iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 5 **Issue:** XI **Month of publication:** November 2017

DOI:

www.ijraset.com

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor:6.887
Volume 5 Issue XI November 2017- Available at www.ijraset.com

Role of Human Capital and Innovation in Economic Growth: Comparative Study of India and China

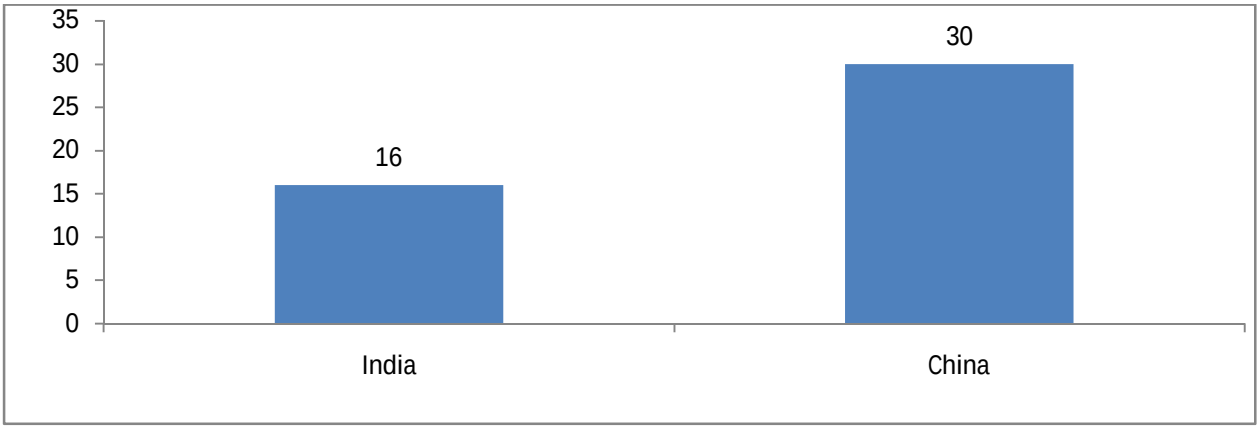
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Abstract: ***The paper evaluates the role of human capital and innovation in economic growth. Human capital and innovation has become crucial for economic growth in the globalized economy. The study compares human capital, innovation parameters and GDP for India and China. Secondary data is used for the study. Patent and GDP data is considered from 2001 to 2015. It is found that China has focused on education and innovation to support aggressive growth oriented policies. A significant positive correlation was found between patent and GDP in India and China. Patent growth rate showed significant differences between India and China. The demographic profile, political activism, and judicious use of information technology can strengthen the innovation ecosystem and economic growth in India.***
Keywords: Human Capital, Innovation, Patent, Education, Economy, China, India

I. INTRODUCTION

India ranked131 in human development index 2016, lowest among the BRICS counties. Rank of other BRICS countries was significantly better than India. Russia ranked 49th, Brazil-79th, China- 90th and South Africa secured119th rank (UNDP, 2017).
Manufacturing is strength for China, and on the other hand despite several policies, contribution of manufacturing in GDP of India is stagnant. The government has set an ambitious target of increasing the contribution of manufacturing from 16% to 25% by 2025 (ibef, 2017)
The Make in India initiative launched by Prime Minister Mr. Narendra Modi was a move to improve contribution of manufacturing sector in GDP of the country. The dream of inclusive growth cannot be realized only with dependence on service sector. The role of manufacturing sector in fast economic growth has been demonstrated by China. The contribution of manufacturing sector in China is 30% as compared to just 13% in India (Einhorn, 2014) as shown in figure1. India exported $15 billion of goods to China and imported $51 billion in 2013 (Mehra, 2014).

