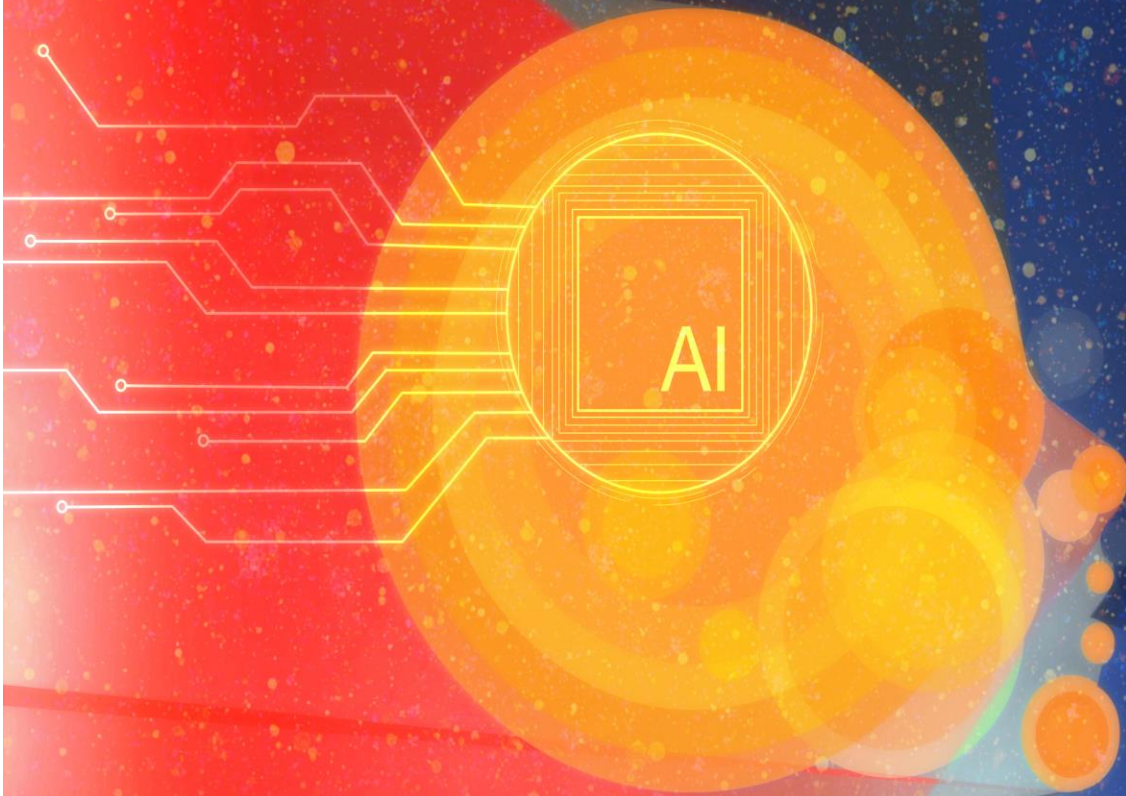


# NATIONAL ARTIFICIAL INTELLIGENCE STRATEGY FOR THE PHILIPPINES



## **Introduction**

The Fourth Industrial Revolution (FIRe) is set to transform industries at an unprecedented rate. It is a disruption that will change everything from products and processes to design philosophies and business models—a multifaceted phenomenon involving technology, people, and the environment. FIRe is supported by nine main technological pillars: Big Data and Analytics, Simulations, System Integration, Internet of Things (IoT), Autonomous Robots, Cloud Computing, Cybersecurity, Augmented Reality (AR), and Additive Manufacturing.

Artificial Intelligence (AI) has been projected to drive 70% of FIRe, with blockchain and cloud computing accounting for the other 20%.<sup>1</sup> In fact, according to PwC's recent report, AI could contribute a whopping US\$15.7 trillion to the global economy by 2030.<sup>2</sup> In Southeast Asia, McKinsey reports that AI could be seen to open up opportunities in the region in that it could “automate about 50% of the work activities performed in ASEAN's four biggest economies,” which include the Philippines. Furthermore, in an October 2020 report by EDBI and Kearney, AI is expected to boost Southeast Asia's GDP by up to US\$1 trillion by 2030<sup>3</sup> while AI will uplift the Philippine GDP by 12% in 2030 equivalent to US\$92 billion.<sup>4</sup> In this light, a strong focus on AI has significant potential to uplift the lives of Filipinos, local industries, and the national economy

It is no question that AI can be expected to revolutionize many mundane aspects of our daily lives within the next decade. For one, the automotive industry will most likely be able to practically perfect autonomous vehicle technology. The synchronization of vehicle movements will be straightforward, and it can be expected that traffic congestion will be addressed and alleviated even in developing countries like the Philippines. AI-driven precision farming can also drastically decrease losses due to pests, and natural disasters, and can significantly increase outputs of high value products per hectare of land. Having the right people and technology to handle the above concerns will not only allow wealth generation but also ensure inclusivity, as these will address the need for shared basic infrastructure that citizens need to be productive and contented: housing, transportation, and food security, among others.

AI is fueled by R&D and innovation. Hence, the Philippines benefits from favorable changes in the local innovation and startup ecosystem. In 2019, the local startup ecosystem ranked 54<sup>th</sup> out of 100 countries, an increase of 16 places from 2017.<sup>5</sup> In 2020, the Philippines rose to the 50<sup>th</sup> rank out of 131 economies (up from 54<sup>th</sup> in 2019) in the annual Global Innovation Index (GII), which has put the country in the top 10 best-ranked lower middle-income economies (#4 out of 29).

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<sup>1</sup> “Big Data Executive Survey 2018”, NewVantage Partners LLC, 2018.

