



Malaysia
Centre for the
Fourth Industrial
Revolution

The Economic Impact of Generative AI:

THE FUTURE OF WORK IN MALAYSIA

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Access
Partnership



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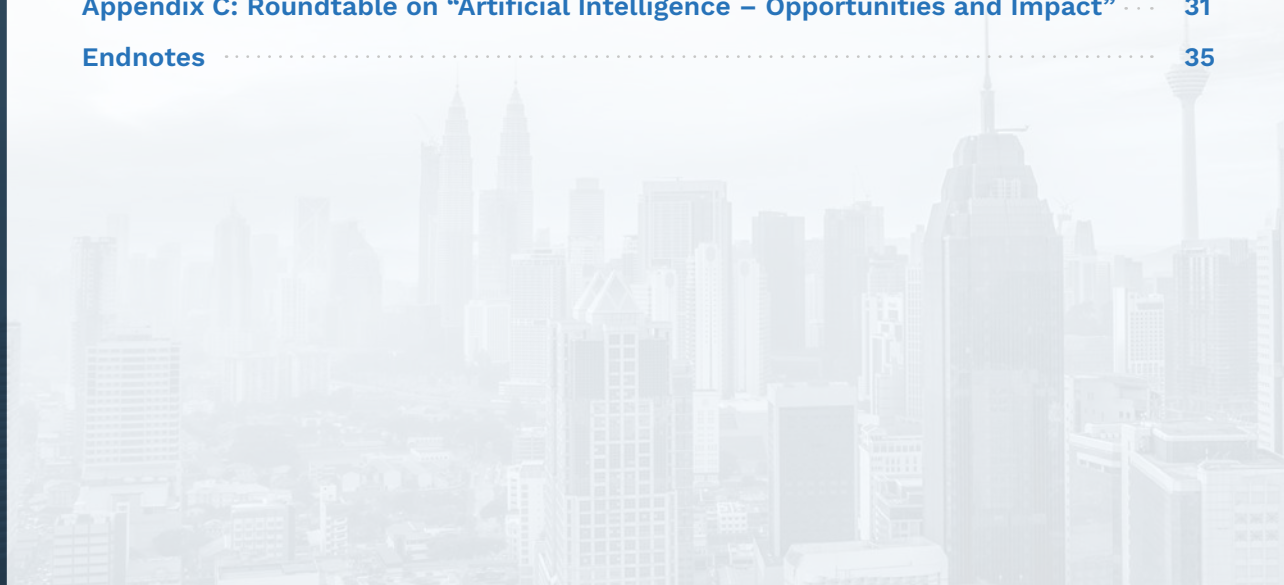
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Executive Summary

Malaysia's digital economy has experienced rapid growth, with the ICT sector contributing 22.6% to Malaysia's GDP in 2021,¹ driven by government initiatives, private sector investment, and increasing adoption of digital technologies. The National Fourth Industrial Revolution (4IR) Policy document identifies AI as one of the key technologies that "are foundational to the nation's 4IR agenda" and stresses the need to develop ethical use of AI for transforming the economy.² To guide AI deployment and governance, the government also published a National AI Roadmap in 2021, aimed at making Malaysia a nation where AI enhances jobs, drives competitiveness, encourages innovation and entrepreneurship, and improves people's well-being.³


Against this background, technology industry leaders have noted that AI is at an inflection point, with powerful new models like generative AI being introduced, and innovative new applications increasingly being used across society and capturing the imaginations of consumers. Generative AI has opened the door to more possibilities and is expected to play a role in tasks requiring creativity, curiosity, and looking at information differently. Therefore, the potential of generative AI lies in its ability to enable people to achieve greater creativity, effectiveness, and efficiency in their work.


This report seeks to contribute to this discussion by providing early insights and raising awareness of the economic opportunities that generative AI can create, and what it means for local industries and workforce readiness.


This study estimates that using generative AI to transform the way work is currently done in the Malaysian economy can potentially unlock **USD113.4 billion** of productive capacity, equivalent to a quarter of GDP in 2022.⁴ Malaysia has an opportunity to better position its businesses and workers to unlock the potential of generative AI, as well as manage emerging risks. Policymakers will need to ensure that they have a clear national vision for AI, and that it focuses on preparing its workforce and establishing an enabling policy environment for AI adoption, including to answer the question "what is required to achieve the aspirations of a brighter future enabled by generative AI?"

Three channels of change

There are three main channels through which generative AI will change the processes of production within an economy and reprioritize the types of tasks undertaken, and skills needed in the workforce.

 **Unleashing Creativity:** Generative AI can contribute to the creative process by reducing the time and cost involved in generating new ideas and producing innovative outputs. Malaysian employees and freelancers across different sectors have started using generative AI in their workflow for brainstorming, planning and writing to unlock greater creative possibilities.⁵

 **Accelerating Discovery:** The use of generative AI can help accelerate the process of scientific research and discovery by reducing the cost of research and supporting better learning outcomes. Both teachers and students in higher education institutions in Malaysia have started to use generative AI tools such as ChatGPT to boost their teaching and learning outcomes.⁶

 **Enhancing Efficiency:** Generative AI can play a role in enhancing workplace efficiency by supporting tasks requiring parsing of big data sets and information sources. The use of generative AI can also help improve the usability of this data and information, making it more interpretable and useful for decision-making. Various private sector companies have started using generative AI to assist with tasks such as document drafting and translations, in order to help improve productivity.⁷

¹ Department of Statistics Malaysia (2021). *Press release: Malaysia digital economy 2021*. Available at: <https://v1.dosm.gov.my/v1/index.php?r=column/pdfPrev&id=cmRYZ21sUVF4eIBySHVWckhKMGU4Zz09>

² Economic Planning Unit, Prime Minister's Department (2021). *National Fourth Industrial Revolution Policy*. Available at: <https://www.epu.gov.my/sites/default/files/2021-07/National-4IR-Policy.pdf>

³ Ministry of Science, Technology & Innovation (2021). *Malaysia National AI Roadmap 2021-2025*. Available at: <https://airmap.my/wp-content/uploads/2022/08/AIR-Map-Playbook-final-s.pdf>

⁴ This represents the value of gross output potentially produced by the resources freed up due to the productivity gains enabled from implementing generative AI. This estimate is based on ADB data on the economic structure of the Malaysian economy as of 2018.

⁵ The Star (2023). *Bots in business: Malaysian companies employ ChatGPT*. Available at: <https://www.thestar.com.my/tech/tech-news/2023/03/27/bots-in-business-malaysian-companies-employ-chatgpt>

⁶ Malay Mail (2023). *Educators welcome AI chatbots applications in education, can improve student's learning capabilities*. Available at: <https://www.malaymail.com/news/malaysia/2023/02/16/educators-welcome-ai-chatbots-applications-in-education-can-improve-students-learning-capabilities/55090>

⁷ Ibid.

The opportunity for Malaysia

Understanding the potential impacts on industries, jobs, and skills will allow policymakers, business leaders, and workers to better prepare for, and take advantage of the capabilities of generative AI.



Generative AI can unlock USD113.4 billion in productive capacity in Malaysia, with implementation by the Manufacturing sector likely contributing close to half of the potential economy-wide gains.

Malaysia's Manufacturing sector is potentially the biggest contributor to the economy-wide gains from generative AI, largely because it comprises a large share of the local workforce and account for high labor productivity. Furthermore, the workers within the Wholesale and Retail Trade and Manufacturing sectors are responsible for a large share of total work activities that could be transformed by generative AI given that they comprise a large share of the local workforce, which means that leveraging the benefit of generative AI in these sectors could transform the work experience for a large number of workers in Malaysia.



There is potential for most workers to use generative AI to some degree in their work, with generative AI evolving the focus within jobs, rather than replacing them entirely.

Close to two-thirds (65%) of workers in Malaysia will potentially use generative AI for 5-20% of their regular work activities, while only a small share (1%) are likely to see generative AI used in more than 20% of their work.

Capturing the economic opportunities that generative AI presents will require equipping the workforce with the future-ready skills to thrive in an AI-powered future. The basic skills of Reading, Writing, and Critical Thinking remain essential skills to engage with and interpret generative AI applications. The cross-functional skills of Operations Monitoring, Coordination, and Management of Material Resources should be evaluated as to how they are recontextualized for generative AI in the workplace.

Furthermore, it will be important to close the digital skills gap in Malaysia, given that only 19% of Malaysians feel they have adequate digital skills to perform their job,⁸ as well as to improve AI aptitude—the ability to operate in an AI environment and leverage AI tools.⁹ This includes learning how to manipulate and apply AI technologies across a range of situations and use functions to enhance existing work tasks for more effective and efficient results.

