INDIA AS A KNOWLEDGE SUPERPOWER – LEGAL AND ECONOMIC REFORM IMPERATIVES

INTRODUCTION[1]

"*The bravest are surely those who have the clearest vision of what is before them, glory and danger alike, and yet notwithstanding, go out to meet it*."

– THUCYDIDES

The aforesaid historian to whom the words are attributed chronicled the Peloponnesian war. It may be said that fully half his wisdom laid entirely in recognizing early and in real-time that the coming war was worth documenting with amazing breadth and in detail. The said war was a highly atypical battle of attrition between an innovative and daring democratic Athenian naval power and a conservative and traditionalist spartan land juggernaut. The war as it dragged on saw many rounds of conflicts, the challenge of Athenian intellectual brilliance to the stability of the spartan spirit offers sharp edification to the students of history. It is for this reason that it becomes necessary to begin a text on the potential fortunes of India's knowledge economy with a historian's proclamations about the nature of bravery. Given the nature of the task it must be seen as essential that the introduction is guided by the hand of the most learned and disciplined historians of the ages. We find that in the contemporary world the fortunes of states rise and fall in accordance with their economic fruits. Like the war, Thucydides chronicled the world order evinces a most curious distribution of intellectual and economic fruits – a highly asymmetrical record of achievement and outcomes. If we stretch the definition of contemporary to include the past two or three centuries of breakneck industrial growth, then this asymmetry and its emergence present us with a stark and incredulous "great divergence'.For that is the term the economists have coined to refer to the different path that the global north or roughly the regions comprising western Europe and North America has traversed vis-à-vis the global south. For our purposes we focus on Asia to the degree that it forms a part of the south, to give the text a deeply rich historical grounding. This obtains

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great significance because whereas one might wish to speak of potential future superpowers, their very emergence, and sustenance demands explanation and shall become the singular source of erudition while studying the prospects of any given people. We shall return to study of historical divergence after other ancillary matters are addressed.

TERMINOLOGY AND METHODOLOGY

It is an almost excruciating proposition to carefully and precisely define terms in the social sciences and therefore to ascertain the exact criteria to be applied to reach our objective conclusions. If one is to be a realistic, any such attempt while it may be boldly made will simply contribute to the growing literature on the subject each claiming their subjective scheme is capable of forming a dispassionate and disinterested naturalistic framework to analyze the positioning of world powers. Unlike the more rigorous and materialistic domains of the hard sciences – where the question of concrete and objective definitions have been a work in progress for several millennia – the soft sciences and the humanities as also more recently mathematically oriented sub-fields such as experimental economics, do not offer similar scope for definitions independent of value judgment. Superpowers may be understood in their colloquial meanings which do capture the efforts of formal disciplines to a remarkable degree. This would mean a definition descending from the classical realist or neoclassical school of international relations, as a power among powers. An antonym to a peer state, such a people who influence the whole world system itself and directly posit global instead of local aims. This implies that the term must be understood as a vertical phenomenon – where the quality of being a superpower simply exceeds the categories which apply to other states – it is beyond mere excellence. Such a competence must be evidenced as which doesn't even exist elsewhere let alone to any measured degree. Not just numerical superiority but conceptual and qualitative super-ordination. This wouldn't necessarily imply hegemony, as that is contingent on the rivalrous powers as also the sum of other states in the region.

Concrete examples would include the unquestioned military, economic and intellectual supremacy of the United States of America at the present time. Furthermore, what is precisely a knowledge economy, or a knowledge superpower? The current intellectual climate is dominated by an obsession with the theoretical limits of computability, the essence of our being, the substrate of the cosmos. A knowledge economy is the natural and ultimate consequence of the industrial revolution

and what it sparked – automation of human labor. The same process continues unabated with the advances in the world of bits, ever-increasing automation of roles previously occupied by human beings applying their intellect in the work environment. Automation means an exponential increase in productivity which begets tremendous economic growth. This is, in a nutshell, gives rise to the notion of the "knowledge economy". Unlike the days of Thucydides where strength was counted in the number of men and material, today the strength of men is contingent on the knowledge powering their life and work and the extent to which their productivity has been multiplied and augmented.

