions). A 'trademark' is a sign used by the owner of certain products or provider of certain services to distinguish them from the products or services of other companies. A trademark can consist of words and/or combinations of words, such as slogans, names, logos, figures and images, letters, numbers, sounds and moving images, or a combination thereof. The procedures for registering trademarks are governed by the legislation and procedures of national and regional IP offices. Trademark rights are limited to the jurisdiction of the IP office that registers the trademark. Trademarks can be registered by filing an application at the relevant national or regional office(s) or by filing an international application through the Madrid System. A resident trademark application is one that is filed with an IP office or an office acting on behalf of the state or jurisdiction in which the applicant has residence. For example, an application filed with the Japan Patent Office (JPO) by a resident of Japan is considered a resident application for Japan. Similarly, an application filed with the Office for Harmonization in the Internal Market (OHIM) by an applicant who resides in any of the EU member states, such as France, is considered a resident application for that member state (France).

Source: World Intellectual Property Organization, WIPO Statistics Database; International Monetary Fund, World Economic Outlook Database, October 2015 (PPP$ GDP) (2010–14). (http://www.wipo.int//ipstats/; http://www.imf.org/external/pubs/ft/weo/2015/02/weodata/weoselgr.aspx)

7.1.2 Industrial designs by origin

Number of designs contained in industrial design applications filed at a given national or regional office (per billion PPP$ GDP)[3] | 2014

This indicator refers to the number of designs contained in industrial design applications filed at a given national or regional office in 2014. Data refer to industrial design application design counts—the number of designs contained in applications—and include designs contained in resident industrial design applications filed at both the national office and at the regional office, where applicable. 'Resident design counts' refers to the number of designs contained in applications filed with the IP office of or at an office acting on behalf of the state or jurisdiction in which the applicant has residence. For example, an application filed with the Japan Patent Office (JPO) by a resident of Japan is considered a resident application for Japan. Similarly, an application filed with OHIM by an applicant who resides in any of the OHIM member state, such as Italy, is considered as a resident application for that member state (Italy).

Source: World Intellectual Property Organization, WIPO Statistics Database; International Monetary Fund, World Economic Outlook Database, October 2015 (PPP$ GDP) (2010–14). (http://www.wipo.int//ipstats/; http://www.imf.org/external/pubs/ft/weo/2015/02/weodata/weoselgr.aspx)

7.1.3 ICTs and business model creation

Average answer to the question: In your country, to what extent do ICTs enable new business models? [1 = not at all; 7 = to a great extent]† | 2015

Source: World Economic Forum, Executive Opinion Survey 2014–2015. (http://reports.weforum.org/global-competitiveness-report-2015-2016/)

7.1.4 ICTs and organizational model creation

Average answer to the question: In your country, to what extent do ICTs enable new organizational models (e.g., virtual teams, remote working, telecommuting) within companies? [1 = not at all; 7 = to a great extent]† | 2015

Source: World Economic Forum, Executive Opinion Survey 2014–2015. (http://reports.weforum.org/global-competitiveness-report-2015-2016/)

7.2 Creative goods and services

7.2.1 Cultural and creative services exports

Cultural and creative services exports (% of total trade)[a] | 2014

Creative services exports (% of total exports) according to the Extended Balance of Payments Services Classification EBOPS 2010—that is, EBOPS code SI3 Information services; code SJ22 Advertising, market research, and public opinion polling services; code SK1 Audiovisual and related services; and code SK24 Other personal cultural and recreational services as a percentage of total trade. The score for the United States of America (USA) includes the category Movies & TV programming in the absence of available data for code SK1 Audiovisual and related services. The category Movies & TV programming is specific to the USA in BPM6 statistics and does not have a code.

Source: World Trade Organization, Trade in Commercial Services database, based on the sixth (2009) edition of the International Monetary Fund's Balance of Payments Manual and Balance of Payments database (2011–14). (http://stat.wto.org/StatisticalProgram/WSDBStatProgramSeries.aspx; http://www.oecd.org/std/its/EBOPS-2010.pdf)

7.2.2 National feature films produced

Number of national feature films produced (per million population 15–69 years old)[a] | 2013

A film with a running time of 60 minutes or longer. It includes works of fiction, animation, and documentaries. It is intended for commercial exhibition in cinemas. Feature films produced exclusively for television broadcasting, as well as newsreels and advertising films, are excluded. Data are reported per million population 15–69 years old. For Cambodia and Cameroon, this indicator covers only feature films in video format; for Slovenia, feature films with a running time of 75 minutes or longer.