<sup>2</sup> <https://www.pwc.com/gx/en/issues/data-and-analytics/publications/artificial-intelligence-study.html>

<sup>3</sup> EDBI, “Artificial intelligence could deliver a US\$1 trillion uplift to Southeast Asia's GDP by 2030”. Accessed from: <https://www.edbi.com/news-room/latest-news/artificial-intelligence-could-deliver-a-us1-trillion-uplift-to-southeast-asia-s-gdp-by-2030>

<sup>4</sup> EDBI and Kearney, “Racing towards the future: artificial intelligence in Southeast Asia”, 2020.

<sup>5</sup> PricewaterhouseCoopers Philippines, “Charging Ahead: Philippine Startups Break Boundaries”, 2020. [https://www.pwc.com/ph/en/ceo-survey/2020/pwcp-ph-start\\_up\\_survey\\_2020.pdf](https://www.pwc.com/ph/en/ceo-survey/2020/pwcp-ph-start_up_survey_2020.pdf)

However, there are still structural challenges that need to be addressed. Philippine Gross Expenditure on R&D (GERD, which is 0.16% of GDP) is still below the recommended expenditure of 1-2% of GDP. Specifically, the country has not been spending enough on education, R&D, and innovation linkages. Furthermore, AI investments in the Philippines, which is less than US\$0.01 per capita, is still the lowest among ASEAN's major economies. Data quality and digital infrastructure remain underdeveloped, which are deemed hindering factors in the performance of the Philippines in AI and innovation rankings.

Today, most enterprises and C-level executives worldwide are largely cognizant of AI's enormous impact on their business processes and products, but the Philippines is slow in this realization and its embrace of AI. To address these, the major barriers to AI adoption for most organizations and enterprises in the Philippines have been identified and recommendations outlined in this document.

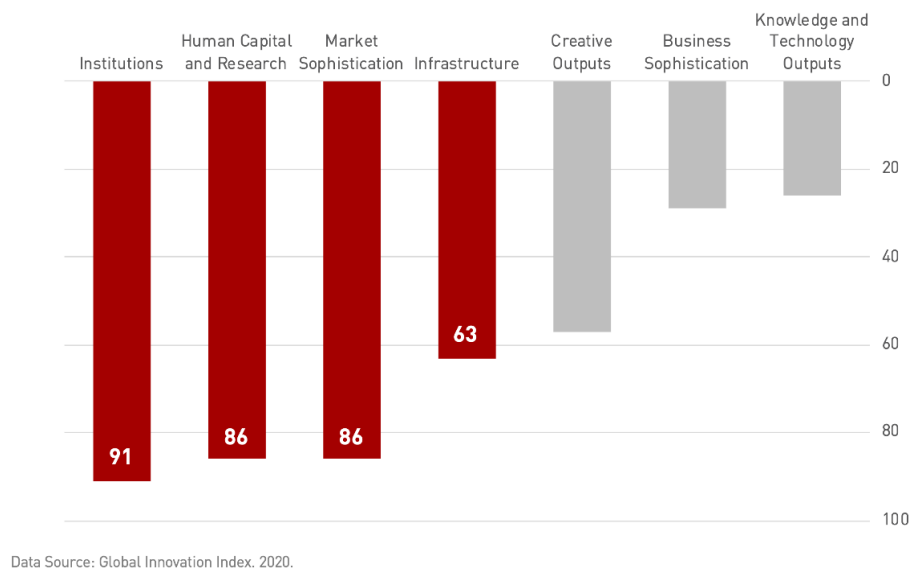
In this light, the ***National Artificial Intelligence (AI) Strategy Roadmap*** was formulated to guide government and private sector stakeholders in employing AI technologies and developing AI economies, while being mindful of the potential consequences and impacts of algorithms to processes and business models. Its overall focus is on how AI can be used to uplift the Filipino people, improve the productivity of local industries, and enhance the competitiveness of the national economy.

The Roadmap is organized according to pillars (2), strategic dimensions (4), strategic imperatives (7), and strategic tasks (42).

## **The Philippine AI Landscape**

The Philippines benefits from favorable changes in the local innovation and startup ecosystem. In 2019, the local startup ecosystem ranked 54<sup>th</sup> out of 100 countries, an increase of 16 places from 2017.<sup>6</sup> In 2020, the Philippines rose to the 50<sup>th</sup> rank out of 131 economies in the Global Innovation Index (GII), which has put the country in the top 10 best-ranked lower middle-income economies (#4 out of 29).

The Philippine economy is among countries that have a high innovation input-output performance, placing it among the global brand outperformers quadrant of the GII brand value matrix—i.e., the Philippine economy has the ability to “translate more effectively innovation inputs into innovation outputs.” This is an assuring development, giving firms more confidence in investing more in R&D and science to further accelerate innovation.

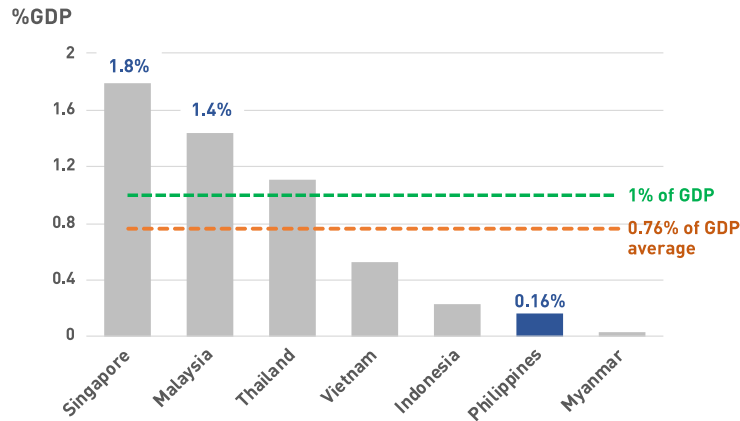


**Fig 1. PH Rankings in the GII Pillars, 2020**

Moreover, a hint can be taken from the country’s performance in the seven GII pillars as actionable indicators in terms of optimizing efforts toward this end by focusing on certain strategic areas (see Figure 1). There is definitely room for growth, especially in the following four pillars of the GII: institutions, human capital and research, market sophistication, and infrastructure. More specifically, the country has shown weakness in Education and R&D engagement from companies.

