Assessing the Impact of innovation on growth& economy: A comparative study of India, China and US

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Abstract:

Innovation has driven the United States and now US become most dominant and powerful economy, but due to the globalization, there is a swift growth in the economies in the other part of the world—particularly in China and India. Also, both India and China are gradually becoming engines of growth and global economy and become the highestemergent economies having high GDP rates. This paper is a detailed study of the seven factors (like the economy, culture, government policies, infrastructure, education, demography, and market structure) that drive growth and innovation of India, China and US. In most of the cases the US leads followed by China and then India but in the case of demography, the US and China are both ageings, and especially from an age viewpoint, the plus point go to India. Still, both India and China have vast challenges with the education quality and literacy levels of the personnel in general.

Keywords: Comparative study, Growth, Innovation, review, India, China, United States (US).

1. INTRODUCTION:

Western world has changed because of theInnovation, Development, and industrialization, and particularly the US, from horticultural economy, through the industrial and commercial Revolution into the high-end R&D. The impact of high-end R&D changes the US into the most powerful and dominant economy of today's world with the highest GDP (Mannan, Khurana and Haleem, 2015). However, globalisation and information revolution that we are facing today are also changing the world. Due to thistransformation, there is ease of global travel, rapid andeasy access to information, change in fundamental economics and opening up of societies.The most noteworthy among these transformations is the swift growth in the economies in other parts of the world like China and India.

Figure. 1 shows the radar diagram.It shows the ranking of the 3 countries according to the12 factors.Out of 144 countries, US ranks 7th in the Global Competitiveness Index (GCI), while India 51stand China ranks 29th. The overall GCI score for India is 4.3, for China it is 4.8 and for theUS it is 5.5.

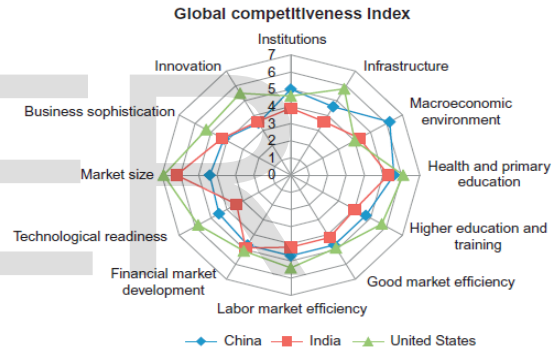

Figure 1: World Economic Forum, Global Competitiveness Index (GCI2012–13).

US is characterised as an "innovation-driven" economy by World Economic Forum for 2012–2013, whereas China is designated as "efficiency-driven" and India is described as "factor-driven". Both China and Indiahave a requirement to catch up in nearly all the input parameters or the indicators as compared to the US. Technically, India look as if itlags behind the China and the US, even though market size is ahead of China.

Li (2013) is centred around two ideas with regards to these two nations—(1)Disruptive Innovation, an idea spearheaded principally by Clayton Christensen, and (2) base of the pyramid, an idea spearheaded by Prahalad and Krishnan, 2008. Khanna (2011) rather than utilizing information and data the creator makes concrete and particular focuses utilizing stories and accounts and related subjective examination between the nations. Eichengreen et al. (2010) is again another efficient book which is rich in information with diagrams and charts and figures, composed fundamentally from a monetary

and exchange points of view. The book begins talking about the economies of India and China; the parts they play in the worldwide economy, exchange, and fare examples of these two nations and afterward gets into differentiating these two nations in their advancement encounters and the difficulties they look in supporting development later on. Bardhan (2010) gives an information rich study yet a nonmathematical political-monetary point of view of India.

Gupta and Wang (2009) think about is another great case here, however this time from the point of view of a business strategist. The creator recognizes that the absolute most broad oversights are: see China and India solely through the perspective of cost decrease and offshoring, building market procedures that are rotated around the urban communities and that check just 5– 10% of the best populace, disparaging the yearnings and limits of creating adversaries, and does not see these two countries as a worldwide contender.