Figure 1: Contribution of Manufacturing Sector in GDP



Source: Einhorn, 2014, India Brand Equity Foundation 2017

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II. OBJECTIVES

A. Compare human capital in India and China
B. Examine the correlation of patent and GDP for India and China

III. LITERATURE REVIEW

Fan (2011) evaluated the role of innovation in economic growth of India and China. Data from 1980 to 2004 was considered. It was argued that innovation capacity has become crucial for firm's success and national level policies influence innovation at firm level.
Mehta (2016) examined between innovation and employment in four industry sectors; pharmaceuticals, transport, ferrous metals and textiles for the period 2000-01 to 2013-14. It was found that product innovation has a positive impact on employment in different industries. It was argued that for long term growth and development, innovation ecosystem is required.
Pansera and Martinez (2016)examined role of innovation for poverty reduction. It was opined that innovation has transformed from role of development cooperation to development of competition. It was further argued that innovation is survival, subsistence and sustainable development though constructive role of diversity.
Ojha and Singhal (2016) examined economic growth trajectory of India and China. It was argued that in 1979 both countries had similar living standards. Later China went on aggressively and tripled per capita income in first 25 years of reform, while India could only double it during those years. It was argued that young population if not skilled properly would lead to socioeconomic challenges. Competing on low labor costs will not sustain for India, as poor support for reskilling would lead to industrial disputes hampering productivity for industry. It was concluded that human development should not be left only to government, it should be everyone agenda.

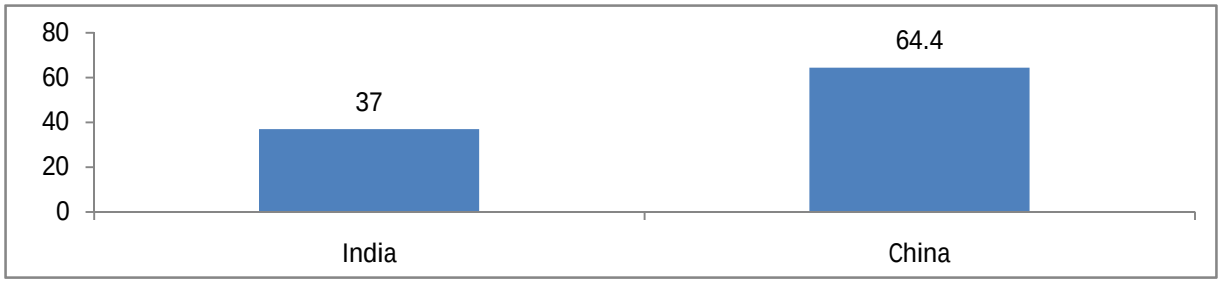
IV. RESEARCH METHODOLOGY

The descriptive research approach was used for the study. Secondary data was used. Data was obtained from reliable published sources. For 2nd objective secondary data of patents and GDP was obtained from World Intellectual Property Organization. Data from 2001to 2015 was considered for the study. Data was analyzed using descriptive statistics and correlation.

A. Findings

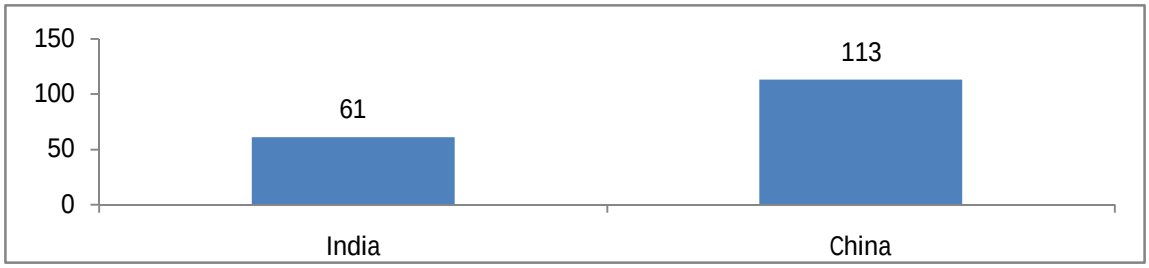
The success of China in manufacturing sector is not by chance but a result of policy, political willpower, human capital, and business friendly labor policies. The comparison provides comparison on human capital. The literacy rate in China was 64.4% against 37% in India in 1982 as shown in figure 2(Madhavan, 2013).

