India’s technological climate: a harbinger in resolving and reducing the carbon footprint

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Abstract: Research in artificial intelligence and cognitive computing (simulation of human thought processes in machines involving self-learning systems and processes that efficiently use pattern recognition such as detecting voice, or acquiring data (data mining) and imitating human thoughts in machines) is an evolutionary and innovative field acquiring knowledge from liberal arts, humanities such as management science, philosophy, psychology. The need to rely on these disciplines is of vital importance and strategic value in today’s technology up-gradation as robots are designed to think and behave like human-beings. Robotic technology can assess and solve problems through the aid of human intervention and support. Issues that are of a laborious nature can be solved through machine technology and processes or machines and humans must work together to solve larger problems of which the dire need is where humans and machines need to work together in solving problems of global warming and climate change.

Keywords: artificial intelligence; cognitive computing; climate change; global warming; ecology; clean energy; innovation; technology investment; clean economy; sustainable cities.

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Biographical notes: Luke Gerard Christie is an Assistant Professor and researcher working in VIT University, Chennai Campus. His area of interest and specialisation is culture studies, cross-cultural communication and global economics, and advanced technology. He has conducted a national seminar on the influences of technology in language teaching and learning eliciting
influences on technology shaping language learning behaviours and an international conference on the lines of the interactivity of science and technology with engineering and language research. His passion for teaching and learning newer and advanced technology with its interaction has heightened over the years owing to the many factors of globalisation and culture change.

Gajendra Kumar is a Professor and Research Advisor in VIT University. He has over two decades of teaching and research experience in the UK, USA and India. His active interest of specialisation is culture studies and post-colonial critical theories. His passion for teaching has taken him across the globe where his exposure to the field has won him many laurels and friends in the intellectual clime and is often called to discuss and deliver guest lectures. He currently heads the Research Department in the Division of Social Sciences and Languages, Chennai Campus, VIT University.

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“Computers can help by doing all or part of the basic tasks. They can be thinking partners. But they can also help by helping the people work together. The machines can be more useful to the degree that they have social intelligence, and the ease with which people can work with them. The machines need to have good models of the people they’re working with.” (Thomas Malone	extsuperscript{1}, MIT)

1 Introduction: India’s impact on climate change after COP 2	extsuperscript{1}

There are remarkable opportunities in cognitive computing where machines and human minds can work together to solve problems. We need to shift from a polluted environment to one of energy efficiency and ecological and energy sustainability. There is a glimmer of hope with our investing on technology and optimising on our young population.

India’s investment in advanced technology with its many startups sprawling across the country bringing in $5 billion dollars every year suggests that there is exemplary scope when it comes to nation building. This year alone has seen about 554 startups being funded in comparison to the previous year which was less. The rise of India as a post-colonial state in a post-modern world happened swiftly when she opened her markets to that of a laissez-faire economy which advocated the boom in the information technology sector owing to its huge and ever growing human capital base. Due to this chief factor, the country can grow but does she have the technology to control carbon emissions, effectively regulate traffic without a snarl as is becoming a common phenomenon in the Metropolitan cities, solve niggling problems of the energy deficit across the country by including the 600.000 villages are a few questions that I intend to look into in my paper.
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The recent Conference in Paris (COP 21) held from 30 November to 12 December 2015 had almost 200 countries interested in protecting their environments from degradation and ecological damage. Issues were addressed with a global agreement being arrived at where countries will have their own legal systems in curbing carbon emissions but in the case of India, being a developing country, the review on climate policy will be on a continuous basis every five years. As far as India is concerned being an emerging economy being the centre of economic attention, it is imperative that her leaders look to solving the problems of our own creation with the adequate utilisation of advanced technology and artificial intelligence systems. In all truth, with a growing human capital base where governance policies are implemented without keeping in mind the technology factor as part of a climate that can solve problems like extreme weather patterns, transport pollution and the demand for growing energy has not been of utmost importance in the past but seems to be gaining ground today. The technology of today, irrespective of being innovative variety is not so sensitively advanced as that of a developed economy.

