India Must Develop AI Technology
for Future Economic and Strategic Security

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[**Abstract**: *Artificial intelligence is poised to become central to economic growth and strategic security. At present, the bulk of artificial intelligence research is conducted and financed by American or Chinese companies which is why their respective governments control access to technology. India lacks the basic infrastructure for doing meaningful research development in artificial intelligence. Taking cue from other countries, policymakers in India may consider public funding of research on artificial intelligence in a policy framework whereby direct funding to selected companies, start-ups and research institutions is made feasible. But, artificial intelligence has the potential to impact employment adversely in manufacturing and other sectors and thus may face political challenges against its use. Therefore, the challenges and opportunities in artificial intelligence call for urgent response from policymakers. India would need to have short-, medium- and long-term action plans for responding to the challenges and opportunities in artificial intelligence.]*

Artificial Intelligence (AI) is poised to become central to economic growth, revolutionising everything from manufacturing to innovation and labour market productivity, and potentially doubling the growth rate of the most advanced economies.[1] According to the PricewaterhouseCoopers (PwC) report dated 27 June 2017, AI will give a $15.7 trillion boost to Gross Domestic Product (GDP), i.e. Global GDP will be higher by 14 per cent in 2030, which is the biggest commercial opportunity in the fast-changing economy exceeding the combined output of China and India. By 2030, China and North America will receive the biggest economic boost from AI, i.e. 26 per cent and 14.5 per cent to GDP respectively, which will be equivalent to a total of $10.7 trillion and will account for almost 70 per cent of the global economic impact. Initially, North America will experience productivity gains faster than China, driven by its readiness for AI; however, China will begin to pull ahead of US' AI productivity in

ten years, after it catches up on a slower build up to the technology and expertise needed. Europe and Developed Asia will also experience significant economic gains from AI (9 to 12 per cent of GDP in 2030). Developing countries will experience modest increases (less than 6 per cent of GDP in 2030) due to lower rates of adoption of AI technologies. It demonstrates how big a game changer AI is likely to be in terms of transforming the lives of individuals, enterprises and the society.[2]

China has allocated large budgets for the advancement of AI, giving priority to cutting-edge fields such as robotics and machine learning. These are dual use technologies, having the potential to revolutionise warfare and change future security environments. But, China's attention to US' AI-based technologies and machine learning has got the US quite concerned. China has been heavily investing in American AI start-ups, alarming the US government enough for it to seriously consider strengthening its strategic investment regulatory mechanism, namely the Committee on Foreign Investment in the United States (CFIUS).

Moreover, China's investments in its universities, research laboratories and companies are huge and directed towards the building of state-of-the-art infrastructure to attract highly-skilled researchers and practitioners from around the world, while developing their own manpower in AI research and development.[3]

The reports of PwC and Accenture quoted above amply indicate that the future economies and the national security environment will be defined by AI; it will be a set of technologies that will shape global politics. At present, the bulk of leading AI research is conducted and financed by American or Chinese companies, allowing their respective governments to control access to the technology. The Indian government is trying to increase human capital by employing its younger generation through the Skill India initiative while seeking to attract global manufacturing to India via the Make

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[2] PWC (2017), "AI to Drive GDP Gains of $15.7 Trillion with Productivity, Personalisation Improvements," PWC Press Room, June 27. Available at: https://press.pwc.com/News-releases/ai-to-drive-gdp-gains-of--15.7-trillion-with-productivity--personalisation-improvements/s/3cc702e4-9cac-4a17-85b9-71769fba82a6

[3] Reddy, R.S. (2017), "Why India Needs a Strategic Artificial Intelligence Vision," *The Wire*, July 21. Available at: https://thewire.in/tech/india-artificial-intelligence

in India programme. The Digital India initiative aims to provide nationwide access to the digital platform. Artificial Intelligence has the potential to influence these initiatives in a big way. Thus, from the point of view of strategic planning for overall development, Indian policymakers have to recognise the potential of AI and develop a relevant set of technologies.

Once it is recognised that AI technology has the potential to shape the future of India's economic and national security environment, the country should deliberately adopt a policy to drive AI innovation, adaptation, and proliferation in sectors beyond consumer goods and IT services. In not setting the national strategies concerning AI, India runs the risk of falling behind the US and China. Modern day computers perform far more complex operations and open up opportunities for rapid advancements in AI. These efficiencies are compounded by the proliferation of cloud technology. The combined impact of superior hardware, cloud-based on-demand computing and the frequent analysis of big data opens up the process of RAPID machine learning.