Figure 2: Literacy Rates of India and China (1980)



Source: Madhavan, 2013

Figure 3: Gender Equality of India and China



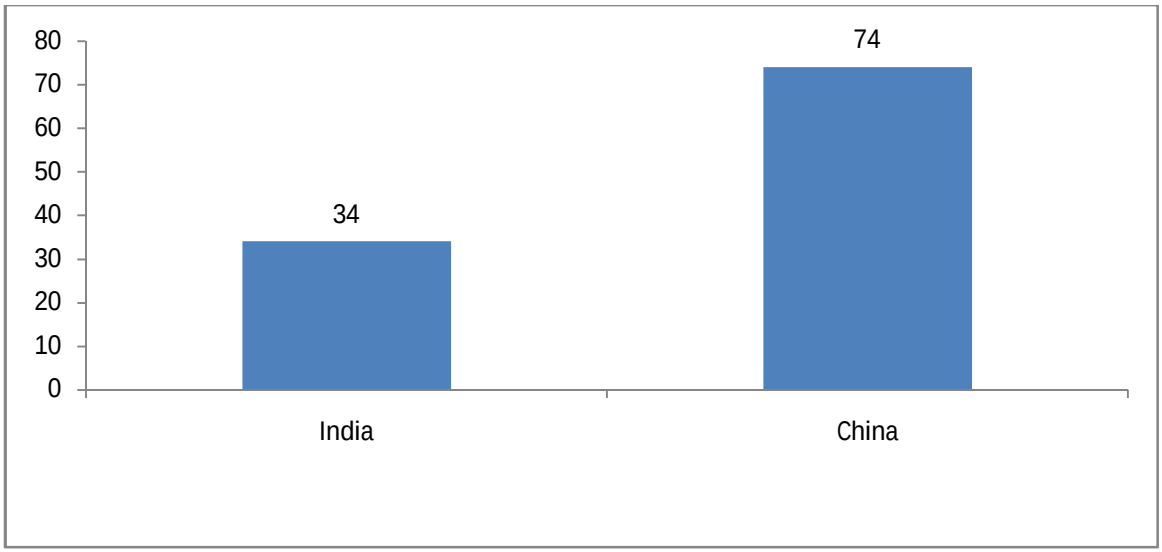
Source: Madhawan, 2013

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The gender equality of China was almost twice as better as India. China was ranked 61st in gender equality as against 113 for India among 134 countries (Madhavan, 2013) as shown in figure 3.

The labor force participation of Women in China is more than double of participation rate in India. The labor force participation in China is 74% while it is only 34% in India (Madhawan, 2013) as depicted in figure 4.

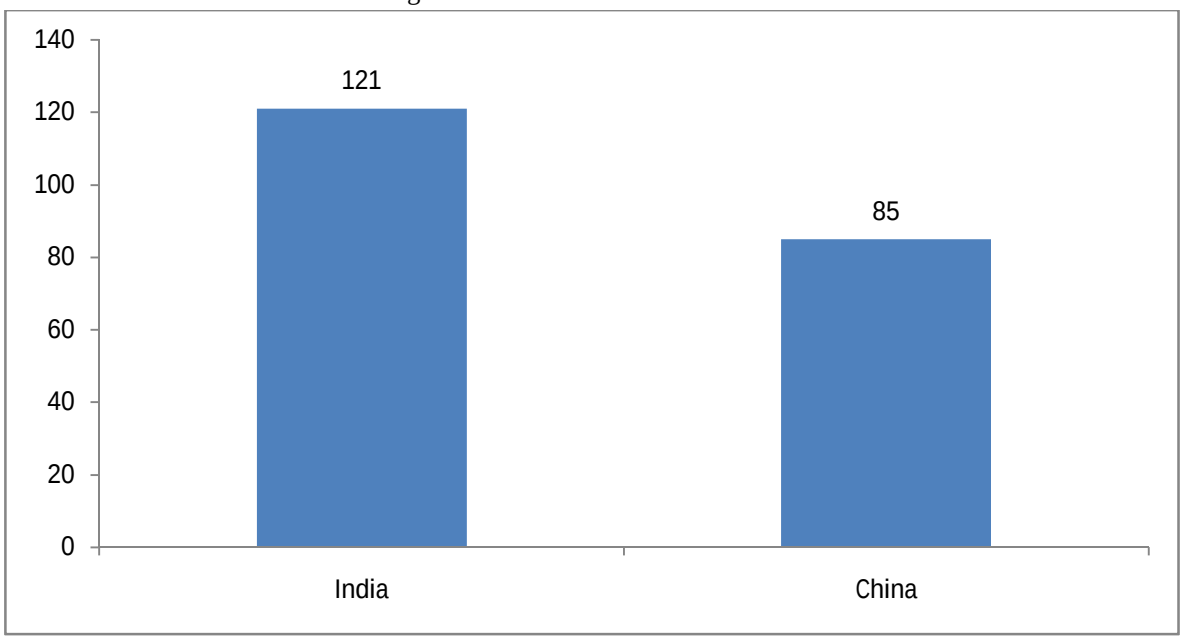
Figure 4: Labor Force Participation by Women