Source: UNESCO Institute for Statistics, UIS online database; United Nations, Department of Economic and Social Affairs, Population Division, World Population Prospects: The 2015 Revision (population) (2006–13). (http://stats.uis.unesco.org; http://esa.un.org/unpd/wpp/)

7.2.3 Global entertainment and media market

Global entertainment and media market (per thousand population 15–69 years old)*[a] | 2014

The Global entertainment and media outlook (the Outlook) provides a single comparable source of five-year forecast and five-year historic consumer and advertiser spending data and commentary, for 13 entertainment and media segments, across 61 countries. The data and intuitive online functionality allows one to easily browse, compare and contrast spending, and create charts and graphs. The segments covered by the Outlook are book publishing, business-to-business, filmed entertainment, Internet access, Internet advertising, magazine publishing, music, newspaper publishing, out-of-home advertising, radio, TV advertising, TV subscriptions and license fees, and video games. The score and rankings for the Global Media Expenditures for the 60 countries considered in the Outlook report are based on advertising and consumer digital and non-digital data in US$ millions at average 2014 exchange rates for the year 2014. These results are reported normalized per thousand population, 15–69 years old, for the year 2014. The figures for Algeria, Bahrain, Jordan, Kuwait, Lebanon, Morocco, Oman, and Qatar were estimated from a total corresponding to Middle East and North Africa (MENA) countries using a breakdown of total GDP (current US$) for the above-mentioned countries to define referential percentages.

Source: The source of the data for the base of these calculations was derived from PwC's Global entertainment and media outlook, 2015–2019; United Nations, Department of Economic and Social Affairs, Population Division, World Population Prospects: The 2015 Revision (population). (http://www.pwc.com/outlook; http://stats.uis.unesco.org; http://esa.un.org/unpd/wpp/)

7.2.4 Printing and publishing output

Printing and publishing manufactures output (% of manufactures total output) | 2012

Publishing, printing, and reproduction of recorded media output (ISIC Rev. 3 code 22) as a percentage of total manufacturing output (ISIC rev.3 code D).

Source: United Nations Industrial Development Organization, Industrial Statistics Database; 2-digit level of International Standard Industrial Classification ISIC Revision 3 (INDSTAT2 2015) (2006–12). (http://www.unido.org/statistics.html; http://unstats.un.org/unsd/cr/registry/regcst.asp?cl=2)

7.2.5 Creative goods exports

Creative goods exports (% of total trade) | 2014

Total value of creative goods exports, net of re-exports (current US$) over total trade. 'Total trade' is defined as the sum of total imports code G goods and code SOX commercial services (excluding government goods and services not included elsewhere) plus total exports of code G goods and code SOX commercial services (excluding government goods and services not included elsewhere), divided by 2. According to the sixth edition of the International Monetary Fund's *Balance of Payments Manual*, the item 'Goods' covers general merchandise, net exports of goods under merchanting and non-monetary gold. The 'commercial services' category is defined as being equal to 'services' minus 'government goods and services not included elsewhere'.

Source: United Nations, COMTRADE database; 2009 UNESCO Framework for Cultural Statistics, Table 3, International trade of cultural goods and services based on the 2007 Harmonised System (HS 2007); World Trade Organization, Trade in Commercial Services database, itself based on the sixth (2009) edition of the International Monetary Fund's Balance of Payments Manual and Balance of Payments database (2011–14). (http://unctadstat.unctad.org/; http://www.uis.unesco.org/culture/Documents/framework-cultural-statistics-culture-2009-en.pdf; http://stat.wto.org/StatisticalProgram/WSDBStatProgramSeries.aspx)

7.3 Online creativity

7.3.1 Generic top-level domains (gTLDs)

Generic top-level domains (gTLDs) (per thousand population 15–69 years old) | 2015

A generic top-level domain (gTLD) is one of the categories of top-level domains (TLDs) maintained by the Internet Assigned Numbers Authority (IANA) for use in the Internet. Generic TLDs can be unrestricted (com, info, net, and org) or restricted—that is, used on the basis of fulfilling eligibility criteria (biz, name, and pro). Of these, the statistic covers the five generic domains biz, info, org, net, and com. Generic domains .name and .pro, and sponsored domains (arpa, aero, asia, cat, coop, edu, gov, int, jobs, mil, museum, tel, travel, and xxx) are not included. Neither are country-code top-level domains (refer to indicator 7.3.2). The statistic represents the total number of registered domains (i.e., net totals by December 2015, existing domains + new registrations – expired domains). Data are collected on the basis of a 4% random sample of the total population of domains drawn from the root zone files (a complete listing of active domains) for each TLD. The geographic location of a domain is determined by the registration address for the domain name registrant that is returned from a whois query. These registration data are parsed by country and postal code and then aggregated to any number of geographic levels such as county, city, or country/economy. The original hard data were scaled by thousand population 15–69 years old. For confidentiality reasons, only normalized values are reported; while relative positions are preserved, magnitudes are not.