Malaysia ranks 31st in the 2022 World Digital Competitiveness Ranking, and 10th in the training and education component of the ranking.¹⁰ While this is ahead of many other Southeast Asian countries, more advanced digital skills of the workforce would need to be further enhanced to fully harness opportunities to leverage generative AI. The Malaysian government, in its *Ekonomi Madani* framework has identified an aspiration of being a leading Asian economy and attaining a top-12 position in the Global Competitiveness Index, and the gains from generative AI have the potential to contribute toward the



⁸ PWC (2021). *Malaysians are hopeful that their digital skills have improved since the pandemic began, but continue to be held back by fears of job security and automation*. Available at: <https://www.pwc.com/my/en/media/press-releases/2021/210430-digital-skills-improved-since-pandemic.html>

⁹ Kenan Institute of Private Enterprise (2023). *The Must-Have Skills in the Era of Artificial Intelligence: How AI's Democratization Will Impact Workers*. Available at: <https://kenaninstitute.unc.edu/commentary/the-must-have-skills-in-the-era-of-artificial-intelligence-how-ais-democratization-will-impact-workers/>

¹⁰ IMD (2022) *World Digital Competitiveness Ranking*. Available at: <https://www.imd.org/centers/wcc/world-competitiveness-center/rankings/world-digital-competitiveness-ranking/>

realization of these aspirations.¹¹ This will continue the momentum from the vision set out in the Malaysia Digital Economy Blueprint that laid out plans to design the curriculums at higher learning institutes such that they equip tertiary students with the right set of digital skills that are highly sought after in the industry, as well as the 12th Malaysia Plan Mid-Term Review and the Madani Economy Framework, in which talent development for a digital world is a key element in the policy enablers identified.^{12, 13} Most recently, the New Industrial Master Plan 2030 builds on these foundations, with a need to “Tech Up for a Digitally Vibrant Nation” identified as one of the 4 Missions set, with an aim to establish Malaysia as a generative AI hub.¹⁴

Harnessing the potential of generative AI

Leveraging generative AI to accelerate economic growth will require a comprehensive, coordinated approach that addresses not only the technological aspects of AI, but also the social, economic, and ethical implications of the technology. A policy framework that takes these factors into account will be necessary to maximize the gains from AI whilst mitigating the risk from such economic transformation. We present a framework of recommendations to drive AI use for consideration by government and business leaders, focused on three main policy objectives.

- 1. Increasing access and adoption:** Ensuring the development of the necessary AI-ready infrastructure with fit-for-purpose, enabling digital policies and regulations. This includes supporting the AI-transition for businesses and having the right workforce readiness policies.
- 2. Mitigating risks:** Recognizing that there are risks and this requires a coordinated effort particularly on guiding responsible and ethical use of AI and establishing the necessary organizational checks and balances when using AI.
- 3. Inspiring innovation:** Finding the right balance between protecting and promoting innovation.

To capture the abundant economic opportunities that generative AI could unlock, a coordinated effort will be necessary to prepare for its widespread adoption. This will require multiple stakeholders, from government, industry, academia, civil society, and the broader community to engage in the topics of how to best leverage generative AI and manage its risks.



¹¹ Prime Minister's Office (2023). *Ekonomi Madani: Memperkasa Rakyat*. Available at: <https://www.pmo.gov.my/wp-content/uploads/2023/07/FINAL-ENGLISH-Translation-Ucapan-Kerangka-Ekonomi-MADANI-1-1.pdf>

¹² The Star (2023). *Mid-term 12MP review to be tabled in Parliament in October*. Available at: <https://www.thestar.com.my/news/nation/2023/03/14/mid-term-12mp-review-to-be-tabled-in-parliament-in-october>

¹³ Prime Minister's Office (2023). *Ekonomi Madani: Memperkasa Rakyat*. Available at: <https://www.pmo.gov.my/wp-content/uploads/2023/07/FINAL-ENGLISH-Translation-Ucapan-Kerangka-Ekonomi-MADANI-1-1.pdf>

¹⁴ Ministry of Investment, Trade, and Industry (2023) *New Industrial Master Plan 2030*. Available at: https://www.nimp2030.gov.my/nimp2030/modules_resources/bookshelf/NIMP_20303/NIMP_20303.pdf

1 Introduction

Malaysia's digital economy has experienced rapid growth, with the ICT sector contributing 22.6% to Malaysia's GDP in 2021,ⁱ driven by government initiatives, private sector investment, and increasing adoption of digital technologies. The National 4IR Policy document identifies AI as one of the key technologies that "are foundational to the nation's 4IR agenda" and stresses the need to develop ethical use of AI for transforming the economy.ⁱⁱ This blueprint aims to increase productivity by 30% across all sectors by 2030, with AI playing a critical role. To guide AI deployment and governance, the government also published a National AI Roadmap in 2021, aimed at making Malaysia a nation where AI enhances jobs, drives competitiveness, encourages innovation and entrepreneurship, and improves people's well-being.ⁱⁱⁱ Despite being in its early stages, AI adoption in Malaysia is increasing with 15-20% of Malaysian companies expected to embrace AI-related technologies.^{iv}

Against this background, technology industry leaders have noted that AI is at an inflection point, with powerful new models like generative AI being introduced, and innovative new applications increasingly being used across society and capturing the imaginations of consumers. Generative AI has opened the door to more possibilities and is expected to play a role in tasks requiring creativity, curiosity, and looking at information differently. Therefore, the potential of generative AI lies in its ability to enable people to achieve greater creativity, effectiveness and efficiency in their work.

To this end, it presents a unique and invaluable opportunity to Malaysia to accelerate a restructuring of its economy to comprise a larger portion of higher value-added activities, while enhancing skilling and capacity-building to harness the benefits of this technology as well as managing emerging risks. Policymakers will need to maintain efforts to implement its economy-wide approach to generative AI, to ensure its workforce and policy environment are prepared for the opportunities it creates. **This report seeks to contribute to this discussion by providing early insights and raising awareness of the economic opportunities that generative AI can create, and what it means for local industries and workforce readiness.**

Some of the public discourse surrounding generative AI has involved concerns about the potential effect on jobs. Such concerns are understandable, as history has shown that the introduction of new productive technologies have changed the way labor is used in production, sometimes significantly, for example, the industrial revolution, and the introduction of the internet. However, based on the findings of this study, it is likely that the implementation of generative AI will change the focus within certain jobs rather than replace jobs entirely. To achieve this potential, workers, employers, and authorities will need to make conscious choices to make the most of the new technology—similar to when horses were replaced with cars, it was a long process that required authorities to build roads, and people to learn to drive.

The National AI Roadmap takes stock of the current state of AI adoption in Malaysia and outlines six strategies to promote adoption within private and public sectors by developing the right governance models, enhancing R&D, enabling digital infrastructure, creating AI awareness, and fostering an AI innovation ecosystem.^{iv} Also embedded in the National AI Roadmap are the government's plans to launch skilling initiatives to revamp the workforce to meet the needs of the digital economy. With the introduction of generative AI, there are more opportunities to reposition Malaysia's workforce so that it can take advantage of its potential for economic transformation.

To capture the abundant economic opportunities that generative AI could unlock, a coordinated effort will be necessary to prepare for its widespread adoption. This will require multiple stakeholders, from government, industry, academia, civil society, and the broader community to engage in the topics of how to best leverage generative AI and manage its risks.

2 Defining the potential of generative AI



Generative AI refers to a category of artificial intelligence (AI) algorithms that generate new outputs based on the data they have been trained on. Unlike traditional AI systems that are designed to recognize patterns and make predictions, generative AI creates new content in the form of images, text, audio, and more.^{ix}

- World Economic Forum (WEF) 2023^v

The WEF provides a succinct definition of generative AI above. AI has evolved over the last two decades with advancements in machine learning and deep neural networks that has paved the way for autonomous systems, natural language processing, and now generative artificial intelligence (see Exhibit 1 for a brief timeline of the evolution of AI). However, rather than the sophistication of the technology driving it, the public's imagination has generally been ignited by consumer-based examples of how generative AI has been used, often in innovative ways.

The application of this technology to specific work tasks is the basis of our analysis of the Future of Work. The analysis assumes that generative AI can find applications across many work activities. Along these lines, its effects are likely to be broad-based like that following the introduction of the internet, rather than like that of automation technologies which have slightly narrower applications.

While the attention has largely focused on consumer-based use cases of generative AI, it is expected that the use cases for generative AI will grow, and increasingly find relevance in business settings (Box 1). There are already examples of enterprise use cases, for example, Panasonic has begun a large-scale deployment of generative AI to assist with tasks such as document drafting, to help improve productivity.^{ix} As more and more businesses identify instances where application of generative AI can lift the burden on its workforce, it is likely that adoption rates will rise.

EXHIBIT 1

1950s

Artificial Intelligence

- Artificial Intelligence is a domain of computer science which aims to develop intelligent machines capable of emulating or surpassing human intelligence

1959

Machine Learning

- Machine learning is a branch of AI that enables machines to learn from available data, enhance their understanding, and utilize that knowledge to make informed decisions or predictions.

2017

Deep Learning

- Deep learning is a machine learning technique that uses layered neural networks to process data and make decisions.

2021

Generative Artificial Intelligence

- Generative artificial intelligence is a type of AI technology that can create content such as audio, code, text, images, simulations, and videos using data that exists on the internet.
- Large Language Models (LLMs) are trained on large corpus of data with billions of parameters which can be used to generate information.

BOX 1

Moving from consumer to enterprise use cases

While many of the current use cases are largely consumer-based, Deloitte predicts that *“the far-reaching impacts and potential value when deploying generative AI are accelerating experimental, consumer, and soon, enterprise use cases.”*^x They also note that the frequently cited criteria for enterprise adoption of generative AI models are:

- 
1. Ease of use: Integrations into systems and workflows via out-of-the-box connections and low/no code tooling, reducing expensive IT resources and enabling frontline users.
- 
2. Security and privacy: Compliance with data security standards and access control over confidential data.
- 
3. Robust ecosystems: Broad set of development and service partners to extend, customize, and co-develop specialized data sets, use cases, and applications.
- 
4. Transparency and explainability: Understanding how model outputs and responses are derived and the ability to perform root cause analysis on inaccurate results.
- 
5. Flexibility and customizability: Ability to create parameters, train on proprietary data, and customize embeddings while maintaining privacy and ownership of data and tuning.