CIVILIZATIONAL AND HISTORICAL BACKGROUND

Now, if one speaks of India's prospects, against this backdrop of superpower status, is that primarily a policy document? A geopolitical struggle? A geostrategic question? Or a research inquiry? This author would submit the need for a multidisciplinary and heterodox approach to the question. It is simultaneously an aspiration, a yardstick of measurement, an executive and civilizational imperative and fertile ground for research. Returning to the phenomena of the divergence witnessed over the last few centuries, its full impact on the question of India's knowledge economy can hardly be overstated. Part of the reason this question has even to be discussed relates to an obvious extent failure to be the driver of this sea change in the order of states. It is precise because such a divergence was not witnessed in India that it acquires the force of nature. Starting in the late 18th century the fortunes of Western Europe, at the time and for the preceding few centuries largely on par with other major civilizational hotbeds viz. Chinese and Indian dynasties – began to experience exponential and incredulous economic growth. In truth, the seeds of this so-called industrial revolution had been sown for some time and this was merely the fruit coming to fruition.

Prior to the industrial revolution, the agricultural revolution in Britain and the intellectual and artistic renaissance in continental Europe, in general, portended great civilizational energies and imminent change. Major feudal and ancient political regimes fell to the "enlightenment" and the "age of reason". The two most recognizable products of this sudden burst in the application of a newfound and unleashed rational faculties of mind were the French and American revolutions. These events were simultaneous to the invention of the steam engine, the revolution in scientific

thought by the likes of Isaac Newton and Francis bacon, revolutionary and ground-breaking advances in political philosophy and governance and preceded by the invention of the printing press.

It has been estimated that until the transpiring of the aforesaid events, Indian, Chinese and western European dynasties accounted for nearly the whole of the global output. However, after the explosion in thought and action in Europe, the global output expanded exponentially and consistently for the next succeeding centuries. Ultimately this meant the shrinking of the horizons for the storied dynasties in Asia as the world expanded around them. The starkest demonstration of the insurmountable gap which had quickly emerged was had in the opium wars between the Qing dynasty and the British Empire in the middle of the 18th century. The former was quickly overcome by the steel gunboats of the British and could only offer primitive wooden ships as resistance. Similarly, in recent times, the American military quickly overcame Iraqi resistance in the aftermath of 9/11 and dispatched a large ground army with minimal casualties. India's aspirations must be seen in the context of the actual knowledge superpowers and in some cases hegemons which emerged out of Europe – Britain, France, and Germany. The current preeminent superpower again is the product of the enlightenment and the American Revolution against the monarchic rule – the slogan raised being "no taxation without representation". India wishes to participate in the greatest leap forward in human history and to become a legitimate aspirant to global power. It necessitates a close and data-driven analysis of the implications, consequences, and causes of the European expansion and case studies of the attempts to replicate it elsewhere.

Much ink was spilled in the latter half of the 20th century on the so-called "population explosion". The irony is that it had in fact already occurred, between 1700 and 1900, human population nearly tripled from 600 million to 1.5 billion persons. It then nearly doubled in less than a century. This fact wasn't missed by the fearmongering notion of an explosion of hunger and starvation but simply not alluded to. After if the population had already exploded and wages in Europe had In fact doubled between 1800 and 1900, then whence cometh the starvation? The wage growth and general economic expansion in the 19th century exceeded the estimated expansion in living standards in the preceding 18 centuries. This absolute miracle was happening simultaneously to the rapid increase in human births on the planet. Similarly, the world has evinced a rapid rise in

production process sophistication,[2] first in the global north than elsewhere (which is a constant theme of the explosion of innovation and knowledge production in the recent centuries). Similarly, in the United States and the United Kingdom, mobile phone subscriptions per 100 people had already reached 30 and 347 respectively by 1999 whereas it lagged in the third world.[3] Preceding mobile phones was the rapid expansion in fixed telephone connections in the first world, a figure of 9 and 26 connections per 100 people in the UK and the US respectively in 1960 as compared to say Vietnam with its anemic rate of 0.022 in the same year. These figures acquire relevancy since the total correlation of such metrics and indices with research output, knowledge production, and market sophistication is quite high.