<sup>6</sup> PricewaterhouseCoopers Philippines, “Charging Ahead: Philippine Startups Break Boundaries”, 2020. <https://www.pwc.com/ph/en/ceo-survey/2020/pwcp-ph-start-up-survey-2020.pdf>

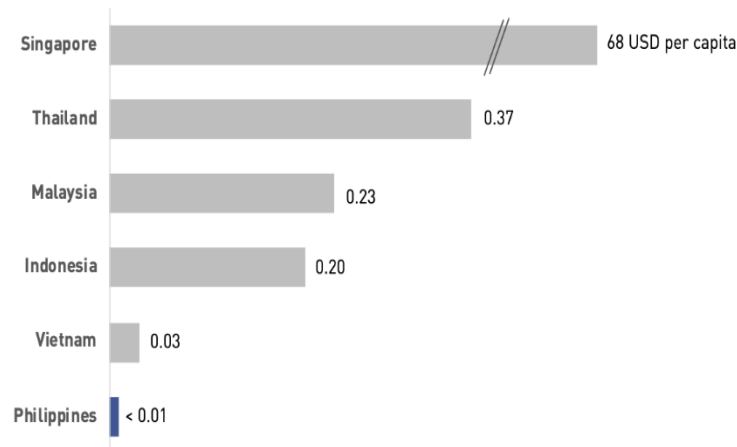




Data Source: World Bank Data Base. 2020. Available online: <https://data.worldbank.org/>  
For Singapore and Thailand, data are taken from OECD and NXPO, respectively, as they have more recent information.

**Fig 2. GERD of ASEAN-member countries**

Figure 2 presents the Gross Expenditure on Research on Development (GERD) of select ASEAN countries. The 0.76% of GDP is the average among the focused countries while the Philippines spent a meager 0.16% of its GDP in R&D. The Philippines' performance and the ASEAN average are clearly below the recommended expenditure which is at 2%. Specifically, the country has not been spending enough on education, R&D, and innovation linkages.



Data Source: Pitchbook; Kearney analysis (2020)  
\* Philippines's figure reflects investments in 2018 due to data availability

**Fig 3. AI Investments across Southeast Asia, 2019**

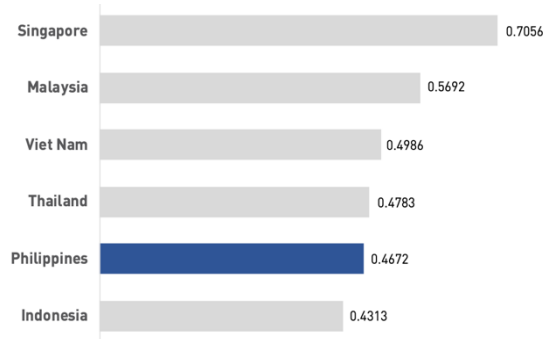
Figure 3 shows that within ASEAN member countries—which, except for Singapore, tend to lag behind more advanced countries by two to three years in terms of AI investments—the Philippines, at less than 0.01 US\$ per capita trails behind its neighbors Thailand (0.37 US\$ p.c.), Malaysia (0.23), Indonesia (0.20) and Vietnam (0.02). A relative dearth of R&D personnel<sup>7</sup> and weak data infrastructure and governance<sup>8</sup> are also major inhibiting factors.

<sup>7</sup> Department of Trade and Industry, op. cit.

<sup>8</sup> EDBI and Kearney, op. cit.

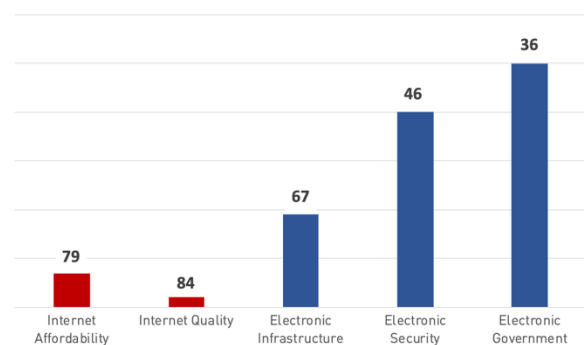
Furthermore, the Digital Quality of Life (DQL) Index 2020 reports that the Philippines (PH) ranks 66th out of the 85 countries; it is 5<sup>th</sup> of the 6 countries indexed from Southeast Asia (see Figure 4). The DQL incorporates five fundamental pillars: internet affordability, internet quality, electronic infrastructure, electronic security, and electronic government (see Figure 5 for PH rankings).