2.1 The basis of this study

As the full potential of generative AI is still being discovered, the approach taken in this study is to look across the universe of work activities and determine what generative AI would not do—the inverse of which is what generative AI could do.

This exclusionary assessment seeks to exclude three types of work activities, that require:

1. Human judgement, such as to provide checks and balances.
2. Management of inter-personal relationships, which assumes that humans still want some connection to other humans.
3. Interacting with the physical environment, such as repairing mechanical machinery, or serving food at a restaurant.

The result of this approach is a list of work activities that could potentially leverage generative AI to different degrees. Similarly, an assessment of the skills that are potentially affected by generative AI is based on an analysis of the skills most relevant to the affected work activities. More than 2,000 work activities were assessed individually, and then assessed again in the context of close to 900 occupations. The exclusionary approach effectively allows the identification of occupations and skills that could potentially leverage generative AI. The analysis does not distinguish between those occupations that will be displaced and those that will be augmented by using generative AI, nor does it take into account the

potential creation of new types of jobs arising from developments in generative AI. Ultimately, the impact of technology on the workforce will depend on whether communities, businesses, and governments are prepared to reap the benefits and manage the risks.

Digitalization has often been associated with automation, but generative AI has the potential to contribute to an economy beyond just automation, and is expected to have wide-spread implications for the way we work in the future:

- Generative AI will hold potential for occupations that have a higher share of non-routine work activities, moving away from the idea of affecting the most “automatable” jobs.
- Generative AI will be most transformative for work activities contributing to decision-making, including by processing large amounts of information and creating new content.
- Generative AI will transform occupations requiring greater preparation—that is, more years of education and training—and those demanding higher pay.

The determinant of what effect generative AI will have for economies will be the pace of adoption, enabling policies, and effective management of risks.



3 Three channels of change

Generative AI is about increasing access to the tools for content creation; lowering the barriers for thinkers to discover new ideas; and lifting productivity broadly. At the same time, human participation in new content creation remains important, particularly as an instigator of curiosity and an arbiter of common-sense.

On the latter point, human oversight in generative AI-produced outputs remains critical to ensuring that new content is relevant, accurate, and ethical. In part, this will help to ensure that its creative and research-related outputs avoid unwanted biases. The need for human oversight is also abundant during the AI training process, which can incorporate a large amount of human feedback to reinforce good behaviors. For example, the ChatGPT model was trained to align with human values to deliver responses that are “*helpful (the question is answered in an appropriate manner), honest (the answer can be trusted), and harmless (the answer is not biased nor toxic).*”^{xi}

There are three main channels through which generative AI will change the processes of production within an economy and transform the types of tasks undertaken and skills needed in the workforce. These three channels are: (1) unleashing creativity; (2) accelerating discovery; and (3) enhancing efficiency.

3.1 Unleashing creativity

Generative AI can contribute to the creative process by reducing the time and cost involved in generating new ideas and producing new outputs. It will be important to ensure that the guardrails placed around the responsible use of generative AI include recognition for the input and contributions of human creators. Innovation will continue to need a human spark, and generative AI can play a role in supporting the creative process. Many traditionally “creative” occupations have a high share of tasks that could be transformed by generative AI, for example, workers within the Arts, Design, Entertainment, Sports, and Media sector (Exhibit 2).

The use of generative AI in content creation is widely reported, particularly in knowledge and creative industries. For example, Deloitte experimented with the use of generative AI for coding and found a 20% improvement in code development speed for relevant projects.^{xii} Given generative AI’s ability to provide outputs in a variety of formats—for example, text, images, video, audio, computer code, synthetic data—its potential for content generation is wide-ranging.

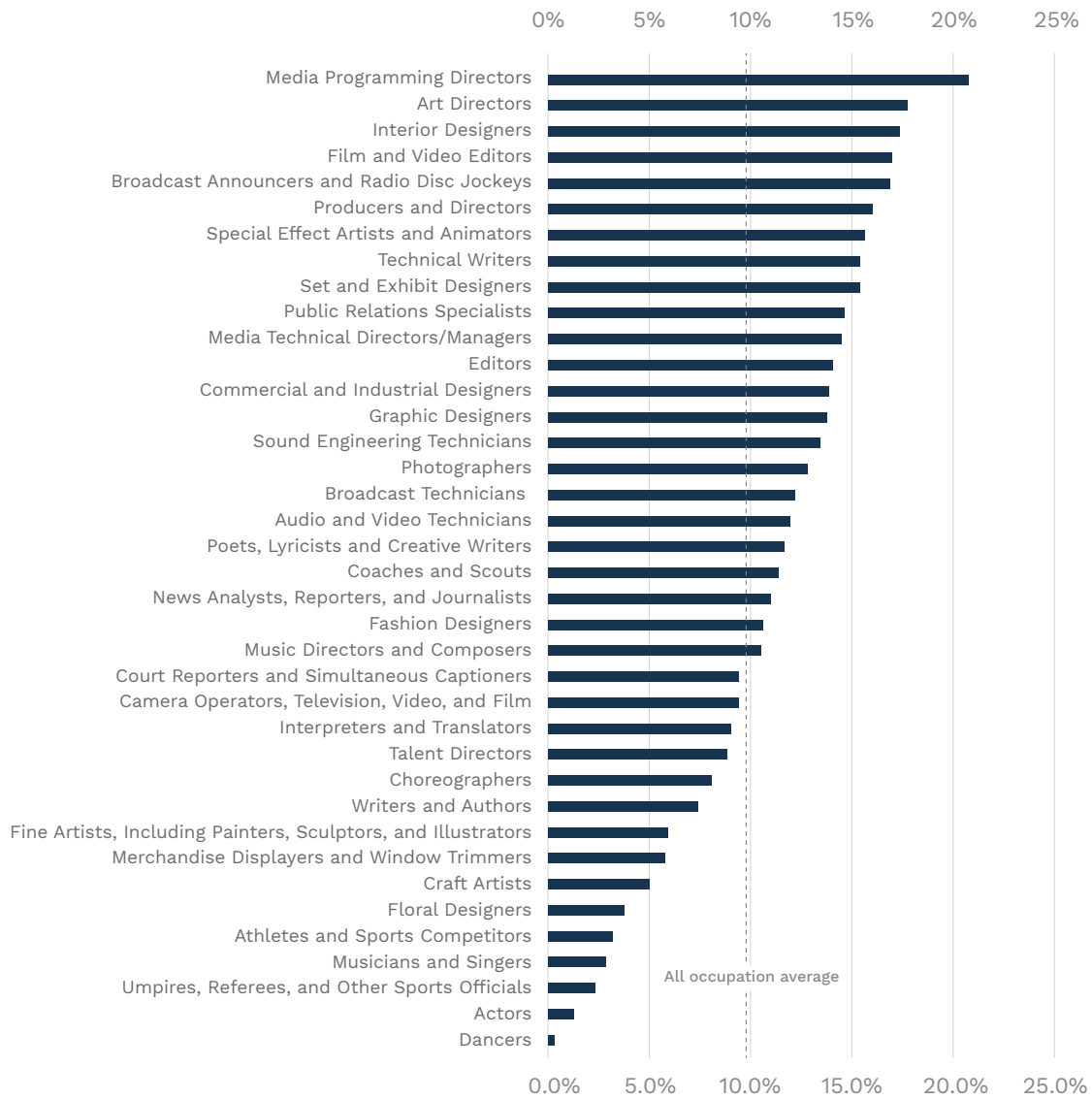
The use of generative AI can support the more efficient creation of new content, including in the conceptualization stage of the creative process, such as to help copywriters generate story ideas for advertising campaigns (Box 2), as well as in later stages, such as by providing first drafts of scripts to be used in marketing materials.^{xiii} Workers are also optimistic about generative AI’s capacity to enhance creativity, with a recent Microsoft report finding that 3 in 4 people believe it will help them formulate ideas for their work. 87% of workers in creative roles have also indicated that they would be comfortable using generative AI in their jobs.^{xiv}

Furthermore, leveraging generative AI models in content creation can facilitate the production of higher quality content. Generative AI models learn from large amounts of input data, effectively enabling users to draw from a wide range of information sources (potentially across different formats and languages), as well as leverage insights identified by such models, to produce more accurate and informative outputs. These creation capabilities of generative AI are used to produce synthetic data to help self-driving car companies to better prepare vehicles for real-world situations.^{xv}

The use of generative AI could also facilitate the drafting of new content, as well as produce content in new forms. This provides an opportunity for content creators to produce more diverse and engaging content for their audiences, as well as tailor content more readily for specific audiences. For example, Coca-Cola has announced its use of generative AI to generate personalized ad copy at scale.^{xvi}

EXHIBIT 2

Generative AI’s potential in the Arts, Design, Entertainment, Sports, and Media sector, adjusted for likelihood, by occupation (% of total affected work activities)



Notes: The analysis is done on a global level. These impacts have been adjusted for 'likelihood'. The adjustment for likelihood considers the potential degree of implementation of generative AI. This adjustment is categorical (i.e., low / medium / high) according to the relative pay levels for each occupation, based on an assumption that the motivation to implement is greater for higher paid jobs. Sources: Access Partnership analysis, National Center for O*NET Development



BOX 2

Supporting the creative industry in Malaysia

Malaysian employees and freelancers across different sectors have started integrating generative AI tools into their creative work processes. For instance, employees from public relations firm PRevious Communications have integrated the use of generative AI tools such as ChatGPT into their workflow for brainstorming, planning and writing for projects, and have seen positive impacts, including time savings and the ability to tap on new creative possibilities inspired by generative AI content. Similarly, freelance graphic designers have used generative AI tools such as Dall-E and Midjourney for their initial conceptualization, citing that it helps with providing a stronger vision of the project’s direction that will aid in the actual creative process.^{xvii}

While generative AI tools are used to support initial ideation processes to help save time for creative professionals, they will still need to review the AI-suggested content accordingly to ensure they are properly edited and customized for their purposes. The role of human creators will remain a key part of the creative process.