KNOWLEDGE PRODUCTION – CURRENT STATE

Currently, the top ten nation-states in terms of research output are the preeminent United States, closely followed by the Chinese quantitively though a significant gap remains qualitatively, western European nations and lastly the most successful Asian tiger economies. Several well-known metrics can be relied upon to empirically chart the very same such as the Nature Index:

	Country/territory	AC	FC
	United States of America (USA)	**27472**	19771.61
	China	**15320**	11266.17
	Germany	**8299**	4368.67

[2] Human progress, "HumanProgress." Available at, https://humanprogress.org/dwdata?p=33&yf=1960&yl=2018. (Retrieved on 07/09/19).
[3] Ibid.

United Kingdom (UK)	**7391**	3661.88
Japan	**4645**	2946.58
France	**4634**	2124.54
Canada	**3158**	1564.53
Switzerland	**3049**	1397.33
South Korea	**2143**	1309.02
Australia	**2749**	1231.63
Spain	**2530**	1116.26

Table 1; Nature Index[4]

These observations generalize very well across several metrics, viz. outcomes at all stages of education, per capita income, per capita research output, etc, R&D spending whether public or private, etc. Further as has been shown through scholarly research on the subject by institutions like nature index, by article and fractional count the United States is far and away from the largest contributor to global research citations and article counts. This is followed now by china in the number two spot. It's important to note India doesn't manage to come near the two goliaths and fundamentally as of right now competes in a different domain.

[4] *Country Outputs | Nature Index* "Nature Index.", Available at https://www.natureindex.com/country-outputs/generate/All/global/All/score.

Similarly, according to SCIMAGO institutional rankings, the United States is by orders of magnitude the biggest publisher of scientific research. The only entity that manages to close some distance is the Chinese nation-state.

The key takeaways follow from the prior discussion of the rapid and miraculous expansion in Europe. The biggest and most prolific research and knowledge production institutes find their home in the global north. However, we notice that key Asian economies compete very favorably with European and North American powers. Simultaneously we notice India ranks usually after the European and Asian cohort. These are not mere coincidences. The European enlightenment and its consequences have spread far and wide but and crucially the distribution is uneven. The case of Japan, South Korea, and China are particularly instructive. These three policies have undertaken a rapid and transformational leap towards a westernized and globalized research modern knowledge economy and all three offer different modes, forms and times frames wherein the transformation was effected. Given India's own experience with western European contact, the Asian miracle of recent decades acquires even more centrality as the locus of study and research.

Further it is of utility to study in a comparative fashion with research outcomes and quality the various metrics on spending on scientific research across the nations on a per capita basis as well as a percentage of GDP. What is revealed is a tight correlation between the outcomes and the financial inputs though however countries do feature wide variations in per capita spending indicating varying efficiency of spending per citizen.

As stated previously the spending figures co-relate heavily with research outcomes outlined above.

EXAMINING THE ASIAN MIRACLE

The Japanese experience begins the earliest with the opening of the economy by the American navy in the mid-19th century. At the time a stagnant civilization it reorganized and reformulated itself as a western-style constitutional monarchy along the lines of the British and initiated state-sponsored reforms in industry, governance, and military. By the early 20th century japan was on its way to being a regional great power and had significant independent capacity to generate high technology and products of scientific and industrial application. After the World War II, the second period of economic expansion and sophistication followed, this time under the Americans with a