**Fig 4. Digital Quality of Life Index Southeast Asia, 2020**



Data Source: Surfshark's Digital Quality of Life Index (2020)

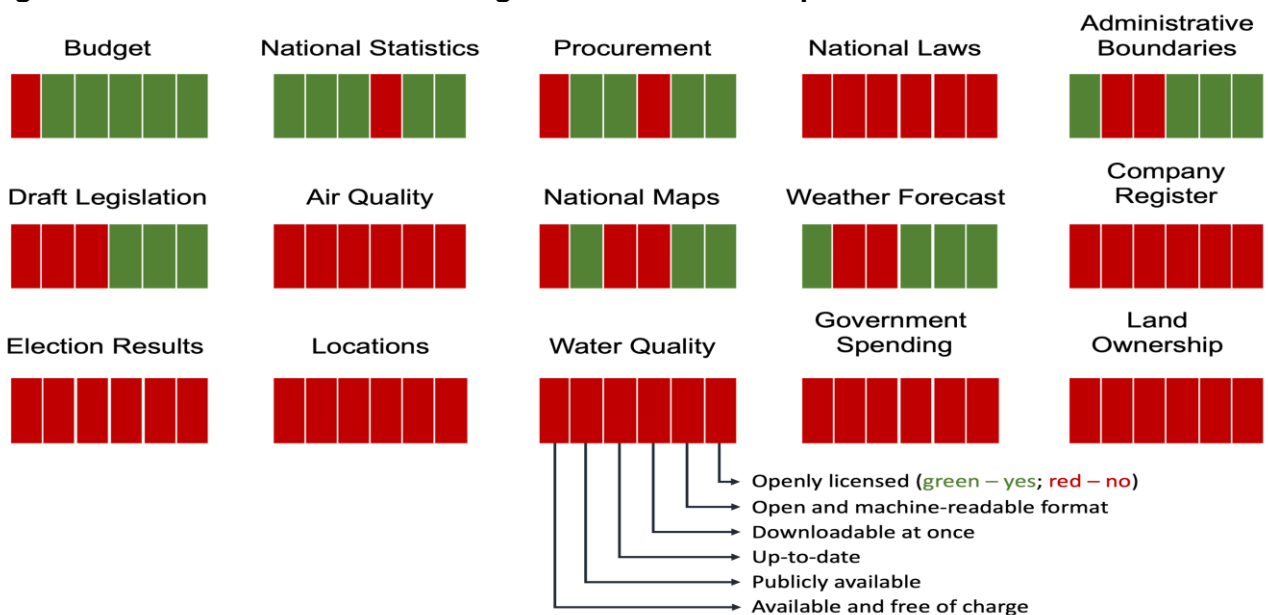
**Fig 5. PH Ranking in Digital Quality of Life Index Indicators, 2020**



Data Source: Surfshark's Digital Quality of Life Index (2020) Philippines' Country Profile

In terms of data infrastructure quality, it is apparent that government needs to improve on several aspects with respect to opening up its datasets to other stakeholders (see Figure 6). Meanwhile, it must also be stressed that the government and other sectors must do more than just boost access to (open) data; they also need to educate society on how to retrieve and make sense of these datasets. In other words, the public and private sectors should all take part in extracting value from these open datasets. After all, data is unserviceable without analytics.

**Fig 6. PH Performance in select categories of the Global Open Data Index**



## **Barriers to AI Adoption among Industries in the Philippines**

Most enterprises and C-level executives worldwide are already largely cognizant of AI's enormous impact on their business processes and products, but the Philippines is slow in this realization and its embrace of AI. To address these, the major barriers to AI adoption for most organizations and enterprises in the Philippines have been identified, as follows:

- (1) Lack of Understanding of Data Science and AI.** Many organizations in the Philippines still have insufficient knowledge of what AI and Data Science are. Hence, they cannot conceptualize how this new technology and set of tools can help their business processes and products. Critically, they are not willing to invest money and other resources into something whose value and impact are not explicit nor tangible to them. Among those with a degree of familiarity to AI, concern about employee backlash due to the pace of change and job displacement tends to be an inhibitory factor.
- (2) Lack of Knowledge on Potential Use Cases.** Perhaps another reason local industries and other organizations lack an understanding of the field of analytics is the scarcity of information on potential use cases of AI. While many concrete examples exist outside of the Philippines that are readily accessible via the news and from online resources, many local enterprises cannot connect or relate to these examples. Many still seem far-fetched to local enterprises and the workforce. There is a need more potential use cases that are locally generated, so as to paint a more compelling picture for local stakeholders.
- (3) Lack of Resources.** The lack of resources is categorized into two forms: equipment (computational resources) and manpower (human resources). First, many enterprises, mostly micro, small, and medium enterprises (MSMEs) in the Philippines are resource-challenged in terms of the capability to set up their own computational resource, including cloud computing resource, and/or even acquire business intelligence (BI) software to aid them in their data and system analysis.  
  
Second, most, if not all, industries in the country, especially those that have started to invest in AI and Data Science, have been restricted by the scarcity of data experts, which include data analysts, data scientists, machine learning engineers, data engineers, data architects, and data stewards, among others. Furthermore, many of the data-skilled talents lack the required business skills to make AI R&D projects practical and profitable for the enterprises.
- (4) Lack of Data Strategy.** Data Strategy or AI strategy is essentially a vision for how organizations should invest their resources towards building capabilities in data science and AI, anchored particularly on each company's strategic imperatives and business objectives. A common misunderstanding is that a data strategy is all just about the data and the technology—e.g., how/what to collect, where to store, what BI platforms to use, etc. Rather, it is about how acquiring technologies and technical capabilities can help enterprises achieve their strategic goals. It is potentially disastrous when organizations pour significant investments into digitization without charting their data/AI strategy in alignment with their own

corporate vision. This could result in enormous monetary and opportunity losses. This particular barrier is more prevalent in large enterprises that have the financial capacity to invest in digitization, which include the capability to solve use cases with ML, but do not have the right people who are both technically and business savvy to bridge the gap between technology and business.

**(5) Uncertainties about Legal & Regulatory Framework for AI.** By setting out ethical boundaries to prevent indiscriminate and non-rights-respecting AI applications and protections for both customers and businesses, a clear legal and regulatory framework for AI will both protect the rights of Filipinos and spur responsible adoption of and innovations in AI. However, at the present, the Philippines lacks a complete framework for such. Indeed, as far as AI has been in the public statements of lawmakers, more emphasis has been placed on its potential disruptive effects such as job losses, especially in the financially important BPO sector. Fortunately, one component of the framework is currently present: the Data Privacy Act of 2012 (Republic Act No. 10173), modelled after the European Union's General Data Protection Regulation, offers robust protections for data privacy. Filling in the missing pieces of the puzzle is now the next step.