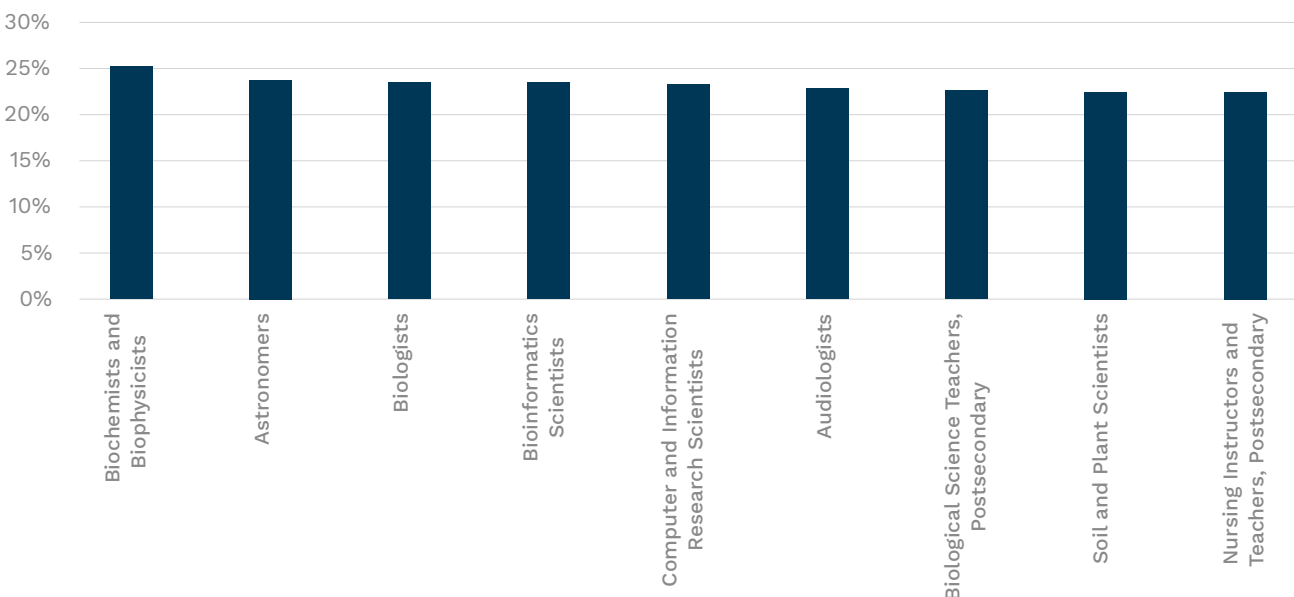


3.2 Accelerating discovery

Generative AI has the potential to play an important role as a tool in scientific progress. The use of generative AI can help accelerate the process of scientific research and discovery by reducing the cost of research and supporting better learning outcomes. Those occupations with the greatest share of tasks that can be transformed by generative AI are occupations related to science, healthcare, and education (Exhibit 3).

EXHIBIT 3

Generative AI’s potential, adjusted for likelihood, top ten occupations (% of total affected work activities)



Notes: The analysis is done on a global level. These results represent occupations with the greatest share of tasks that are transformed by generative AI. The adjustment for likelihood considers the potential degree of implementation of generative AI within each occupation. This adjustment is categorical (i.e., low / medium / high) according to the relative pay levels for each occupation, based on an assumption that the motivation to implement is greater for higher paid jobs.
Sources: Access Partnership analysis, National Center for O*NET Development

Scientific breakthroughs often involve curiosity, creativity, and trial and error, but the methodical process of iterative questioning and answering is costly and time-consuming. Generative AI can help develop and test hypotheses leveraging its capabilities to interrogate the vast datasets to field and answer research questions based on the data it has been trained on. For example, generative AI has been used in the development process to create new designs for materials and medicines, significantly reducing the costs and time required from years to weeks.^{xviii}

Furthermore, generative AI can be used as a tool to improve student learning outcomes (Box 3). Teachers can use generative AI to supplement their teaching methods to allow for the creation of more engaging and interactive learning materials for students. Generative AI can also be used to tailor curriculums to students. For example, generative AI could be used to create personalized learning experiences based on an analysis of a student's learning patterns and preferences.^{xix} Personalized learning can be effective in improving student learning outcomes and can be useful for engaging students with learning challenges.^{xx} Increasing access and quality of school education will contribute to securing opportunities for future scientists and researchers who will contribute to future scientific discoveries.

Many occupations within the Educational Instruction sector have an above average share of tasks that can be transformed by generative AI (Exhibit 4), suggesting significant opportunity.

BOX 3**Improving teaching and learning experiences through generative AI**

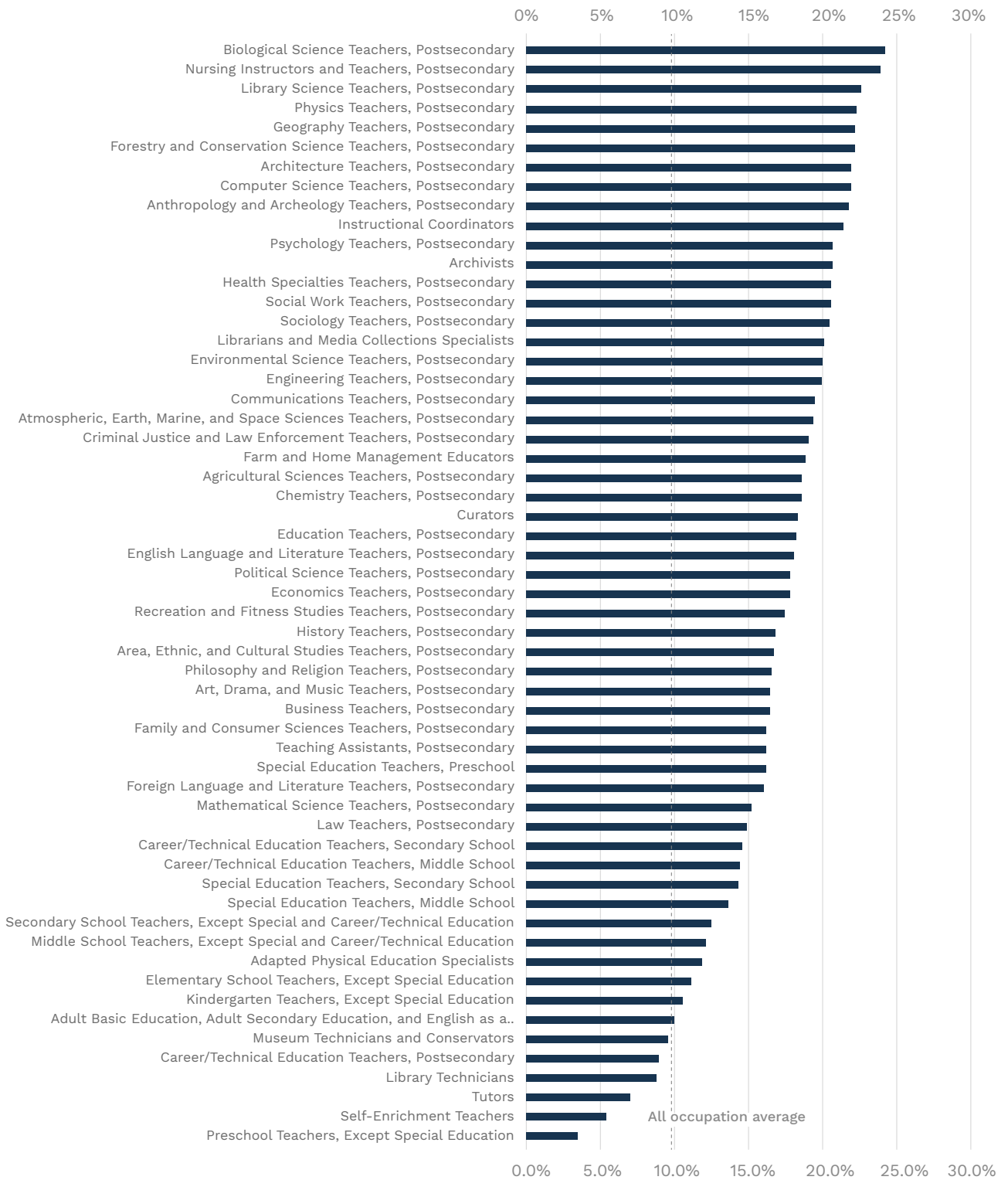
The use of generative AI tools has benefitted teachers and students in Malaysia by supporting the teaching and learning process. For teachers, generative AI has offered a way to help generate more interesting lesson plans as well as to come up with higher order thinking assignments for their students. Educators from Universiti Tunku Abdul Rahman (UTAR) have started using ChatGPT in classes to teach students how to find and evaluate facts for writing reports.^{xxi} For students, it offers independent learners a tool to help them better understand difficult topics by leveraging on generative AI's ability to summarise and simplify complex concepts. The use of generative AI tools could support students to approach learning beyond a traditional focus on rote memorisation, by helping to encourage analytical, problem-solving, and critical thinking.^{xxii}