The technology that IBM, Google, Nike being designed to solve ecological and humanitarian problems especially in areas where populations are high to reduce stress on environment reducing the carbon footprint has won many commendations. These organisations have established their research facilities in India to reach out to the globe where in an atmosphere that is globalised, solutions can be found from anywhere. Multi-lateral organisations are found to be the pioneers in resolving technological problems in our societies in trying to etch pathways but must invest intelligence in making our cities more sustainable, cleaner and greener in order to protect ecosystems and enhance the longevity of life. With Delhi leading the list of the most polluted city across the globe, our governments have a big problem on their hands. This is soon catching up with the metropolitan cities across the Indian state.

India’s investment in globally advanced technology is low requiring development and has to gain ground to:

a. resolve problems in city pollution governance through smart technology being incorporated in automobiles
b. meticulously calculate the number of electric units being frittered away which can be used in agriculture
c. assess the quality of air for sustainable living in societies
d. utilise 40% of nuclear energy for renewable energy in designing the future to being a low carbon economy
e. efficient and effective healthcare techniques by investing on artificial intelligence in hospitals where robotic technology is a part of the strategic workforce in detection and prediction of hidden diseases and cancers that will surface in the future of a patient(s).
Table 1 The theoretical framework of cognitive computing and informatics*

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Note: *The table is a reproduction from Yingxu Wang’s work and paper titled ‘Cognitive informatics: the science of abstract intelligence and cognitive computing’. The Table is a compilation of what goes on in the making of a machine and the processes where the newer advanced technologies that are embedded with cognitive processing systems are sensitised to function and behave as human beings. These systems can be efficiently utilised in organisational ecosystems and in vital place of work to detect or investigate problematic areas that require solving. The competency is developed where the intelligence and reasoning capacity of the machine is designed to accept and function with the embedding of human language processes through applied software. In the 21st century, robots are designed to think and behave like human beings and to tackle difficult problems being activated through neural networks. This quality of technology can be used effectively in disaster affected regions efficiently and effectively to reduce human stress and to save lives.
India’s growth is surging forward with her being an attractive destination for investment and initialising of manufacturing units across states. All governments since post-liberalisation have opted for support from global investors and by engaging with the IMF and World Bank with policies that are also aimed at solving the bottlenecks in education, healthcare and infrastructure. Till date, the infrastructure and the potential is dwindling in comparison to global standards. It is places like these that exhibit the country’s growth that makes her sustainable and clean but owing to poor planning, improper civic measures, inadequate governance control that states are floundering. There was a shift in how our post-offices functioned where today by turning from the old model of working in service of the nation to one that is technologically driven has brought desired relief. The banks in India are more user-friendly and transactions are all online with work processes more efficient and meticulous. The technology shift in India has benefitted India’s post-offices, banks and the railway systems. Most problems that did exist are a thing of the past only with the investment on technology. The technological infrastructure is being carefully monitored with consistent upgradations so as to be more efficient and customer-friendly. There have been many niggling issues that the previous generation had has been cropped for good.

In the 21st century of economic sovereignty and cultural identity, is there a possibility to live in ecosystems that are inclusive, safe and sustainable for us and for the coming generations with tremendous investment and influx of technology in the country? The BJP government insists on making cities out of our villages and build smart cities. This is a vision where the repercussions will be seen in how energy-intensive these cities will be ignoring the question of security.