## **The National AI Strategy**

In 2019, the Philippine Congress championed the approval of the Philippine Innovation Act (Republic Act No. 11293), aiming to fund and support R&D efforts in the country towards national development. The Act's main objective is "to generate and scale up actions in all levels and areas of education, training, research, and development towards promoting innovation and internationalization activities of micro, small and medium enterprises as drivers of sustainable and inclusive growth."

Consistent with the law, the ***National Artificial Intelligence (AI) Strategy Roadmap*** was formulated to guide government and private sector stakeholders in employing AI technologies and developing AI economies, while being mindful of the potential consequences and impacts of algorithms to processes and business models. Its overall focus is on how AI can be used to uplift the Filipino people, improve the productivity of local industries, and enhance the competitiveness of the national economy.

Among the Roadmap's main objectives are:

1. To maintain the regional and global competitiveness of Filipino industries, noting that AI is one of the biggest drivers of innovation for enterprises;
2. To identify key areas (in both R&D and technology application) for investing both time and resources of government, industry, and society, which includes harnessing existing global knowledge and new technologies that will aid in the development of new processes, products, and services for increasing productivity and for promoting overall public welfare;
3. To recommend ways for effectively fostering a triple-helix (R&D) collaboration among government, industry, and the academe, which is essential to national development;
4. To suggest approaches for preparing the future workforce for the jobs of the future; and
5. To attract the biggest industries to set shop in the country, and thus generating more jobs for the Filipino people.

The Roadmap is organized according to pillars (2), strategic dimensions (4), strategic imperatives (7), and strategic tasks (42). The pillars and dimensions have been defined so as to ensure that the country has clear metrics in terms of tracking the progress of its implementation towards transforming the Philippines into a globally competitive AI-driven economy.

It is divided into two pillars based on the structure of the Global AI Index (GAI).<sup>9</sup> The *first* pillar is **Implementation** which reflects the operationalization of AI by practitioners in business, government and communities. The *second* pillar is **Innovation** which reflects technology

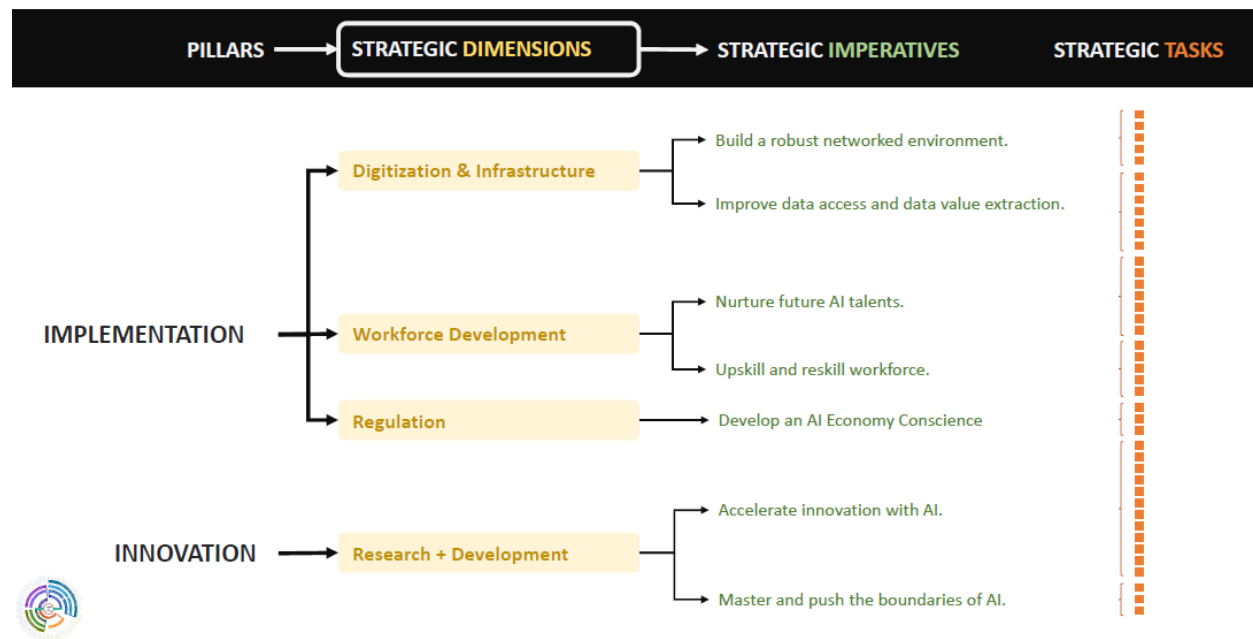
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<sup>9</sup> The Global AI Index. Accessible at: <https://www.tortoisemedia.com/intelligence/global-ai/>.

breakthroughs and advancements in methodology that are indicative of greater capacity for AI in the future.

Strategic dimensions comprise each pillar. The *first* dimension is **Digitization and Infrastructure** as it is critical in achieving all the strategic goals defined in this Roadmap. The *second* dimension is **Research and Development** that includes as subset “Investing in Strategic Sectors” and “International Collaboration.” The *third* dimension is the **Workforce**, which focus on anticipating and preparing for the potential impact of AI technologies by ensuring enough talents and skilled practitioners that can deliver AI solutions (more on application and implementation) and perform AI research (academic and industry-driven). This dimension will also cover both reskilling and upskilling of the workforce. Finally, the *fourth* dimension is **Regulation**, which protects human rights and puts into place equitable AI activating opportunities. Digitalization and Infrastructure, Workforce Development, and Regulation fall under the Implementation pillar of the Roadmap, while Research and Development is under the Innovation pillar.