The use of generative AI tools has the potential to improve the experience for teachers and students, however the Malaysian government also recognizes that there are risks, including the issue of plagiarism. The Higher Education Ministry has been working on guidelines to govern the use of generative AI tools in educational institutions, which have since been distributed to Malaysian universities to outline the appropriate situations for using generative AI tools.^{xxiii}



EXHIBIT 4

Generative AI’s potential in the Educational Instruction sector, adjusted for likelihood, by occupation (% of total affected work activities)



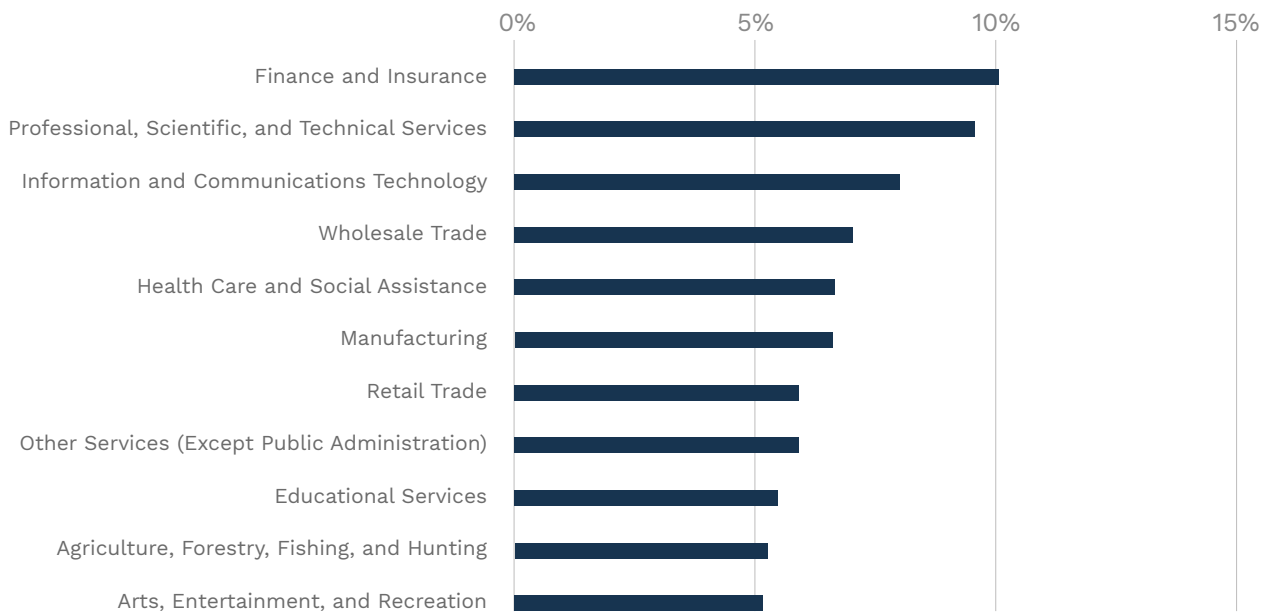
Notes: The analysis is done on a global level. These impacts have been adjusted for 'likelihood'. The adjustment for likelihood considers the potential degree of implementation of generative AI. This adjustment is categorical (i.e., low / medium / high) according to the relative pay levels for each occupation, based on an assumption that the motivation to implement is greater for higher paid jobs. Sources: Access Partnership analysis, National Center for O*NET Development

3.3 Enhancing efficiency

Generative AI can play a role in enhancing workplace efficiency by supporting tasks requiring parsing of big data sets and information sources. The use of generative AI can also help improve the usability of this data and information, making it more interpretable and useful for decision-making. The use of generative AI has applications across all industries and will hold more significant potential for industries that typically work with large amounts of data or involve complex tasks, such as financial services, professional services, scientific research, and ICT (Exhibit 5).

EXHIBIT 5

Generative AI’s potential by industry, adjusted for likely impact on occupations (% of total affected work activities)



Notes: Excludes public sector, real estate, and utilities. The analysis is done on a global level. These impacts have been adjusted for 'likelihood'. The adjustment for likelihood considers the potential degree of implementation of generative AI. This adjustment is categorical (i.e., low / medium / high) according to the relative pay levels for each occupation, based on an assumption that the motivation to implement is greater for higher paid jobs.
Sources: Access Partnership analysis, National Center for O*NET Development

Nonetheless, in addition to complex tasks, a recent study of customer support agents found that those given access to generative AI tools were able to successfully solve client problems more quickly—with productivity gains of around 14%.^{xxiv} Workers are also prepared to leverage these productivity benefits—a recent report by Microsoft found that 70% of people would delegate to AI to lessen their workloads, and 3 in 4 people are comfortable with using AI for administrative tasks.^{xxv} The study also noted that the least skilled workers were among those that benefited to the greatest extent, reporting that they could get their work done 35% faster. This also suggests that the application of generative AI tools to administrative work activities could create benefits. For example, private sector businesses have begun integrating generative AI tools in work processes to help streamline tasks (Box 4).

Generative AI has the potential to also enhance efficiency in practical situations. In the automobile industry, generative AI can help businesses go from predictive maintenance (i.e., relying on IoT sensor devices and data to predict when assets will require maintenance) to prescriptive maintenance (i.e., collecting and analyzing data on the condition of the equipment to makes specialized recommendations that would reduce operational risks). This would allow manufacturers to take a more proactive approach in identifying issues early, reducing risks in the manufacturing process and improving efficiency by increasing overall uptime of equipment.

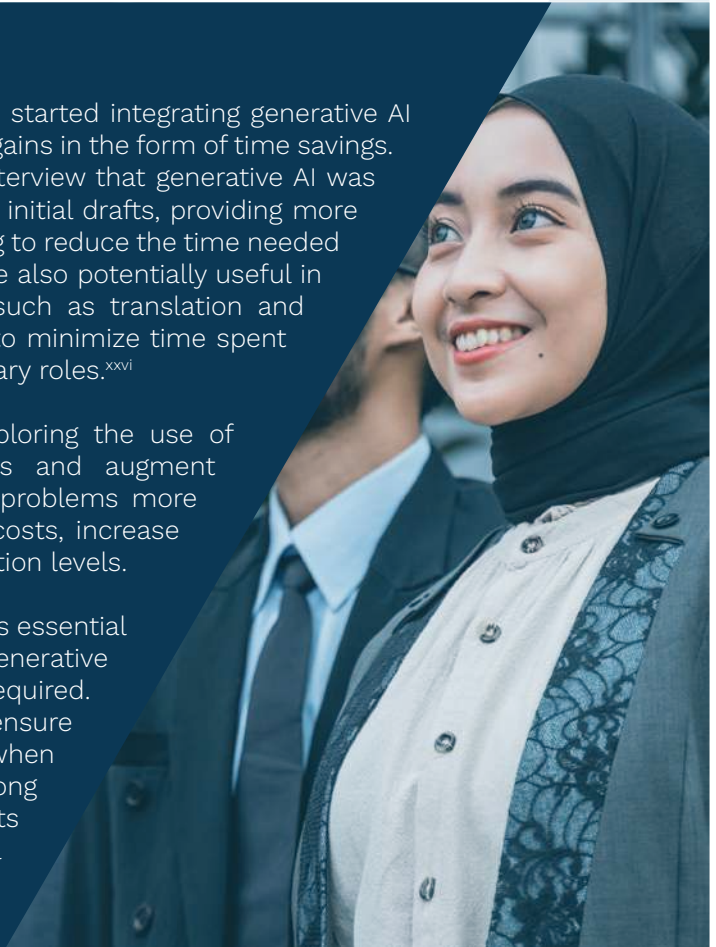
BOX 4

Supporting efficiency gains with generative AI

Malaysian employees across different sectors have started integrating generative AI tools into their work processes to reap productivity gains in the form of time savings. Employees from a marketing agency cited in an interview that generative AI was useful when conducting initial research and writing initial drafts, providing more concise information on unfamiliar topics and helping to reduce the time needed to draft documents by half. Generative AI tools were also potentially useful in supporting tasks outside of their primary roles, such as translation and simplifying technical content, allowing employees to minimize time spent on these tasks so that they can focus on their primary roles.^{xxvi}

Telco providers in Malaysia have also started exploring the use of generative AI to train customer service agents and augment operations by allowing agents to solve customer problems more efficiently. This in turn can help businesses save costs, increase worker productivity, and improve customer satisfaction levels.