2. RESEARCH QUESTIONS:

With the upsurge of the West, and because of a few social and political reasons; India and China lost their impact of economy, and their economies are predominated by Western economies. The two nations have indicated noteworthy development in a current decade, and this lead us to the research questions (RQ) that:

RQ1: *Is growth of India and China will sustain or the US will remain the dominant economy?*

RQ2: *What are the factors that are important for growth and innovation to thrive?*

RQ3: *What is the present status of this factor when compare to India and China to the US?*

RQ4: *How these factors influence growth and innovation?*

3. THE EVOLUTION OF ECONOMY, GROWTH AND INNOVATION

China began off as an economy with huge creative capacities however consequently saw a falling-off because of their common ideological, political, and social conditions. The opening up of the economy in 1978 gave a lift to advancement, science and innovation in the nation and set the phase for resulting development and advance in China. India, then again, had a rich science, innovation, and development base to begin with. The time of European strength, especially British govern, unfavourably affected the economy and its prevalence in science, innovation, and technological advancement. After India's autonomy from the British, it approached constructing a science and innovation foundation. While some of its endeavors were productive, it didn't bring about building huge creative abilities in the modern division. The connection amongst science and innovation with industry was missing, and the resultant financial execution was flimsy as appeared in figure 2. Regardless of its exceptionally short history, around 200 years, the US has been extraordinarily fruitful rather than China and India, in progressing and commercializing science and innovation.

Table 1: US, Europe, China and India: A Look Back (Percentage of World GDP)

Year	The US and other Western offshoots	Europe	China	India
1000	0.7%	13.4%	22.7%	28.9%
1500	0.5%	23.9%	25.0%	24.5%
1700	0.2%	29.7%	22.3%	24.4%
1820	1.9%	32.3%	32.9%	16.0%
1913	21.7%	46.6%	8.9%	7.6%
1950	30.6%	39.3%	4.5%	4.2%

Source: Maddison (2003)

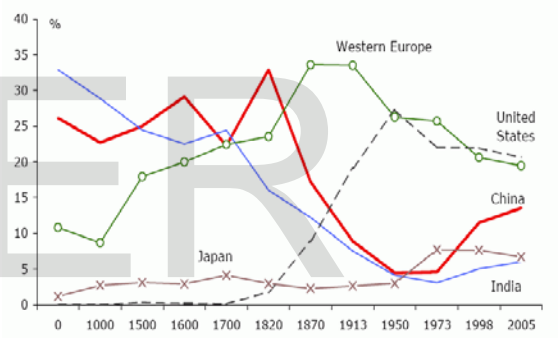

Figure 2: A history of world GDP (Sources: Angus Maddison, University of Groningen; The Economist)

The historical backdrop of these nations exposes the bearing that the political condition and belief system that a nation embraces and creates over a period has on its innovative capacities. In this manner, US has unquestionably a plus in comparison to India and china in the current decade.

4. FACTORS CONTRIBUTING TO GROWTH AND INNOVATION

Innovation is essential since it brings about new business creation, which thusly drives growth and economi development. We at this point analyzed in detail different variables that influence development particular to each of these three nations i.e. the US, China and India. these factors are discussed one by one.

4.1 Economy

Mostly, there are three parameters of the economy that can help in measuring technological innovation—

patents, R&D expenditures and FDI (Khurana, Mannan and Haleem, 2014). About these three parameters or indicators, India and have significantly improved in recent past but still lags behind the US. China investment on R&D is not organized to empower sustainable innovative capacity. Moreover, a part of the R&D work is done by institutions and universities which has low on effectiveness, since the researches are conducted separately which has little to deal with actual industry problems.

In India, the government spend the most discernible offer of R&D, and the dominant part of its undertakings are not composed towards commercialization. Industrial and business R&D and patents are expanded and have indicated change, and the incremental effects are more explained in particular areas, for instance, ICT and pharmaceuticals. In spite of the fact that, the consumption made in these divisions are way off the mark to the US and China.

The current Influx of FDI into R&D spending and the resultant development in foreign R&D focuses have added to an expansion in patents activities in India and China.