Source: Madhawan, 2013

Rank of China 85 in women education as compared to 121of India (Madhawan, 2013). Figure 5 shows the rank comparison.

Figure 5: Rank in Women's Education



Source: Madhavan, 2013

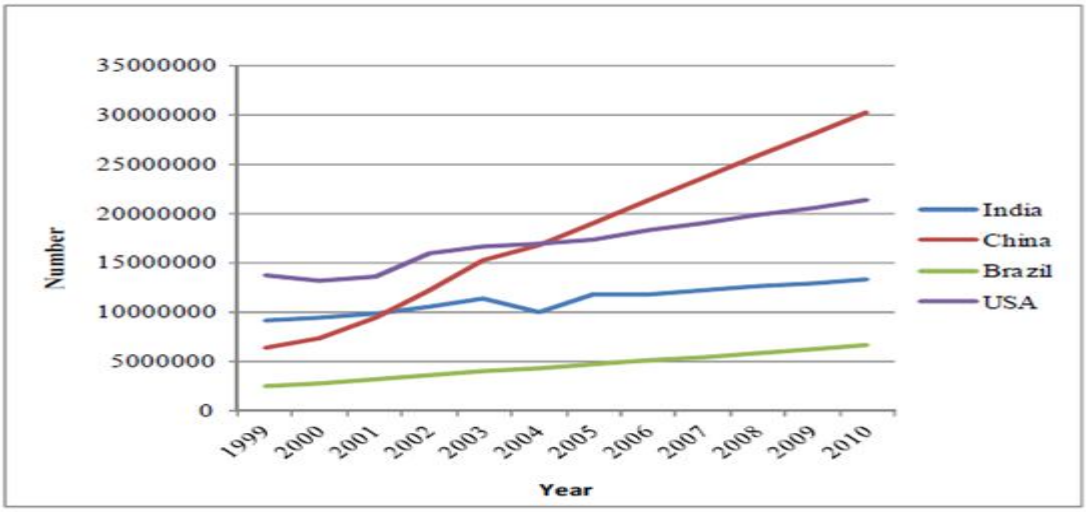
B. Higher education

The economic success of China can be attributed right policies supported by education system.

In the period before 2000 India was ahead of China in higher education..

Figure 6: Enrollment at Tertiary Level

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Source: UNESCO as cited by Goswami

While India ignored higher education, China worked hard to strengthen the education system. Now China is way ahead of India in higher education as shown in figure. China has 26% enrollment in higher education as compared to just 18% in India (Avery, 2013). The shortage of faculties is another major challenge in Indian higher education system. The faculty shortage will be 1.38 million by 2020 (Kabir, Saxena, 2012) as shown in table 1. Teaching has lost attractiveness as profession of first choice by talent students. The problem should be corrected by providing decent salaries and good working conditions comparable with global standards and attracting faculties from other countries to change the work culture.