Despite efficiency gains, human intervention remains essential to verify and finetune the information supplied by generative AI, especially in tasks where human judgement is required. Guidelines and policies also need to be in place to ensure there is proper accountability in instances when generative AI models 'fail' or provide the wrong information. Ultimately, the decision to use outputs from generative AI applications must remain with a human decision-maker.



4 The opportunity for Malaysia

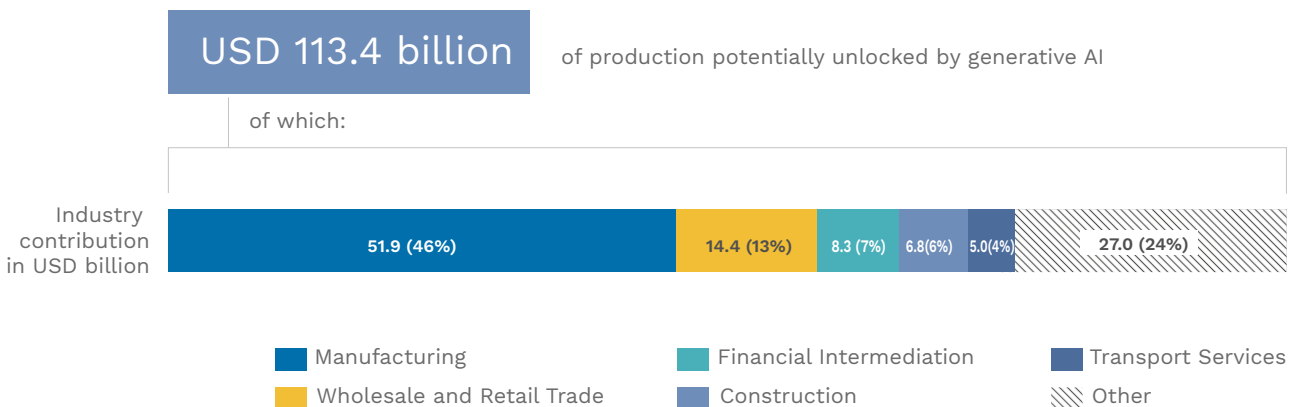
Although generative AI brings opportunities for all economies, its implications for Malaysia are related to the country’s industry structure, workforce composition in each sector, the level of productivity and existing stock of skills in the labor force. By understanding the potential implications of generative AI on industries, jobs, and skills, policymakers, business leaders, and workers can better prepare for, and take advantage of the effects of generative AI.

4.1 Generative AI implementation can unlock economy-wide gains in productive capacity equivalent to one-quarter of GDP

The successful application of generative AI technologies across industries could help unlock additional productivity capacity. Based on an analysis of the relationship between labor and production in the Malaysian economy, it is estimated that use of generative AI to supplement work activities could help unlock **USD113.4 billion** of productive capacity across the economy,¹⁵ equivalent to 28% of GDP in 2022 (Exhibit 6). The Manufacturing industry is the largest contributor to this potential, largely due to the fact that it comprises a large share of the workforce and with a labor productivity (in terms of value added per employment) that is more than double that of the economy-wide average.

EXHIBIT 6

Production in Malaysia potentially unlocked by generative AI (USD billions)



Note: Other includes: Agriculture, Hunting, Forestry, and Fishing; Mining and Quarrying; Hotels and Restaurants; Telecommunications; Real Estate, Renting and Business Activities; Education, Health and Social Work; and Other Personal Services. The analysis excludes the Public Sector and Utilities.
Sources: Access Partnership analysis, ILO, National Center for O*NET Development.

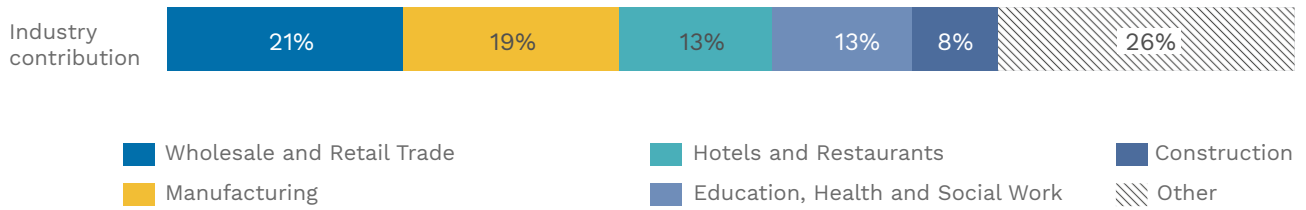
There is also significant potential to leverage generative AI technology across many workforce activities. Based on an analysis of the total work activities undertaken by the workforce in Malaysia, work activities undertaken by workers within the Wholesale and Retail Trade and Manufacturing industries comprise the largest share of work activities potentially transformed by generative AI (Exhibit 7).¹⁶ These activities include generating ideas for new product designs and drafting trade contracts and marketing materials. While the type of work activities within these industries may not hold the highest potential compared to other industries, they comprise a large share of the local workforce, and therefore account for a large share of total work activities within the economy. This means that leveraging the benefit of generative AI in these sectors could transform the work experience of a large number of workers in Malaysia.

¹⁵ This represents the value of gross output potentially produced by the resources freed up due to the productivity gains enabled from implementing generative AI. This estimate is based on ADB data on the economic structure of the Malaysian economy as of 2018.

¹⁶ This analysis is based on a ground-up estimate of the detailed work activities that are undertaken within every occupation, which is then scaled up by an estimate of the composition of occupations within each industry, which is then scaled up by the size of the workforce within each industry.

EXHIBIT 7

Work activities in Malaysia potentially transformed by generative AI, industry contribution (%)



Note: Other includes: Agriculture, Hunting, Forestry, and Fishing; Mining and Quarrying; Telecommunications; Transport Services; Financial Intermediation; and Real Estate, Renting and Business Activities; and Other Personal Services. The analysis excludes the Public Sector and Utilities.
Sources: Access Partnership analysis, ILO, National Center for O*NET Development.

4.2 Generative AI will evolve the nature of jobs, rather than replace them

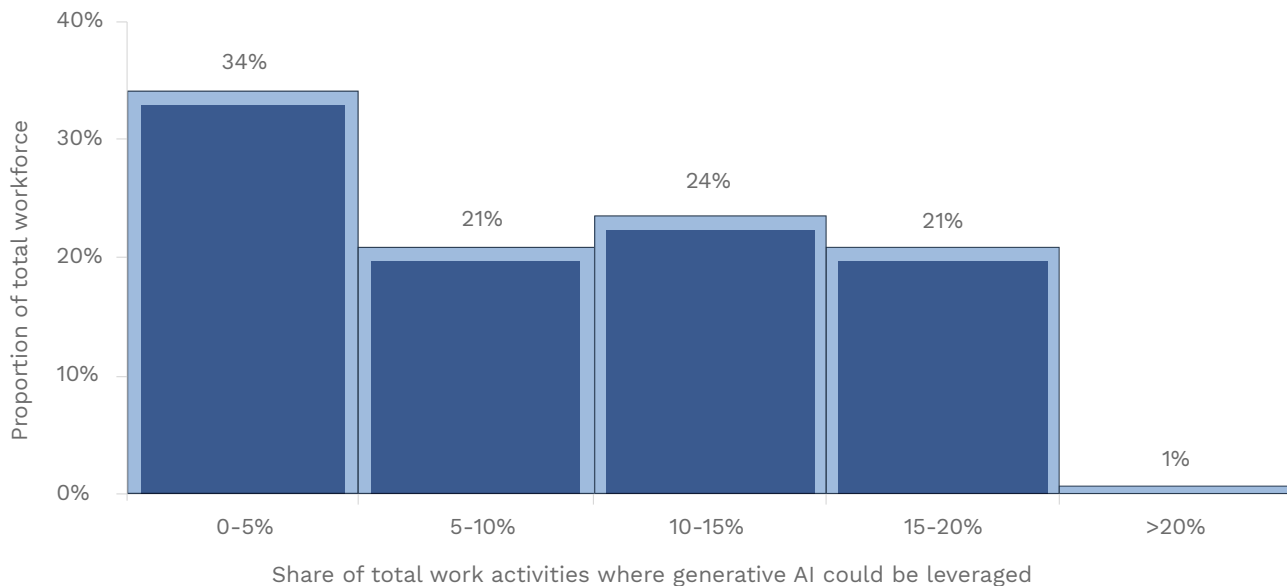
The application of generative AI will change the way that labor is used in production, and it will have implications for the workforce across all industries. However, it is likely that the implementation of generative AI will change the focus within certain jobs rather than replace jobs entirely. Furthermore, many work activities, such as managing teams and interacting with customers, will still be largely undertaken person-to-person. Based on an analysis of the local workforce, the extent to which generative AI could be used will vary according to the nature of work for specific occupations. Almost every worker could use generative AI to some degree—although the level of adoption by businesses will vary in the short term. Importantly, close to two-thirds (65%) of the workforce could incorporate generative AI in 5-20% of their work activities (Exhibit 8)—it is estimated that only 1% of the Malaysian workforce would see generative AI used for more than 20% of their work.

As will be discussed in Section 5, this has relevance for policymakers and industry, as it illustrates that while there will be a broad demand for AI skills, the demand will be more pronounced for the share of the workforce expected to use generative AI more extensively in their work.