Figure 3: GDP at current prices. [Source: World Bank (www.worldbank.org) accessed April 2017]

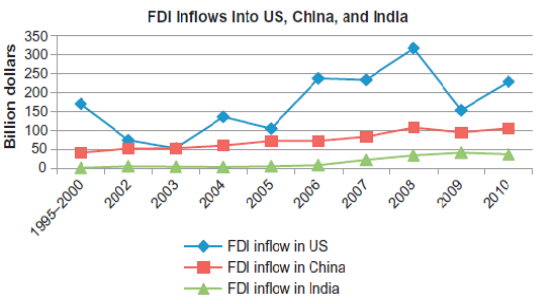

Figure 4: FDI inflows into India,China, and the US. (Sources: China Statistics Year Book, 2011; US Statistical Abstract, 2012, Handbook of Statistics on Indian Economy 2011–12, www.rbi.gov.in.)

With respect to the level of FDI inflow, after the US, China has turned into the second most astounding FDI beneficiary on the earth. For instance, from 1995 to 2000, the normal FDI inflow into China was just $41.8 B and it expanded to $106 B in 2010, with a pattern of continuous development consistently aside from 2009 (Figure 4).

To the extent, the patent is a worry the records of India and China in US patents have enhanced since the introduction of changes in economy (Table 1). China has more US patents than India in both design and utility patent classes. In any case, the US is a long ways in front of both China and India significantly to the extent the US patents is concerned.

Table 2: Total number of Patents granted by USPTO to US, Chinese, and Indian Inventors

	Total Utility Patents Granted During the Period 1963–2011	**Total Design Patents Granted During the Period 1977–2011**
World	4,992,192	407,802
USA	2,837,050	252,607
China	12,647	4011
India	7091	233

An investigation of the patent portfolio arrangement uncovers that India has less design patents as compare to utility patents in its US patent portfolio while 33% of China's US patent portfolio comprises of design patents. Utility patents speak to new creations, while design patents speak to aesthetic appearance. It is conceivable that many design patents might be on similar developments for which item patent have been recorded (Basant and Mani, 2012).

Finding: *The current influx of FDI into R&D spending and the resultant development in foreign R&D focuses have added to an expansion in patent exercises in India and China. Be that as it may, while the quantity patent applied for and allowed has developed quick in China and India, these are still dwarfed by the quantity of US number of patents, and furthermore the nature of these patent is far substandard compared to those documented in the US. Once more, this is another positive point for the United States.*

4.2 Culture

Contrasted with Chinese and Indian societies, conventional American culture is extremely helpful for advancement. Notwithstanding, winds of standard social

change in the US that have influenced its capacity to advance lately might be a purpose behind future concern. Indian and Chinese culture has the qualities of generally higher power separation and administration, more cooperation and vulnerability shirking, high resistance to transparency and acknowledgment of progress and equivocal conclusions about accomplishment—all of which have significantly prevented, as of late, the sustaining of an innovative mind (K. Bardhan, 2014). The hindrances to advancement in Indian culture, extend from high power separate showing itself in a solid requirement for control, independence exhibited by poor cooperation, high vulnerability evasion prompting frail vital viewpoint. Culture is driven more by philosophical and scholarly interests instead of an activity introduction and physical work. (Mannan, Khurana and Haleem, 2016). Since 90% of Indian associations are family-possessed, their capacity to improve and adjust to new advances is likewise a noteworthy challenge by their organizational structure and administration style.

Finding:*Culture is surely another immense plus for the US as of now in contrast with India and China, despite the fact that it could be a region of worry for the US later on without endeavors to invigorate the culture of development.*

4.3 Government Policies

A lawful structure for the assurance of protected intellectual rights, while despite everything it keeps on developing, has existed in the US for quite a while and has assumed a key part through the industrialization of the US as in other Western nations, though it is later in India and China, and its prosperity and effect are yet to be acknowledged (Khurana, Khan and Mannan, 2012). While they assumed a part in before years, charge arrangements and government obtainment for the advancement of innovation in the US as contrasted with that in China have not been extremely critical. On considering India, the tax approach aims for advancing innovation have been reasonably successful in certain focused sector. There is additionally an issue of acknowledgement of these incentives.