Table 1: Gap in Faculty Resources

Particulars	2012	2020
	millions	Millions
No. of Students	16.9	31.9
UG	14.6	27.4
PG	2.3	4.5
Faculty Student Ratio(As per UGC guidelines)		
UG	15	15
PG	12	12
Faculty Required		
UG	0.97	1.82
PG	0.19	0.37
Total	1.16	2.19
Current Faculty	0.81	
Faculty Shortage	0.35	1.38
Annual Faculty Requirement (Till 2020)		0.17

Source: Kabir, Saxena 2012

The bill to allow foreign universities in India was presented in Parliament in 1995, but till date it not passed. The ignorance of higher education has led to a situation of oversupply of poor quality institutions and poor employability of graduates.

C. Innovation

The rank of China in global innovation index 2017 is 22, whereas India ranks 66nd in the ranking (wipo, 2017).

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Table 2: Correlation of Patents and GDP for India

Correlations			
		Indian Patent	Indian GDP
Indian Patent	Pearson Correlation	1	.997**
	Sig. (2-tailed)		.000
	N	15	15
**. Correlation is significant at the 0.01 level (2-tailed).			

It was found that a significant positive correlation exists between patent and GDP in India. Pearson correlation was found as 0.997 and P value was obtained as 0.000.

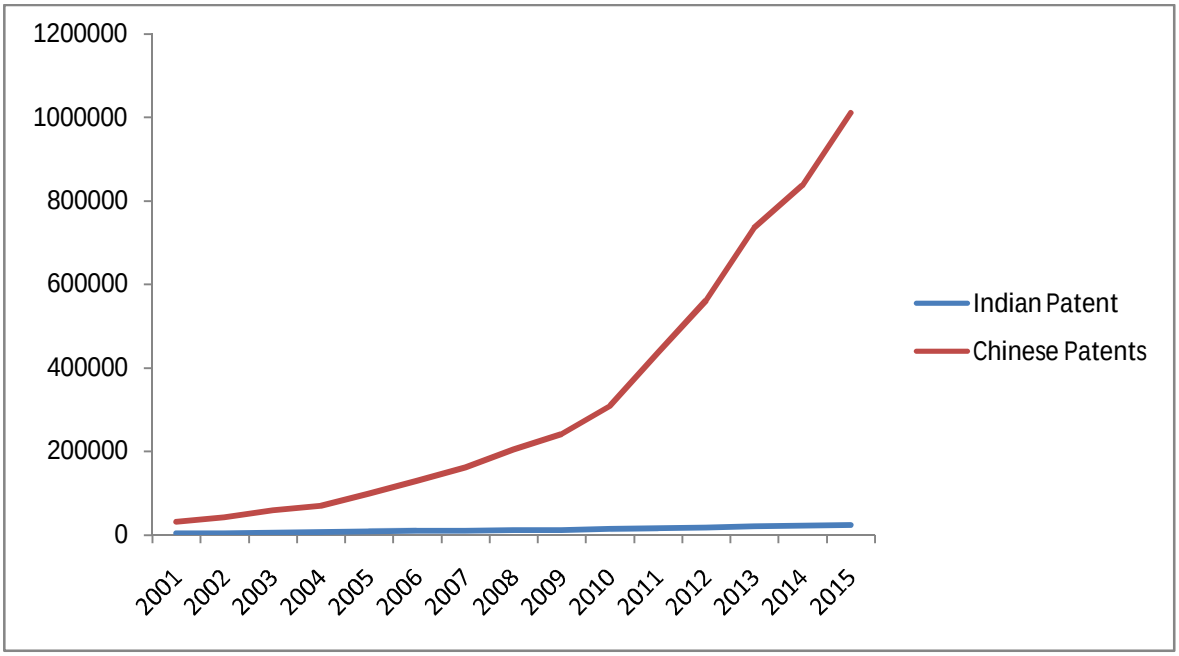
Table 3: Correlation of Patents and GDP for China

Correlations			
		Chinese Patent	Chinese GDP
Chinese Patent	Pearson Correlation	1	.957**
	Sig. (2-tailed)		.000
	N	15	15
**. Correlation is significant at the 0.01 level (2-tailed).			