EXHIBIT 8

The potential to leverage generative AI in the Malaysian workforce (% of total workforce)



Note: The analysis excludes the Public Sector and Utilities. Figures may not sum due to rounding. Sources: Access Partnership analysis, ILO, National Center for O*NET Development.

4.3 An AI-ready workforce will require upskilling in current and future-ready skills

To capture the potential economic opportunities of generative AI, it will be important to identify the existing stock of workforce skills which will need to be uplifted, as well as the sets of new skills which will need to be developed.

4.3.1 Uplifting the current stock of skills

The basic skills of Reading, Writing, and Critical Thinking are relevant across most occupations, albeit used in differing degrees of frequency and to differing levels of proficiency. Nonetheless, the input-and-output style of generative AI, particularly when applied to content creation work activities, would seem to suggest that for such tasks, these basic skills become less important. However, it is arguable that skills such as critical thinking, particularly in context of generative AI still being susceptible to errors of data and ethics, remain a key part of the input-and-output equation. At the same time, reading and writing skills are fundamental building blocks for thinking, as well as essential skills to engage with and interpret generative AI applications. It will be necessary to rethink how such basic skills should develop in the context of generative AI, but it's likely that the answer lies in strengthening such skills rather than abandoning them.

Beyond basic skills, there are cross-functional skills specific to certain types of occupations. Based on an analysis of all the cross-functional skills that are likely to be affected by generative AI, across most industries, Operations Monitoring, Coordination, and Management of Material Resources are found to be most impacted (Exhibit 9).^{17,18} This means that such priority should be given to evaluating how these skills should be recontextualized in the context of using generative AI in the workplace.

¹⁷ These cross-functional skills are based on O*Net's taxonomy of 25 cross-functional skills across five categories: (1) Complex Problem Solving Skills; (2) Resource Management Skills; (3) Social Skills; (4) Systems Skills; and (5) Technical Skills.

¹⁸ Operations Monitoring is defined as watching gauges, dials, or other indicators to make sure a machine is working properly. Coordination is defined as adjusting actions in relation to others' actions. Management of Material Resources is defined as obtaining and seeing to the appropriate use of equipment, facilities, and materials needed to do certain work.

EXHIBIT 9

**Generative AI and its potential impact on cross-functional skills
(% of total impacted cross-functional skills)**



Note: The analysis is done on a global level. The analysis excludes the Public Sector and Utilities.
Sources: Access Partnership analysis, National Center for O*NET Development.

Furthermore, the work activities which are expected to be less affected by generative AI also point to both basic and cross-functional skills which will continue to be important for the workforce. These work activities relate to people-to-people interactions and tasks such as coaching, developing, and caring for others (Exhibit B.2 in Appendix B). This means that social skills around persuasion, negotiation, and giving instructions, as well as management skills around personnel management will remain core parts of the toolkit for all workers. Furthermore, in a world experiencing constant technological change, the basic skill of having learning strategies will be critical for all workers.¹⁹ Along these lines, a recent Microsoft report found that ‘analytical judgment,’ ‘flexibility,’ and ‘emotional intelligence’ are at the top of the list of skills essential for employees in AI-powered future.^{xxvii} The report also noted that 82% of leaders said that “their employees will need new skills to be prepared for the growth of AI”. Businesses and individuals should continue to value strengthening of these skills.

4.3.2 Developing new future-ready skills

Future-ready skills in the context of AI have been considered to consist of three types: (1) skills to develop and manage AI; (2) skills to work with AI; and (3) skills to live with AI.^{xxviii} The specific skills required include hard skills in areas such as computer science and data analytics for more specialized AI roles, as well as softer skills such as creativity, critical thinking, and problem-solving as AI technologies become more accessible.

¹⁹ Learning Strategies refers to the capacity to select and use training/instructional methods and procedures appropriate for the situation when learning or teaching new things.

While the ubiquity and level of proficiency of required skills within a population will be achieved to varying degrees of success (particularly related to developing and managing AI), to ensure that the economic opportunity from the application of generative AI can deliver widespread benefit will require the population to achieve some minimum level of digital literacy, including some “fluency” in using AI.

Malaysia ranks 31st in the 2022 World Digital Competitiveness Ranking, and 10th in training and education.^{xxxix} While this is ahead of many other Southeast Asian countries, more advanced digital skills of the workforce would need to be further enhanced to fully harness opportunities to leverage generative AI. As of 2019, the ITU reported that while three-quarters of Malaysians carried out at least one activity requiring basic digital skills in the previous three months, only 15% carried out at least one activity requiring advanced digital skills.^{xxx, 20} In the workplace, jobs that require advanced digital skills including cybersecurity and AI are often left vacant for more than three months due to difficulty in finding the right talent.^{xxxi} Uplifting advanced digital skills for individuals and businesses will be critical to ensuring that generative AI can be fully leveraged, and focus should be placed on developing strong curriculums at the tertiary level focused on the use of advanced digital skills. The Malaysian government has put in considerable effort to build a digitally skilled workforce, with the 2021 Digital Economy Blueprint laying out plans to design the curriculums at higher learning institutes such that they equip tertiary students with the right set of digital skills that are highly sought after in the industry as well as the 12th Malaysia Plan Mid-Term Review and the Madani Economy Framework, in which talent development for a digital world is a key element in the policy enablers identified.^{xxxii, xxxiii, xxxiv}

The manufacturing sector is one of the most important contributors to the Malaysian economy and made up 23.4% of the national GDP in 2022.^{xxxv} Recognizing the need to drive the digital transformation of the manufacturing sector for sustained growth, the Ministry of International Trade and Industry launched the Industry4WRD National Policy on Industry 4.0 in 2018^{xxxvi} The recently-launched New Industrial Master Plan 2030 builds on this, recognizing the critical role of the manufacturing sector in the Malaysian economy, and setting a strategic direction toward increased economic complexity and moving up the value chain, among others, by leveraging on technology adoption, skills development and innovation. The Malaysia Smart Factory (MSF) 4.0 was established by the Selangor Human Resources Development Centre (SHRDC) and the Swiss Smart Factory to deliver training and talent development in the realm of Industry 4.0 and Smart Factory competencies including computer vision, data generation, data analytics and formulation, digital workflow management and so on with the goal of implementing agile, efficient, and automated production lines that seamlessly integrate with a smart logistics and service network.^{xxxvii}

Furthermore, building upon digital literacy will be the need to improve AI fluency—the ability to operate in an AI environment and leverage AI tools.^{xxxviii} This includes learning how to manipulate and apply AI technologies across a range of situations and use functions to enhance existing work tasks for more effective and efficient results. This will require on-the-job training and industries to work with schools, universities, and vocational training institutions to ensure that curricula and syllabuses provide learners with job-ready skills for an AI environment.



¹² Basic digital skills are defined as the ability to conduct four activities: (1) copying or moving a file or folder, (2) using copy and paste to duplicate or move information within a document or folder, (3) sending emails with attachments, and (4) transferring files between computer and other computers. Standard digital skills are the ability to: (1) use a basic arithmetic formula in a spreadsheet, (2) connect and install new devices; (3) create presentations; and (4) find, download, install, and configure software. Advanced digital skills refer to the ability to write programs and engineer software.

5 Harnessing the potential of generative AI

Generative AI has the potential to create significant opportunities for the Malaysian economy by revolutionizing the way in which work is currently done—by improving efficiency, increasing productivity, and supporting innovation. Anything that revolutionizes the production process has the potential to disrupt labor markets, particularly in the short-term. At the same time, how policymakers, businesses, and workers choose to anticipate and prepare for the revolution will determine how effectively its benefits can be harnessed to support more sustainable and inclusive economic growth.

Implementing generative AI with the aim of harnessing its potential to drive economic growth will require a comprehensive approach that addresses not only the technological aspects of generative AI, but also the social, economic, and ethical implications of the technology. A national vision, which includes a policy and regulatory framework, that encompasses these factors will be necessary to ensure that the benefits of generative AI are maximized. One of the key purposes of such a framework would be to provide clarity for businesses and other potential users of generative AI technologies on the policy and regulatory stance, as well as the guardrails that need to be put in place.

It may be necessary for policymakers to reimagine existing government policies and regulations and create new ones that are fit-for-purpose and adaptable—such as facilitating access and adoption and securing innovation—while guiding participants on responsible use. Policies to support broader digital transformation and address societal challenges may also help facilitate adoption of AI, and in some instances, government can take the lead in addressing key barriers. Some enabling policies for Malaysia are discussed in Box 5. Businesses should consider investments to prepare its systems, processes, and people to make the most from generative AI's opportunities, as well as being cognizant of its potential risks. Furthermore, workers will need to be open to adjusting to the changing work environment, including by gaining new skills and engaging in lifelong learning.