The Figure 5. gives a pictorial portrayal of different government offices associated with innovation and R&D. In spite of the fact that the administration has been assuming a proactive part in R&D in India, it must find a way to build R&D endeavors and the effect of open R&D consumptions and reinforce commercialization keeping in mind the end goal to exploit full R&D potential of India.

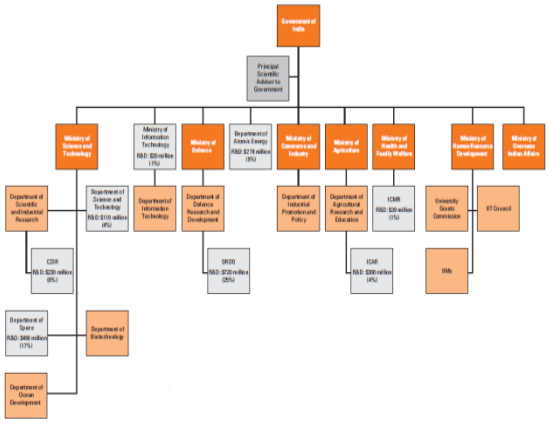

Figure 5: Key public institutions involved in R&D and R&D expenditure. [Source: Dahlman et al. (2007)]

Finding: *Government policies is again a huge plus for the US. Prevalent corruption and the presence of noteworthy size parallel economies are enormous challenges in India and China*

4.4 Demographics

While populaces in both the US and China are maturing, populace might age speedier in the US, because of the maturing of the "child of post war America" age, than in China, additionally driving the US to be a country of a greater number of customers than makers, and this may unfavorably influence the rate of advancement in the US in the years to come. This can possibly make an expanding pattern for migration to the US of actually talented experts or those eager to make creative new business openings. While a maturing populace isn't a difficult issue in China today, this is probably going to wind up noticeably a huge issue later on, as China's working-age populace will achieve its crest in 2015, and after that, the percent of working-age individuals will begin to decay. The anticipated offer of elderly in the populace in China will start to surpass that of the United States by 2030. India, then again, may have favorable position around there, since the greater part of its populace is youthful which prompts innovation and development in the work constrain. While, levels of lack of education is still high yet there is critical advance has been made throughout the years however offers of populace instructed past secondary school are still low in China and India contrasted with that in the US.

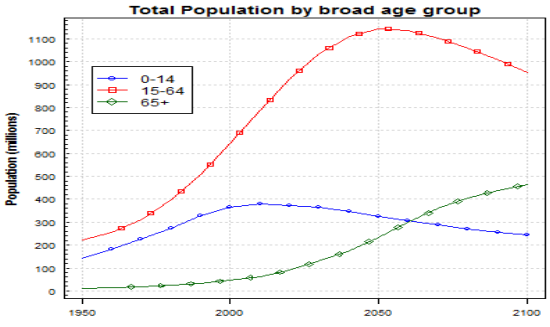

Figure 6.1 Change in India's working-age population (ages 15–64) (Sources: Untied Nation Population Division, 2015 U.N. data, World Population Prospects: The 2015 Revision Population Database, https://esa.un.org/unpd/wpp/Graphs/DemographicProfiles/, accessed April 2017.)

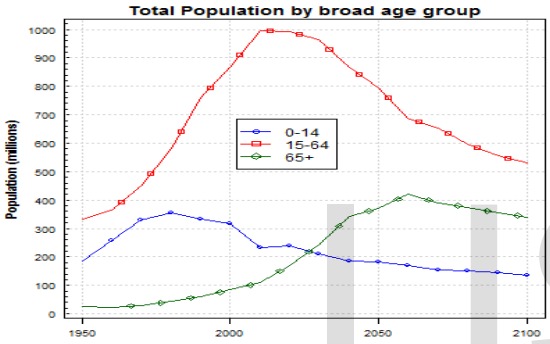

Figure 6.2 Change in China's working-age population (ages 15–64) (Sources: Untied Nation Population Division, 2015 U.N. data, World Population Prospects: The 2015 Revision Population Database, https://esa.un.org/unpd/wpp/Graphs/DemographicProfiles/, accessed April 2017.)