Each of the strategic dimensions consists of strategic imperatives. For Digitization and Infrastructure, these are to (1) build a robust connected and networked environment, and (2) improve data access and data value extraction. For Workforce Development, (3) transform education and nurture future AI talents, and (4) upskill and reskill the workforce. For Regulation, (5) build an AI ecosystem “conscience.” And lastly for Research and Development, (6) master and push boundaries of AI, and (7) accelerate innovation with AI by helping industries innovate through AI R&D, supporting and nurturing AI startups, and transforming institutions to maximize the impact of AI R&D.



**Fig 7. National AI Strategy – Pillars, Dimensions, Imperatives, Tasks**

## Digitization and Infrastructure

### 1. Build robust connected and networked environment

The need for reliable and robust network and internet connection is paramount to the transformation of the Philippines into a knowledge-based economy. This is crucial to support, sustain, and scale up AI and Data Science and Analytics (DSA) programs in the country. It is imperative that all localities should have fixed, reliable, and fast broadband speeds. The goal is for every household to have at least 1 Mbps download and upload capabilities and for critical zones — economic, government offices, Higher Education Institutions (HEIs), and Research Development Institutions (RDIs) — to have internet speeds that are at least within the global averages for mobile and fixed broadband (currently about 40 and 90 Mbps, respectively).

<b>Strategic Tasks: Build robust connected and networked environment</b>	
1. Make the internet equitable; i.e., more affordable for everyone. Ultimately, ensure everyone has access to the internet.	DICT
2. Improve internet quality.	DICT
3. Ensure that industries, especially those in economic zones, have access to reliable and secure networks that are at least within the global averages; that is, about 40 and 90 Mbps for mobile and fixed broadband currently.	DICT, DTI
4. Ensure that government agencies and other public institutions have access to reliable and secure networks. Government agencies, like economic zones, must be considered as reliable areas for information access and transfer.	DICT, DILG for LGUs
5. Ensure that HEIs and RDIs have access to reliable and secure networks.	DICT, CHED, DOST

### 2. Improve data access and data value extraction

Data accessibility be improved, and cross-sector data utilization be supported as it powers AI. In addition to opening up public datasets, the government also needs to explore how private datasets can be tapped and, at the very least, insights be democratized. MSMEs lament about the imbalance of power to larger companies due to data ownership and exclusivity.

To help MSMEs, academic institutions, and the general public in this aspect, it is proposed to have both a National Data Center (NDC) and National Research Cloud (NRC). The NDC will house and secure government, private, and other publicly available datasets. It will be a one-stop-“data”-shop for governments, universities, and enterprises. On the other hand, the NRC will provide our academic researchers and MSMEs shared AI resources such as supercomputers.

**Strategic Tasks: Improve data access and data value extraction**

6. Make public data open, available, and digestible, for analysis.	DICT, FOI, All NGAs
7. Build a <b>National Data Center (NDC)</b> that will eventually be housed under the proposed National Center for AI Research.	DOST, DICT
8. Invest in a <b>National Research Cloud (NRC)</b> that will be part of NCAIR, which will afford our scientists and researchers with low-cost access to computing power and public datasets secured in a cloud environment.	DOST, DICT
9. Encourage government agencies, RDIs, HEIS, and the private sector to maintain their own data centers linked to the NDC.	DTI, DICT, DOST
10. Encourage and promote data analysis (at least descriptive analytics) across all functions of businesses, industries, and government agencies.	DOST
11. For more sensitive data sets, promote projects that would enable access to them as long as the business value and/or the value to society is clear.	DOST, DTI
12. Extensive training of analysts and data scientists to extract and communicate actionable insights from data accessible from ST6.	CHED, DTI, DOST

## Workforce Development

### 3. Transform education and nurture future AI talents

The Philippines needs to invest in AI-enabling resources and develop a deep appreciation for Science, Technology, Engineering, and Mathematics (STEM) and DSA. In particular, there is a need to include the DSA foundations (mathematics, statistics, and computing) in secondary education and general courses of data analytics, business analytics, and introductory AI in HEIs. The country must increase the number of research-oriented graduate students in business analytics, data science, and AI trained in quality AI and DS degree programs. It is also imperative to train competent and confident AI modules teachers with the help local and international organizations. Finally, local academic institutions must be incentivized to have practitioners engage with graduate students to maximize impact of AI research to other fields.

**Strategic Tasks: Transform education and nurture future AI talents**

13. Promote data literacy for all.	DepEd, CHED, DOST
14. Ensure proper training of teachers in Data Science and Analytics (DSA)	DepEd, CHED, DOST
15. Support and development of AI-centered graduate programs.	CHED

16. Increase business analytics, data science, and AI graduate students.	CHED, DOST
17. Promote lifelong learning. Design learning pathways for out-of-school individuals who want to learn the latest trends and technologies in AI.	CHED, DOST, DTI, TESDA
18. Include data science and analytics, including data visualization and storytelling, as general education courses in universities.	CHED
19. Work with technology companies to provide sufficient computing resource and equipment to students and teachers.	DepEd, CHED, DOST, DICT

## 4. Upskill and reskill the workforce

There is a need to incentivize industries to offer Learning & Development (L&D) programs related to data extraction, data cleaning, data analysis, and machine learning, among others. TESDA is currently pursuing the creation of the sector skills councils/recognized industry boards or associations, which shall provide specific L&D programs for workers, employers, and trainers.