Source: ZookNIC Inc; United Nations, Department of Economic and Social Affairs, Population Division, World Population Prospects: The 2015 Revision (population). (http://www.zooknic.com; http://esa.un.org/unpd/wpp/Excel-Data/population.htm)

7.3.2 Country-code top-level domains (ccTLDs)

Country-code top-level domains (ccTLDs) (per thousand population 15–69 years old) | 2015

A country-code top-level domain (ccTLD) is one of the categories of top-level domains (TLDs) maintained by the Internet Assigned Numbers Authority (IANA) for use in the Internet. Country-code TLDs are two-letter domains especially designated for a particular economy, country, or autonomous territory (there are 324 ccTLDs, in various alphabets/characters). The statistic represents the total number of registered domains (i.e., net totals by December 2015, existing domains + new registrations – expired domains). Data are collected from the registry responsible for each ccTLD and represent the total number of domain registrations in the ccTLD. Each ccTLD is assigned to the country with which it is associated rather than based on the registration address of the registrant. ZookNIC reports that, for the ccTLDs it covers, 85–100% of domains are registered in the same country; the only exceptions are the ccTLDs that have been licensed for commercial worldwide use. Of this year's GII sample of countries, this is the case for the ccTLDs of the following economies: Armenia am, Austria at, Belarus by, Belgium be, Canada ca, Colombia co, Finland fi, Iceland is, India in, Iran ir, Italy it, Latvia lv, Mauritius mu, Moldova md, Mongolia mn, Montenegro me, Nicaragua ni, Serbia rs, Slovenia si, Spain es, and Switzerland ch (this list is based on www.wikipedia.org). Data are reported per thousand population 15–69 years old. For confidentiality reasons, only normalized values are reported; while relative positions are preserved, magnitudes are not.

Source: ZookNIC Inc; United Nations, Department of Economic and Social Affairs, Population Division, World Population Prospects: The 2015 Revision (population). (http://www.zooknic.com; http://esa.un.org/unpd/wpp/Excel-Data/population.htm)

7.3.3 Wikipedia monthly edits

Wikipedia monthly page edits (per million population 15–69 years old) | 2014

Data extracted from Wikimedia Traffic Analysis Report, Wikipedia Page Edits per Country, Overview on the portal http://www.wikipedia.org. The count of monthly page edits data is based on a 1:1,000 sampled server log (squids), averages of quarterly reports. Countries are included only if the number of page edits in the period exceeds 100,000 (100 matching records in 1:1,000 sampled log). Page edits by bots are not included. Also all IP addresses that occur more than once on a given day are discarded for that day. A few false negatives are taken for granted. Data are reported per million population 15–69 years old.

Source: Wikimedia Foundation; United Nations, Department of Economic and Social Affairs, Population Division, World Population Prospects: The 2012 Revision (population). (http://stats.wikimedia.org/wikimedia/squids/SquidReportsCountriesLanguagesVisitsEdits.htm; http://esa.un.org/unpd/wpp/Excel-Data/population.htm)

7.3.4 Video uploads on YouTube

Number of video uploads on YouTube (scaled by population 15–69 years old) | 2015

Total number of video uploads on YouTube, per country, scaled by population 15–69 years old. The raw data are survey based: the country of affiliation is chosen by each user on the basis of a multi-choice selection. This metric counts all video upload events by users. For confidentiality reasons, only normalized values are reported; while relative positions are preserved, magnitudes are not.

Source: Google, parent company of YouTube; United Nations, Department of Economic and Social Affairs, Population Division, World Population Prospects: The 2015 Revision (population). (http://www.youtube.com; http://esa.un.org/unpd/wpp/Excel-Data/population.htm; http://www.comscore.com/Industries/Media)

Acknowledgement

Sincere thanks to Mr. Janak Nabar and Ms. Amrita Brahmo of the Centre for Technology, Innovation and Economic Research (CTIER), Pune towards the production of this report particularly in data analysis, providing research inputs and drafting of this report.


cipam
Creative India
Innovative India