constitution predicated on democratic republicanism and the separation of powers. During this period japan became the sole country in Asia capable of putting out research as impactful as that of the west though it is not precisely a peer state in this regard. South Korea picks up after World War II under American protection and tutelage and gains in sophistication and economic output through the rapid adoption of all relevant western institutional designs. Both the South Korean and Japanese model operates under a rule of law regime enforced by the supremacy of the written constitution. The Chinese case, however, deviates significantly and is the most recent of the bunch. Over the past 30 years china emerged as the largest economy in Asia and the second-largest globally. After the disaster of the communist planned economy in the first half of the previous century, the death of Supreme leader chairman Mao allowed reformist Deng xiao peng to put in place the lessons he learned in Singapore and Hong Kong. The Chinese strategy has been full autonomy and sovereignty over its nation while putting in place a highly modified and lopsided enlightenment regime. Unlike its rule of law neighbors, the Chinese practice concentration and indivisibility of power. As a natural outcome the Chinese model is dominated by state investment extracted from the populace in the form of direct and indirect taxation. This is not to say the Chinese economy does not have large private ventures, but there are safety valves for the state to retain complete control over the individual should the need arise. In fact, the combination of these forces has produced the second largest research hub outside of the United States in the western world. Among the powers desirous of competing with the United States, china has the most realistic prospects of matching its research output.

INDIA'S STANDING IN THE CONTEMPORARY KNOWLEDGE NETWORK

India stands to learn from the experience of Asia in importing the European enlightenment experience. China's hobbled attempt to modernize its economy is unbalanced and suffers from long-run doubts as to its legitimacy and viability. The other powers did not need to force technology transfers or resort to coercion (not to the same extent at any rate) to transfer western knowledge to domestic companies as the collaboration and capital flowed in naturally in accordance with market forces and personal preferences of the personnel in a modern market economy ruled by the law. In terms of their relative standing, India has a dubious claim as a global

power aspirant. It produces 27,000 Ph.D. graduates in recent years, half the number of Ph.D. graduates as the US and China.[5] Furthermore, it has roughly half the productivity of the western researchers in terms of the production of impactful research (>8 citations for a paper annually). In terms of total researchers, India only has about 200,000 compared to 1.4 and 1.1 million strong cohorts of china and us respectively. By citation count India has an average rank of 4.6-6.4 in pharmacology, material science, engineering, and chemistry. Outside of these areas, in agriculture (13.6), genetics (14) and computer science (9) the performance is disappointing. In the remaining areas of social sciences and the humanities India has a rank lower than 15. India had about a thousand 1000 papers in top conferences versus 4000 for china and 11,300 for the US. Furthermore, in terms of highly cited papers by country, we had over >15000 papers with more than 100 citations, the Chinese had about 7,200, India only produced 989.[6] A dismal number. On the other end, papers with more than 1000 citations we are in the clear lead with 234 such papers, the Chinese with 50 and India produced only 17. Another way of looking at it is India's citations as a percentage of given country's citations. By this metric India has about 9% of the US and 21% of the proportion of the Chinese citations. On the other hand, looking at the percentage of highly cited papers, India has 6% of us and 14% of the Chinese proportion of citations. India performs better in producing citations than highly impactful research with strong network effects. [7]

India's research output climbed to about 2.4 % of the world total over the period of 2007-2015 whereas the Chinese output expanded from 4.8% to 11.8%. Overall, the growth in documents in absolute terms was the highest in the united states from 2008-12.[8] This means although India may be growing fast it is not, in fact, catching up with China or the US. Another relevant and practically useful metric is patent application and grants. The WIPO' s report titled world intellectual property indicators tells us India Ranked 14 In the patent-filing activity, whereas the US and China are