Strategic Tasks: Upskill and reskill the workforce	
20. Incentivize industries to offer data literacy and L&D programs.	DTI, TESDA, DOST, DOLE
21. Develop sector-specific curricula or stackable programs with varying degrees of specialization which include BI and other AI tools.	DTI, TESDA, DOST
22. Identify the industry-specific tools to help upskill the workforce	DTI, TESDA
23. Incentivize industries to send employees for graduate studies that focus on R&D to develop a scientific culture within organizations.	DTI, DOST, CHED, DOLE
24. Identify jobs that are vulnerable to automation and other FIRE technologies. Map the skills that need upgrading or retooling.	DTI, DOLE, NEDA

## Regulation

### 5. Build an AI Ecosystem “Conscience”

Intellectual property (IP) laws and data-protection laws need to be strengthened to address potential ethical concerns on the use of both data and AI. Further, AI technologies need to be standardized. In this aspect, particular government champions need to work together including the National Privacy Commission (NPC) for data protection, the Intellectual Property Office of the Philippines (IPOPHL) for intellectual property protection, the Philippine Competition Commission (PCC) for competition enforcement, and the DTI for consumer protection.

It is recommended that the government establish a commission or an advisory board composed of lawyers, ethicists, academics, and data science practitioners who can ensure responsible and internationally-aligned use of AI.<sup>10</sup> A “regulatory sandbox” is recommended, so that government can provide a better testing ground to balance both regulation and consumer protection that can help assist the growth of emerging business models brought by AI.

<b>Strategic Tasks: Build an AI Ecosystem “Conscience”</b>		
25. Ensure industries, especially MSMEs, to freely compete in an AI-driven and data-driven environment to support their growth.		PCC, IPOPHL, DOST
26. Review and transform business regulations for ease of business, especially in launching new platforms, products, and services.		DOLE, DTI
27. Establish a committee of experts in data and AI ethics who will serve as guardians of AI usage.		DICT, DOST, IPOPHL, NPC, NAST, CHR

## Research and Development

### 6. Master and push the boundaries of AI

To be recognized as one of the AI hubs in ASEAN, the Philippines must fortify its understanding of AI technology and contribute to the global body of AI knowledge. Furthermore, there is a need to improve the immediate recruitment of international talent and enhancement of international collaboration to increase international visibility. Pushing the boundaries of knowledge in AI translates quantitatively to publications in peer-reviewed indexed journals and presentations in international conferences related to AI and computing. It is recommended that the research be aligned with the Harmonized National Research and Development Agenda (HNRDA) and the National Higher Education Research Agenda (NHERA) to integrate AI in HEIs and RDIs.

<b>Strategic Tasks: Master and push the boundaries of AI</b>		
28. Fund and develop competency in AI research as measured by publications, patents, and technology disclosures.		DOST, CHED
29. Invite and recruit international experts that can bring in new capabilities, serve as AI mentors, and promote international collaborations.		DOST, CHED
30. Appropriate funding for AI algorithmic innovations.		DOST, CHED

<sup>10</sup> Jobin, A., Ienca, M., and Vayena, E., “The Global Landscape of AI Ethics Guidelines,” *Nature Machine Intelligence* 1, 389-399 (2019).



## 7. Accelerate innovation with AI

There is a need to invest in AI R&D on strategic areas where the Philippines can perform well and compete globally. These strategic areas should attract big MNCs maximizing local AI talent. Furthermore, startups must be incentivized, in line with the Innovative Startup Act, to accelerate economic growth through creating more jobs, wealth, new markets, and effect innovations.

<b>Strategic Tasks: Accelerate innovation with AI</b>	
31. Strengthen academic-industry partnerships in AI R&D	DOST, DTI
32. Incentivize HEIs to promote R&D internships with local private institutions.	CHED, DOST, DTI
33. Government must measure, coordinate, and improve industry policies	DOST, DTI
34. Strengthen academe-industry technology transfer mechanisms	DOST, DTI
35. Identify and prioritize sector-specific R&D projects that can maximize impact of AI research.	DOST, DTI, and NGAs
36. Track and analyze the quality and quantity of job displaced, created, and transformed as a result of academic-industry partnerships.	DOST, DOLE, DTI
37. Identify and support local startups that can significantly contribute to the AI ecosystem. Commercialize AI R&D by providing incubation services.	DTI, DOST
38. Improved government regulation in the areas of visa issuances, tax breaks, and stock issuances to foreign technologists and startups.	DTI, DOST
39. Encourage and incentivize investors and venture capitalists to support promising AI startups through tax breaks visas, among others.	DTI, DOST
40. Host AI-themed hackathons to encourage organizations to invest their time and creativity in helping the nation develop an AI ecosystem.	DTI, DOST
41. Host events to foster collaboration with global AI experts and startups.	DTI, DOST
42. Build a National Center for AI Research (N-CAIR)	DTI, DOST, DTI, NEDA

## National AI Strategy Roadmap FOR THE **PHILIPPINES**

2 PILLARS

4 STRATEGIC DIMENSIONS

7 STRATEGIC IMPERATIVES

42 STRATEGIC TASKS

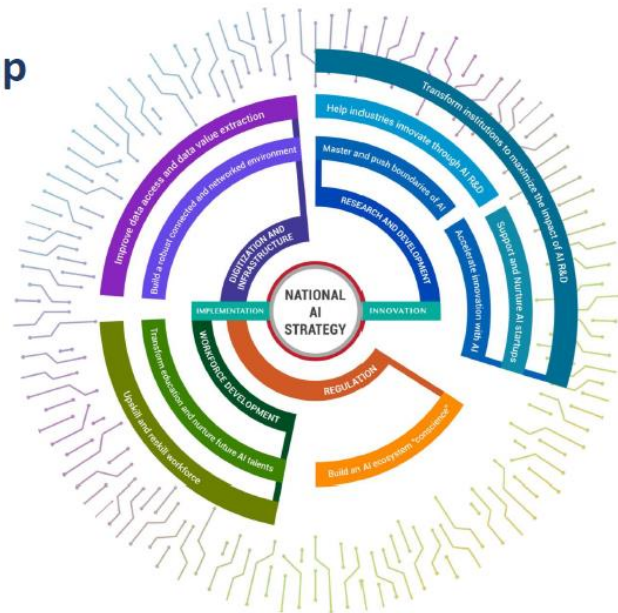


Fig 8. National AI Strategy

## **Ways Forward**

**Governance.** A body that would steer and oversee the implementation of the Roadmap needs to be established, composed of key government agencies, including the DTI, DOST, NEDA, DICT, CHED, TESDA and other champions from government, together with industry and academic representatives.