Artificial Intelligence powered applications and services are already available to Indian customers. However, Indian academics, laboratory researchers, and entrepreneurs face challenges in conducting research as the infrastructure necessary for AI revolution has not come up indigenously. Indian data largely reside in servers beyond the country's borders over which the Indian government has little direct control. Without critical infrastructure, India will continue to struggle to reach inflexion point in AI efficiency and productivity. On the other side, Chinese search engine, Baidu, has been developed with built-in AI capabilities. Baidu invested heavily in physical infrastructure to create an enabling environment in which multifaceted AI research could flourish. Baidu is thus a unique Chinese platform, independent of the western platform. Baidu's advancements in homegrown infrastructure, its institutionalised approach to research and an extended innovation ecosystem is something which is lacking in India. Until India creates infrastructure that is well-matched with that of the US and China, the deep learning capabilities to address the linguistic diversity across India using machine intelligence may be elusive. Thus, the

policy focus in India should be on the creation of Indian Google on the one hand and the organisational structure, facilities and customs required for these technologies on the other.

Indian policymakers wishing to spur AI research would do well to look closely at global lessons. Besides, India is not bestowed with laboratories like those of Google, IBM, Microsoft and Facebook or innovation clusters like those of Silicon Valley. Therefore, India has to have public funding in order to advance AI research. Even late entrants like South Korea and Australia invested in AI research through their governments along with the private sector to spur AI growth. Clearly, public funding for AI has transcended borders.[4]

Following the examples of the US, China, the European Union, South Korea, Australia and the like, the Government of India should support AI research and development. The Indian government should provide the necessary policy framework and incentives, including direct funding to select companies, startups and research institutions, to adopt the model of DARPA (Defense Advanced Research Projects Agency), an agency of the United States Department of Defense. This implies that India's defense will require a discretionary research apparatus in order to ensure the flow of research ideas from the laboratories to the real world and take a quantum leap to match China's progress, fuelled by the lessons from the DARPA experience.

As AI technology takes root, AI induced automation would begin to impact jobs as has been recently witnessed in India's IT industry. Similarly, while India's hopes increase with its manufacturing through the Make in India programme, it would be a matter of close examination as to how employment would be affected with the advent of industrial robots. Even in the Skill India programme, the orientation of training disciplines would need to be kept under constant review. Undoubtedly, it would impact the middle-skill category jobs like those of line workers, clinical workers, and the like. Similarly, an individual's upward-mobility may also slacken. Thus, to maintain the employment potential, skilling and reskilling would be required to equip

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[4] Vempati, S.S. (2016), "India and the Artificial Intelligence Revolution," Carnegie India, August. Available at: https://carnegieendowment.org/files/Brief-Vempati-AI.pdf

manpower with requisite skills in new fields opened by AI technology. This would be possible if the education of a corresponding standard is available in the system. Thus, the National Education Policy must urgently make radical recommendations on the models of education that will best suit the future economy.

There is a possibility that politics surrounding technologies such as AI in India could give rise to protests as had happened when India was to introduce computers to control machine tools in the 1960s and banking in the 1980s. However, it has been effectively demonstrated that computers have not only upscaled productivity in India, but also has empowered its citizenry in a big way. Similarly, the AI opportunity in India needs to be viewed in the same way as the economic scenario would change rapidly with the proliferation of AI technologies. The nature of work (jobs) would constantly change in an environment of continuous reskilling. Mid-career job change would become a routine feature as individuals would have to re-invent and reskill themselves to stay relevant in the fast-changing economic environment. India would have to prepare itself to experiment and innovate on a continuous basis in the AI environment.

The challenges and opportunities concerning AI advancement call for a response and that too urgently. Advances in AI would affect the three flagship programmes. Automation will result in shortfall in job creation under the Make in India programme. The obsolescence of skills will put a strain on the Skill India programme; if consumer data continues to be at the mercy of AI powered platforms and services located outside India—the fears of digital colonisation may prove to be real. The AI powered global economy could dilute India's demographic dividend unless new education policies are brought in to adequately adapt to the future. If India does not come up with a strong AI base, it could be strategically disadvantaged in the balance of power, particularly China which has developed considerable defense-driven AI capabilities.

Therefore, India needs to have short-, medium- and long-term action plans. In the short term, India needs to reorient its flagship programmes, namely Make in India, Skill India, and Digital India. The Make in India programme should be investing in automation research by developing appropriate research jobs and design centres with

the ultimate objective of making India a global hub for machine intelligence based innovation in manufacturing. The programme must also envisage creating linkages among universities and start-ups along the way. Likewise, the Skill India programme should be made resilient to skill obsolescence by tying together the employers, training institutes and students and by paying special attention to new skills needed to survive. Similarly, the Digital India programme needs to be reconfigured to establish cloud infrastructure in India in order to reduce dependence on platforms having linkages outside India. Simultaneously, with regards to the reorientation of the three flagship programmes, the National Policy on Education should be revisited to place in position alternative models of education which would be better suited to the future needs of the economy and which would call for rapid changes in curricula. As a long-term strategy, as advocated in the body of this text, India should adopt the DARPA model of defense research and funding to private sector, public sector and universities to create a talent pool to develop technologies for both civilian use as well as strategic needs.[5]

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[5] *Ibid.*