Similar results were found for China. A significant positive correlation was found between patents and gross domestic product. The Pearson correlation was obtained as 0.957, and P value was obtained as 0.000.

As shown in figure 7 there is a sharp rise in number of patents by China from 2010, whereas for India the trend is almost flat. It indicates that China has been focusing on innovation along with infrastructure and cost competitiveness for economic growth, as compared to India, which is comparatively lagging behind in innovation and relying more on FDI and superficial policy reforms.

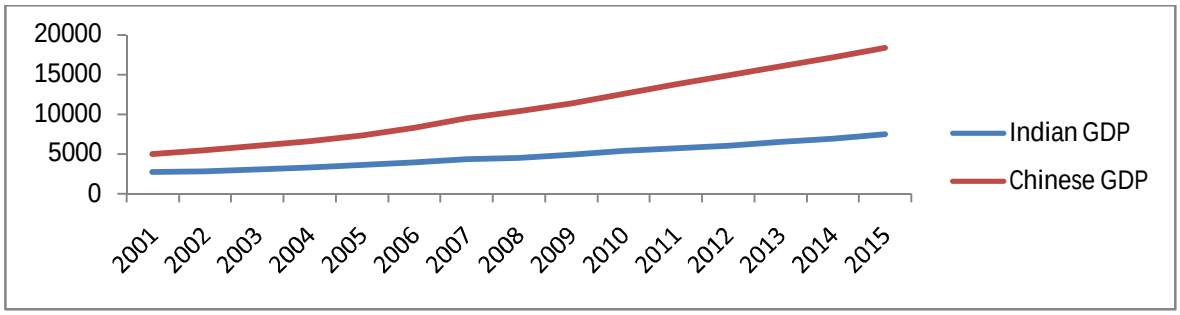
Figure 7: Trend of Patents for India and China



Source: World Intellectual Property Organization, 2016

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Figure 8: Trend of GDP of India and China ($ billion)



Source: World Intellectual Property Organization, 2016

It is observed that there is a rapid growth in GDP in China from 2010, whereas the India had shown comparatively less aggressive growthGDP.

Table 4: T test for Patent Growth Rate (2001-2015)

Group Statistics						T Value	P Value
	Country	N	Mean	Std. Deviation	Std. Error Mean		
PatentGrowthRate	India	14	.1514	.07921	.02117	-4.157	0.000
	China	14	.2857	.09129	.02440		

There is a significant difference (P value <0.05) between patent growth rate of China and India during 2001 and 2015. China is significantly better than India in terms of patent growth rate.

The information technology revolution provides India an opportunity to reform the delivery mechanism of higher education, networking of researchers with stakeholders and knowledge creation to develop robust innovation ecosystem. The online courses should be promoted so that the enrollment rate can be increased and higher education will become accessible to a large number of aspiring students. To monitor quality the premier institutions should be motivated to play a constructive role in evaluation of content, assessments and training of teachers.

V. CONCLUSION

The study found a significant positive correlation between patents and gross domestic product in India and China. China is way ahead of India, getting 42 times more patents as compared to India. To improve economic growth, India should improve the innovation ecosystem to take the economy to next level and compete globally.