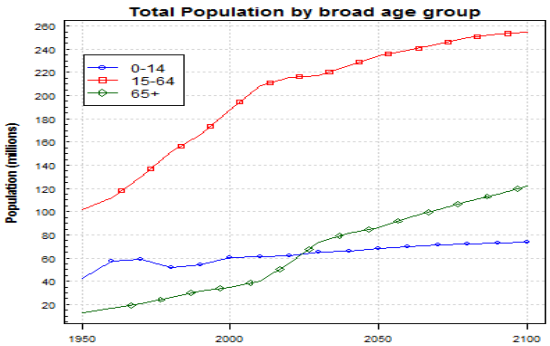

Figure 6.3 Change in US working-age population (ages 15–64) (Sources: Untied Nation Population Division, 2015 U.N. data, World Population Prospects: The 2015 Revision Population Database, https://esa.un.org/unpd/wpp/Graphs/DemographicProfiles/, accessed April 2017.)

Finding:*.From the point of view of demography of age, the US and China are the two ageing countries, and entirely from an age viewpoint, the preferred standpoint here may go to India. Be that as it may, both China and India have enormous difficulties with proficiency levels and the nature of training of the workforce as a rule. The US may have favorable position here in light of the fact that the issue in the US is probably going to be tended to later on, as it has been previously, through a more noteworthy influx of reasonably qualified foreigners however this may not be sure on the grounds that now the US isn't supporting immigration.*

4.5 Education

Contrasted with the US, China's education and training expenditure is low per student, since China had a lower proportion, a lower GDP, yet a substantially bigger number of student. For instance, in 2008, in the United States, the yearly expenditure per student in primary was $10,070; it was $12,097 for all secondary education, was $29,910 for higher education. By differentiate, in China, the yearly primary education expenditure was $4550 in 2008, short of what 1/6th of that of the United States, and it was $1593 for essential to higher education, just around 1/10thof the US (OECD, 2011). The educational expenditure as a level of GDP on account of India is far not as much as that of the US and China and has been floating around 3– 4%. In the year 2009– 2010, 41.8% of the aggregate use on education was spent on primary education, and on secondary education, 25.6% was spent, while 32.3% was spent on advanced education and just around 0.3% was spent on grown-ups training and education. Regardless of a bigger level of use spent on basic training, India will take in any event an additional two decades to accomplish 100% educational rate at the essential or primary level. Furthermore, India faces an alarmingly state of dropout at all levels of education and all the more so at the essential or the primary level to the degree of 44%. This huge contrast among the three nations in even the extremely essential training clearly adds to a lack of taught individuals who could proceed onward to end up trend-setters, more on account of India and to a degree on account of China also.

Finding:*The US still has a positive favorable position here, in connection to China and India. Nonetheless, this is a zone that should be tended to in the US—enhance education in schools, paying little respect to pay inconsistencies, and more noteworthy motivators and support for local students to pursue significant, important, and affordable school and college training*

4.6 Industry and Market Structures

India and China, then again, began the progress from an agrarian to an industrial and business economy just as of late about the US. Despite the fact that China as of late has turned out to be all the more a goal for outsourcing of US manufacturing and fabricating operations, the assembling area isn't extremely inventive. The greater part of the innovative firms are from joint sector—not state-possessed. In India, the modern development is more conspicuous in retail and infrastructure sector and not in cutting edge areas (Hasan, Mitra and Sundaram, 2013). With the current endeavors in group improvement in the MSME part picking up energy, the SME area is demonstrating creative. Nonetheless, with respect to presenting "new-to-the-world" developments, the SME part has a great deal of making up for lost time to do. In spite of the fact that the administration happens to be the most elevated R&D high-roller, the linkage between industry, college, and government R&D labs is absent. Government-claimed firms have the minimum development intensity(Khurana, Khan and Mannan, 2013). Private division organizations, all in all, and on-MNC organizations particularly are more innovative. The MNC firms have been concentrating their R&D more on taking care of market requests of parent organizations somewhere else instead of in the nearby Indian market.