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[5] *The OECD*,"Research and Development (R&D) - Researchers - OECD Data." , Available at https://data.oecd.org/rd/researchers.htm. (Retrieved on 07/09/19).
[6] Aggarwal,Varun,"leading science and technology:India next?",Sage Publication, New Delhi,India,2018, P. 53,54,55,65,70.
[7] *U.S. News & World Report*, U.S. News & World Report, "America's Dominance in Scientific Research Is Shrinking: Study." Available at, https://www.usnews.com/news/best-countries/articles/2017-06-16/us-leads-world-in-scientific-research-output-but-dominance-shrinking-study. (Retrieved on 07/09/19).
[8] *UNESCO*, "Facts and Figures from the UNESCO Science Report.", Available at https://en.unesco.org/unesco_science_report/figures. (Retrieved on 07/09/19).

ranked first and second respectively. China filed a million applications, us about 600,000, India filed only 45,000. The growth from 2010-15 again shows India is not catching up, China grew about 220 percent whereas growth in India stood at 60 percent. The US grew 20 percent which is incredible for a country of its size and maturity. In terms of the patent cooperation treaty which allows for simultaneous filing and protection in multiple jurisdictions, china filed about 30,000, the US produced 60,000 application but India produced only 1500.[9] This is further evidence that India is not only a laggard in terms of total output but particularly in the realm of highly valuable and impactful research. This is a domain where the United States continue to have undisputed leadership.

Causes and Consequences

India's performance can be explained at the macro and micro scale. At the former level, the economy has been utterly hobbled since independence and deliberately disabled as a matter of state policy and public reluctance to comprehend or argue against the overreach of the state in their private lives. The program of socialist command economy as initiated by the Indian government citing the best of intentions in fact simply removes all other wills in the marketplace except for the state and therefore the machinery of trade and commerce grinds to a halt. In such a state economic expansion is severely limited and all the consequent gains in the increased surplus, the greater time horizon of the people, steep and sustained rise in literacy rate, educational attainment of the people are lost. As a direct outcome, in Acer educational surveys Indians are placing near last at all levels, from elementary to senior secondary. India is squandering its demographic dividend.

THE IMPERATIVE FOR LEGAL AND ECONOMIC REFORM

Capital market controls, Restrictive land and labor law regime, agricultural sale restrictions and extensive state intervention in the commodity and wholesale prices along with public education is a massive retard on growth and eventually the research output of the Indian Public. Furthermore,

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[9] *Wikipedia*, Wikimedia Foundation, "World Intellectual Property Indicators." Available at https://en.wikipedia.org/wiki/World_Intellectual_Property_Indicators. (Retrieved on 07/09/19).

India requires more in the way of basic infrastructural investment in physical capital, the justice delivery machinery and other such basic amenities which would enhance worker productivity. India finally reluctantly implemented the product patent after suspending it for decades pursuant to the obligations under TRIPS. The push for private property, rule of law and the free play of market forces needs to continue to give the Indian economy the room it needs to breath and the correct incentives for investment in high impact and fundamental research.[10]

In terms of the micro-industry and sector-specific blunders, the state intervention in higher education has produced subpar outcomes. India has too few excellent research universities, poor industry-academia linkages and far too little expenditure on research in both public and private sectors. Moreover, the share of researchers working in govt. run labs far outweigh universities and the private enterprise. The former has much lower research productivity and perverse anti-competitive incentives. India like other major powers requires an eco-system split evenly between the universities and industry which are both in a close symbiotic relationship. The state-run model which currently dominates does not produce satisfactory outcomes in terms of the quality of research, education, attracting the best talent and bringing research to market. At the level of the university, the culture needs to be recalibrated to embrace commerce, intermediate positions such as the postdoc researcher and teacher assistants. Ultimately India's fate in the world of commerce is not zero-sum, but geo-strategically, Thucydides warns us in the Melian dialogue, "Right, as the world goes, is only in question between equals in power."[11]

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[10] Kaul, Vivek. *India's Big Government: The Intrusive State and How Its Hurting Us*. Equitymaster Agora Research Private Limited, 2016. P. 78,82,102,156.

[11] *Thucydides Mythistoricus*, "Chapter X. The Melian Dialogue.", doi:10.9783/9781512821239-012.