**Funding.** AI can be a good anchor to start justifying increased public spending for R&D, as it immediately has a multiplier effect and is aligned to future jobs and skill sets. Currently, the Philippines is spending less than 0.2% of GDP on R&D (US\$ 0.8 B), far from the global benchmark of 1% of GDP (~US\$ 3.75B) and Europe's Barcelona target of 3%.<sup>11,12,13</sup> This places the Philippines second to the last compared to other countries in Southeast Asia. In fact, experts suggest that the Philippines should target at least 2% of GDP (~US\$ 7.4 B or ~US\$ 370B).

**National Center for AI Research (NCAIR).** The National Center for AI Research (NCAIR) will serve as the country's hub for AI research that will be instrumental in making the Philippines an AI Center of Excellence. It will be responsible for advancing scientific discoveries in AI, including algorithmic innovations, nurturing and developing AI talent and Data Science leaders, and engaging in research and development (R&D) projects that address various socio-economic needs of society and industry. Given that the two pre-requisites to advance AI research are data and computing power, NCAIR is also expected to build and administer both the National Data Center (NDC) and the National Research Cloud (NRC).

The creation of NCAIR is central to the implementation of the AI Roadmap as it will perform world-class industry-driven R&D activities and coordinate AI integrators in regional hubs previously identified by the DOST. In particular, NCAIR will serve as a focal hub for R&D collaboration between universities, industries, multinational companies, RDIs, and startups. More importantly, one of the goals of NCAIR would be to assist MSMEs interested in using different DSA and AI tools to help them improve their efficiency and productivity through AI and data-driven science.

Technical capabilities at NCAIR would initially include algorithmic improvements in machine learning applications, natural language processing, deep learning, recommendation systems, sentiment analysis, public opinion monitoring, and computer vision.

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<sup>11</sup> Study on the State of S&T Development in ASEAN (2012), Volume 1, ASEAN. [https://asean.org/wp-content/uploads/2017/10/01-Study-on-the-State-of-S\\_T-Development-in-ASEAN-Vol-1-ASEAN-State.pdf](https://asean.org/wp-content/uploads/2017/10/01-Study-on-the-State-of-S_T-Development-in-ASEAN-Vol-1-ASEAN-State.pdf)

<sup>12</sup> Statistical Yearbook for Asia and the Pacific (2013). United Nations ESCAP. <https://www.unescap.org/sites/default/files/C.4-Research-and-development.pdf>

<sup>13</sup> A Time Series Analysis of the Development in National R&D Intensities and National Public Expenditures on R&D. IDEA Consult Belgium and Fraunhofer Institute for Systems and Innovation Research ISI. 2008.

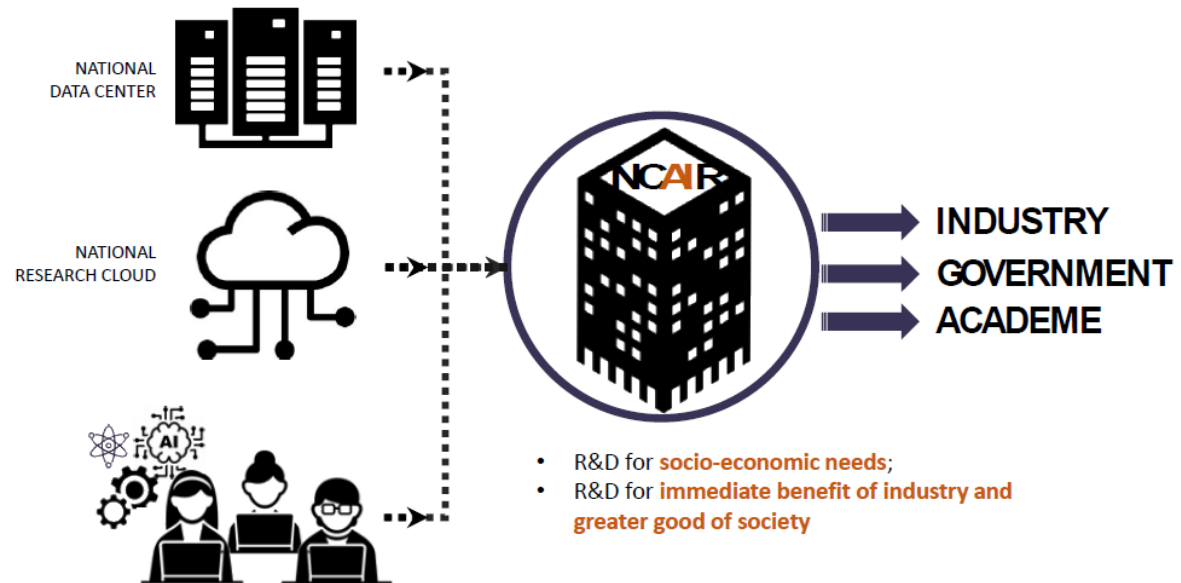


Fig 9. National Center for AI Research