Finding:*This is likewise a territory that the US has had a particular preferred standpoint generally. The worry for the United States around there must be the change that it has experienced from assembling to an administration economy and its subsequent solid reliance on different nations for manufacturing product. China and India are surely picking up around there in some divisions.*

4.7 Infrastructure

Infrastructure is a key factor that empowers and encourages business. The US has had a chosen advantage in connection to physical infrastructure contrasted with China or India, both of which are rising economies but US is the most predominant and effective economy of the 21st century. The US keeps on having this preferred standpoint over both these nations, and this isn't relied upon to change in the blink of an eye. Be that as it may, this is a region of worry for the US, since the US infrastructure is maturing and needs a noteworthy infusion of new capital keeping in mind the end goal to remain aggressive and competitive. This is particularly valid in connection to China, where tremendous ventures are being made to quickly manufacture an extremely current and propelled infrastructure, particularly in the region of rail and air transportation. Different territories of foundation keep on lagging behind in China and are relied upon to keep on presenting challenges for business enterprise in the blink of an eye (Panagariya and Sundaram, 2013). A huge and surely understood worry for China is a carelessness for natural contemplations and the resultant air and waterway water contamination. India then again still falls behind altogether and notwithstanding late increments in foundation speculations faces tremendous difficulties in all parts of infrastructure. This is relied upon as far as possible the effectiveness and viability of business enterprise in India in the close and middle of the road future.

Finding:*Again, this is a region where the US keeps on having a huge preferred standpoint. Be that as it may, China is making enormous interests around there and, given the age of the mature US infrastructure, ought to be a worry for the US. An open door for the US is to put resources into overhauling its foundation. This is additionally a zone that presents huge difficulties to India.*

5. DISCUSSION

This paper detail looks at factors that affect development and advancement particular to each of three nations i.e. India, China and the US. The investigation begin from the development of advancement and development (as a marker of potential proclivity towards development and advancement) and then we talk about various elements social elements, financial variables, the part of government approaches and different establishments particularly adapted towards advancing advancement (as pointers of infrastructural and institutional systems and general business and market modernity), socioeconomics and training framework (as pointers of human capital and research), to industry and market structures (as a pointer of level of complexity of development crosswise over different ventures of each of the economies). In light of the investigations of the above variables, the finding infers that India needs to fortify its R&D association. The R&D and its subsequent application should be focus towards industrial development. For instance, China has challenged the dominance of advanced country like the US by focusing R&D on their manufacturing industries. What China has been able to achieve is not only through increased R&D but through creating conditions that encourage learning and leveraging. Given the fact that India has made impressive achievements in different sectors but there are systemic problems confronting India's higher education and innovation system. Given the resource crunch India faces and the demographic edge that India has; it becomes overbearing to use national resources sensibly to leverage internal strengths. Thoughnumerous initiatives have been taken by Indian government to increase innovation, the results are not much noticeable.

6. LIMITATION AND FUTURE SCOPE:

There is great variety of definition of innovation and it is intricate task to compile and compare all the factors as it deals with interdisciplinary perspective. In this study, we have taken up and compare seven most prominent factors that deal with innovation and growth of a country. For future study, one can add several more factors to these seven factors and can compare them for more exhaustive results and finding.

7. CONCLUSION:

Most of the study is on development around the globe have concentrated on enhancing proficiency and profitability in business keeping in mind the end goal to remain in front of the opposition. In any case, there are various societal glitches that fundamental to be tended to through development, for example, lack of education, populace development, a maturing populace, and related human needs; and the need for enhancing the brilliance of education.

Innovation upgradation, past what happens normally at any rate, in this way, should be driven by the real challenges that a nation faces and should be made upon capacities and assets that are accessible in the nation by thinking about their level of development and maturity. This paper talked about the different troubles interesting to the local settings of China, India, and the US and looked into the methodologies being taken to address these issues

All three countries show impressive but fluctuating levels of sophistication ongovernance arrangements and policy frameworks for the management of their innovation systems and country's research. In India, the most persistent and key weakness are the lack of policies and programs that inspire collaboration and knowledge exchange between researches in institutions and the industries. Undiversified and Inadequatefunding remain a major challenge to the growth and innovation.

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