There are certain goals that are impractical and in excess despite having the technology but lacking the most advanced as found in USA or Germany. With economic growth being a positive, our government leaders must look into areas with the aid of artificial reality where:

- there exists safety mechanisms in emission control on roads and the highways
- traffic snarls are carefully diverted with 0% pollution
- buildings and offices are sensitive to the environment and respond accordingly by saving energy (for, e.g., where buildings can absorb heat and generated into energy to power them in future)
- all electronic gadgets passing the test of emitting less radiation into the atmosphere
- agricultural produce by our farmers is of high quality where crops over large acres are monitored and protected from pests and rodents by constant analysis which the farmer is aware of possessing information on a mobile device or where the farmer is aware of the quality of the crops before harvest with inputs from the artificial technology being used
- our educational systems shifting to using smart technology that enhances the development of a student making classes more interactive and fun
- quality of air is detected and solutions can be offered by human intelligence.
1.2 The need for smart, sophisticated technology

Artificial Intelligence is an expansive field and needs to be quickly incorporated in all spheres of life from government offices to our homes and in research laboratories to solve problems that impede the progress of life and our ecologies in any way. Our governments by working along with foreign government and global players should bring about in-built cognitive computing system that can work and interact with the environment, to solve pollution problems, that can offer banking solutions, offers and promotes effective answers in critical areas like healthcare where the human mind cannot access will prove to be an exemplary counter-intuitive shift in adapting to a advanced technological climate that is adaptable, humane and safe.

India is very slowly seeing the importance of innovation in solving problems that never had solutions to. The need for social innovation or sustainable innovation in tackling challenges in our societies is gaining influence. The National Association of Software and Services Companies have predicted going by the current figures where India has around 3,000 innovative tech-start ups will by 2020 be doubled to 11,000 innovative hubs that will have the potential in solving technological problems in an efficient manner but also will benefit society at large. India needs start-ups that are bent of innovation aimed to solve social problems. For instance, in December 2015, Mr. Bhagwati Agrawal, a social entrepreneur and an Indian American was elevated and honoured being awarded by CNN as a hero for championing a social cause through his efforts and genius solving the water crisis in his village where he grew up in northern India. The success of his project started when as a child, he used to walk with his mother and other village folk for miles in search of water. It has been observed that in India those women in the household have to give up on their education in search of water or had to stand in queues by water reserves for 6–8 hours everyday. His experience as an engineer in America helped him build a social innovation project where rainwater would be collected from rooftops to solve the inevitable water crisis in his village due to the investment on innovation and smart thinking. Today, the people of his village are grateful and deeply indebted to him for solving a problem that had no solution for decades. His innovative bent of mind solves sicknesses and diseases that people come in contact with as people were washing their cooking and dining utensils with sand. Mr. Agrawal’s current project has won tremendous applause as in modern day India, water remains a huge concern.

The need for innovation in India is more important than any kind of development of any sort. Projects that show innovation have more support from overseas investors rather than our very own governments. The country with its awkward complexities in development has created problems of its own that has no effective solutions especially in pollution and healthcare. The bureaucracy is exceedingly strident when a rule is passed but after a few days, the purpose and objective of sticking to schedule of decision making is forgotten. Most things get back to normal as before. The bureaucracy should stick to directives and cannot afford to compromise in aspiring to achieve a quality of life on the policy of development and growth. The current government seeing that most young graduates are leaving India for better and promising opportunities overseas has framed rules where they would not be easily allowed to leave the country. This is mainly to ensure that as an emerging economy, the country needs more brains to power its own economy rather than having young graduates leaving for better shores or powering the economy of another society. It is a known fact that most software engineers being the
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world’s largest source of outsourcing with the best of business minds with about 67% of US$130 billion dollar market come from India. The Department of Industrial Policy and Promotion have released a document stating that India and in the past, where the skills of these find minds were not exploited is now in big demand to create an atmosphere of learning, creativity and sustainable innovation as a Mr. Bhagwati Agrawal and a few others like him.