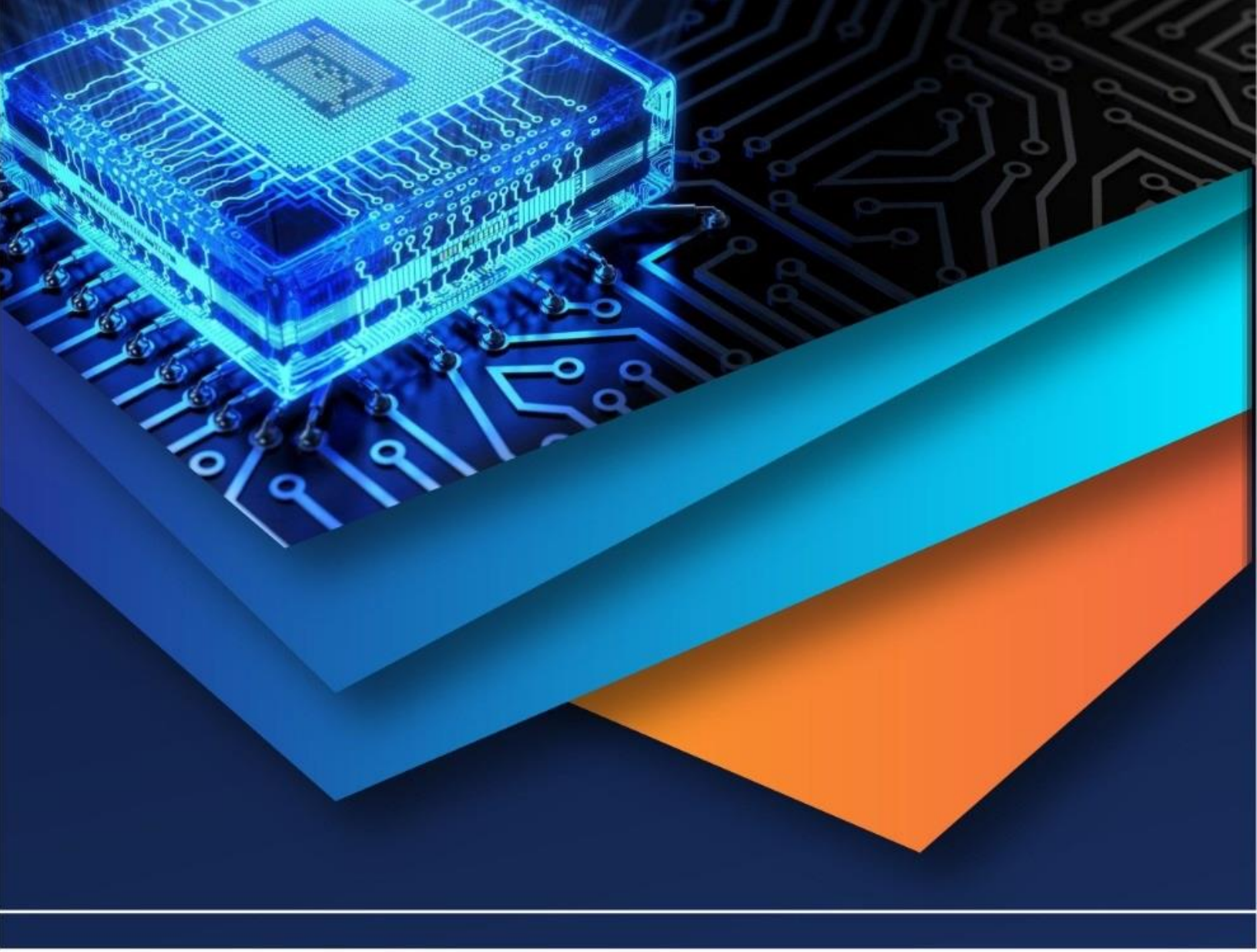
The Make in India, demonetization, digital India and other policy initiatives of government are steps in the right direction, to strengthen the economy of India. But just fewcampaigns will not change the scenario, unless these initiatives are supported by competent human capital. Similar efforts were made earlier by UPA government when the intention of making 2006-15 as decade of manufacturing, but situation did not improve. However India has got another chance to revive the economic growth and human development with the presence of growth oriented political leadership led by visionary Prime Minister Mr. NarendraModi. The performance of BJP government in few years after 2014 has created a positive sentiment in corporate world about economic growth, innovation and human development. Thechange in FDI polices to attract the investments in manufacturing sector will provide the funds for the manufacturing sector along with better management practices and scale of operations critical to make India a hub for manufacturing sector. The higher education should be delivered by online medium for rural, semi urban students and those working in industry. The salary of teachers should be result oriented and incentive schemes should be introduced for teachers producing good quality research papers and providing useful inputs in patenting, entrepreneurship and consultancy. Focus on human capital along with political activism will provide the opportunity to reap the benefits of demographic dividend, political dividend, and political synergy to transform India as an economic super power.

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