1.3 India’s investment on technology in 2015

The technological sphere in India is robust enough only for an emerging economy but we need technology as a developed society to solve many myriad problems that are a hydra especially in renewable energy and in effective healthcare. India employs around 9.5–10 million everywhere with the cost-competitiveness more economical than the United States of America. India has seen globally reputed organisations setting up several innovation hubs, research and developed facilities, as the country is at its zenith having the largest human capital in the world with ages between 24–37 years easily making her the youngest country in the world. The information technology is all set to grow by 11% with the revenue projections predicting to touch US$350 billion by 2025. Medium and small enterprises are attracting a lot of foreign investment from USA which has currently propelled the Indian Government to establish the digital revolution initiating the need to develop incubation centres for internet of things (IOT) aided by partnering with private organisations. The Government of India is also a willing partner to jointly work alongside with the USA in finding opportunities and in implementation of Shri. Narendra Modi’s initiative of ‘Digital India’. Both sides have complied to work together and hold the US-India Information and Communication Technology Working Group before 2016. The initiative of the central government has spurred state governments to set up innovation and incubation centres where Hyderabad remains the first state in the country to set up the HITEC city, home to more than 1,300 IT and ITES firms ranging from Microsoft that has its largest Research and Development Facility outside the USA, Dell, Yahoo, Facebook, Cognizant Technologies, Tata Consultancy Services, Wipro, Accenture are a few congregated with hundreds of startups that attract foreign investment. The Government of Telangana has its aim in leveraging Hyderabad as the largest technology destination in India by setting up a technology incubator. A project that spans 60,000 sq feet which is India’s largest start-up incubator has the state government investing around US$5 million. It is predicted by analysts and economists that once the project is complete will house around 1,000 startups easily making it the globe’s largest start-up incubator.

In India, social, mobility, analytics and cloud (SMAC) technology segments attract a lot of investment and opportunity. According to the Department of Industrial Policy and Promotions (DIPP) and the Department of Information and Technology state that SMAC is a US$1 trillion opportunity with the Cloud segment attracting the highest investment in India which is around US$700 billion. The second segment that attracts foreign investment is the social media which will be a US$270 billion opportunity by 2020 with the e-commerce segment in its desire to developed service and products to a larger and growing consumer base attracts about US$10–US$12 billion. The compound annual growth rate (CAGR) is being escalated with India’s investment in technology and its start-ups that attract foreign investment and at the same time attract employment opportunities as our universities and academic institutions generate engineers in large
numbers who are seeking for opportunities. As of this writing, where most highly
talented and young graduates travel across the globe seeking for better destinations to
work and build on their capabilities, investments that attract capital from abroad will help
in ensuring these graduates live in the country contributing to its GDP. The heart of the
matter is when people are deprived of opportunities in India leave for shores that value
their skills and talent.

If India can keep her millions of graduates will help in growth of the economy as she
partakes and participates in the global economy of sorts with an active interface with
neighbours, big and small but where her reputation will be even more valued where the
taskforce works on the principles of innovation in tackling ever-growing problems that
have no effective solutions to such as global warming, climate change tackling the energy
deficit where most of the 600,000 villages lack electricity and cities across the Indian
state lack efficient and smart electric grids.

With tremendous funding coming from abroad as the Ministry of Foreign Affairs
assert, India should shift her focus on the spirit of innovation. Social scientists who have
studied the country come up with fascinating results and stories where they find that out
of all countries across the globe, India is a country where innovation comes naturally. A
predominant reason is primarily owing to mindsets and thinking patterns as is in the
developed economies where people are not forced to live life on the edge and hence think
only on terms of a high quality lifestyle with no compromises in the making whereas in
India which is a poor country has to make compromises on living standards or on
utilisation of resources which naturally bring out the innovative bent of mind. Most
innovations in India are achieved in an exceptionally creative manner to have the goal
achieved or fulfilled with results. Such incidents that come out of innovation in
agriculture in solving a water problem, in industries or manufacturing hub, in the field of
education or in healthcare are many are not patented. Psychologists have proved that the
human mind when deprived of a resource is naturally inclined to achieve the end results
through creativity and imagination.

1.4 Aims and objectives for a cleaner economy

With a rising population, the problems are many. Our political elite may have the
necessary support with investments coming from abroad as investors across the
developed economies see India as the back office to the world. We are solving the
problems of the globe in our very own markets but as the world is wrestling with issues
of global warming and climate change, India needs to amplify her strategies in solving
the problems of global warming by utilising an ever-growing talented workforce to
develop technology that reduces greenhouse gases being emitted into the atmosphere
having a smaller carbon footprint.

We are aware of the benefits and repercussions of an extended carbon footprint on
health, agricultural practices and on marine life. The more strident our governments
become where technologies are created to enhance our lifestyles but have less impact on
the climate will further rapid changes for the better in our country and across the globe.
We cannot afford to lose our ecosystems and biodiversities that sustains and conserve
different life patterns. India’s aim should focus on a cleaner, greener, environment
making her a low-carbon economy like Germany and the others who already possess
effectual strategies to combat the aftermath of climate change and a warmer planet.
Across the globe, 2015 saw rapid advances in artificial intelligence as scientists and engineers have transformed the way we operate on computers to a phase where these large-scale systems are incorporated with cognitive models that offer solutions which was offered by humans. Take for instance, IBM that is currently working with banks and insurance organisations where solutions are offered on computerised models being induced with human thought processes through an advanced and complex system of cognitive computing. The 21st century technology is growing rapidly where organisations like IBM are relying on sophisticated computing models utilising the cloud as a platform having codes reinvented from the past embedding cognitive science into their robots.

The future of technology will be replete with cognitive computing where systems will be ultra intelligent and will be used for exploration and discovery offering precise and elevated expertise with deeper human engagement in solving problems and finding answers to problems which was an impossible task in the past. As organisations research and explore into the unknown in solving problems through cognitive computing, the innovations in machine language learning through natural language learning processes, and in deeper analysis of situations will prove to be a thing of the future. In today’s technological scenario, around 80% of all data from banking, literature, social and emotional expressions, chemistry equations and formulas in physics are out of the realm in current systems but as IBM predicts keeping in mind the transformation of artificial intelligence through cognitive computing will see that all data will be on the cloud and where most consumers across the globe will be interacting and interfacing with cognitive services and systems in less than a decade. IBM is a leading organisation in the technological domain and has stood the test of organisational resilience by constantly reinventing itself and sees for the 21st century with its investment on cognitive-based application programming interfaces bringing a tremendous influx to the digital revolution which will positively impact banking, insurance, the telecom industries and the retail industry.

2 Conclusions

Global warming is a dampener for any economy and will be more so for India as we are a developing country teeming with a huge population that today owns more mobile-phones across the globe where people’s mindsets are on having more technology and where the belief is with more technology, one’s social status is also boosted. The time is now to inject solutions to resolve the cataclysmic challenges of global warming and climate change where with the massive investments that come into our country can be used where societies and organisations can shift focus from computing to cloud and cognitive computing to tackle aggressive and uncontrollable factors of climate change where machines now have the competency to think like humans to solve bigger challenges that only technological processes and systems are capable of. It is possible that the growing wave of technology will benefit India and with our reliance on technology as now is the best time to optimise on finding the solutions as the platform is set quite naturally as we are a consumerist society.

The innovations and technological strategy should come from organisations like Google, IBM, Microsoft and other growing organisations, startups with government
intervention and involvement for building sustainable cities and preserving our dying ecosystems that are responsible for the sustenance of life. We can take inspiration from the internet being the biggest engine has made it possible to solve problems of employment, farming, and poverty and with it many other issues can also be solved in ensuring our cities and ecosystems with their biodiversity do not become a thing of the past but a resilient force being re-awakened. The technological sphere can solve and combat humanity’s problems but not to the extent where it can colonise humanity but rather being used and managed by human-beings to find solutions as is the case of cognitive processes and cognitive computing.

“It has become appallingly obvious that our technology has exceeded our humanity.” (Albert Einstein)

Consulted works
India’s technological climate


Notes

1 Thomas Malone is Patrick J. McGovern Professor of Management at the MIT Sloan School of Management and a Management Consultant.

2 COP 21 also known as the 2015 Paris Climate Conference.