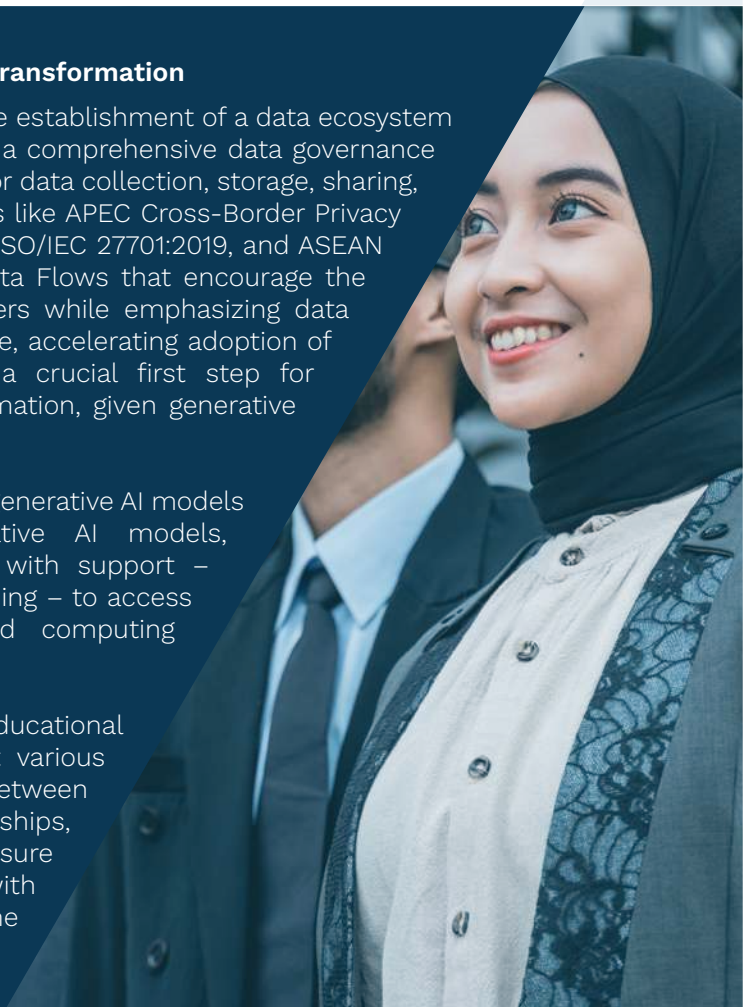
BOX 5

Enabling Policies for Malaysia's AI-led Digital Transformation

Data Ecosystem: Government could facilitate the establishment of a data ecosystem that promotes the adoption of AI by developing a comprehensive data governance framework with clear guidelines and standards for data collection, storage, sharing, and usage and promote policies and approaches like APEC Cross-Border Privacy Rules (CBPR), Data Free Flow with Trust (DFFT), ISO/IEC 27701:2019, and ASEAN Model Contractual Clauses for Cross Border Data Flows that encourage the sharing of data across organizations and borders while emphasizing data privacy, security, and ethics.^{xxxix, xl, xli, xlii} Furthermore, accelerating adoption of cloud technology and infrastructure will be a crucial first step for governments to realize a AI-led digital transformation, given generative AI's significant computing capacity needs.

Cost: Given the high cost involved in developing generative AI models or adopting commercially available generative AI models, government could consider providing MSMEs with support – whether financial or other form of capacity-building – to access AI tools, development platforms, and cloud computing resources.^{xliii}

Education: Government could work with educational institutions to develop AI-focused curricula at various educational levels and facilitate collaboration between academia and industry by promoting partnerships, internships, and research collaborations to ensure that students develop skills that are aligned with industry-needs and are able to transition into the workforce.^{xliii}



The Malaysian government published the National AI Roadmap in 2021, which brings together seven other AI-related national documents, solidifying AI as a key driver of Malaysia's future development.^{xlv} Given the broad-ranging impacts of generative AI, a coordinated effort is necessary to prepare for and enable the widespread use of generative AI – the acknowledgement that the AI Roadmap is a “living document” is a testament to this need to constantly ensure its relevance. This will require collaboration across multiple stakeholders, from government, industry, academia, civil society, and the broader community to engage in the topics of how to best leverage generative AI and manage its risks. Malaysia has taken the first steps towards this in the AI Roadmap and the subsequent initiatives developed pursuant to the Roadmap, as well as through efforts such as establishing the Malaysia Centre for the Fourth Industrial Revolution to leverage the powers of AI and other cutting-edge technologies for economic growth and post-pandemic recovery.

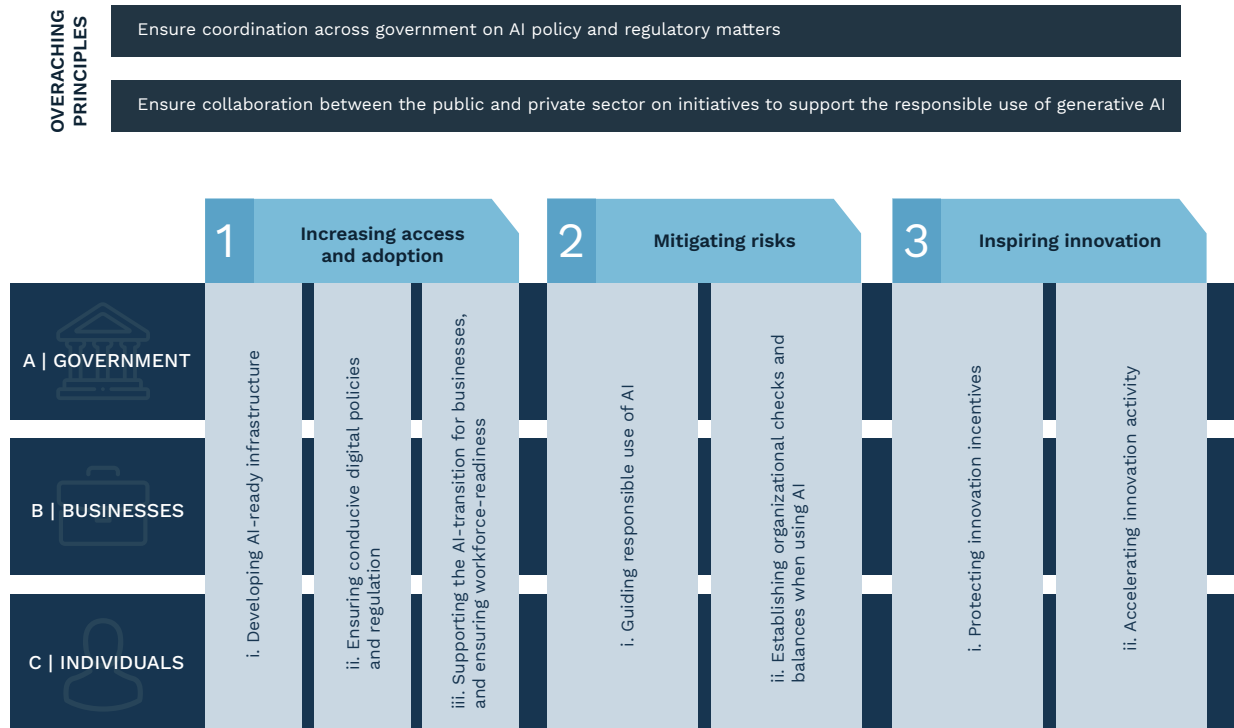
The recommendations in this section are aligned with the direction of Malaysia National 4IR Policy document and National AI Roadmap which emphasizes the need to incorporate AI into the quadruple helix of government, academia, private sector, and civil society to accelerate economic growth with a governance paradigm that is not siloed and promotes information sharing.^{xlvi}

Exhibit 10 presents a framework of 16 recommendations to drive generative AI use for consideration by government and business leaders, focused on three main policy objectives: (1) increasing access and adoption; (2) mitigating risks; and (3) inspiring innovation.

Two overarching principles should guide the approach to considering these recommendations:

1. Ensure coordination across government on generative AI policy and regulatory matters, such as through establishing a cooperation mechanism like the UK's Digital Regulatory Cooperation Forum.^{xlvii} Given the broad-based potential for generative AI to have applications across all industries, there will need to be alignment in the approaches taken by sector regulators towards applications of generative AI within their regulatory purview.
2. Ensure collaboration between the public and private sector on initiatives to support the responsible use of generative AI, with a view to maximizing the benefits for the country, including through hosting Public-Private Forums.





Source: Access Partnership

5.1 Increasing access and adoption

A coherent national vision that includes a fit-for-purpose policy and regulatory framework to guide the development and deployment of generative AI technologies will be critical in maximizing its benefits for the country. This could be part of existing initiatives to increase access and adoption to digital technologies in general, such as the current efforts under Malaysia’s Jalinan Digital Negara (JENDELA) plan.

Developing AI-ready infrastructure

1. The development and deployment of generative AI technologies often require significant resources including high-performance computing systems and large datasets as well as highly specialized skills which creates significant barriers to accessing it and this can exacerbate existing social and economic divides. A review of the current state of access to digital infrastructure and investments to improve access, with a focus on high speed broadband and hyperscale cloud will support the ability of the country to leverage on AI technologies.
2. A review of households’ access to digital tools, such as computers and the internet, and investments to improve digital inclusion, with a focus on women, the elderly, youths, populations in underserved communities as well as residing in rural areas, will also be important.^{xlviii} By improving household access to digital tools, the government can narrow the digital divide and ensure that all individuals, regardless of socioeconomic status have opportunities to participate in an increasingly digital world. This in turn can help reduce inequalities in education, employment, and access to information, and in the longer run improve social wellbeing and livelihood of citizens.
3. There will also be a need to assess the local generative AI ecosystem with a view to understand strengthens and potential gaps, including model and application developers, and service providers who can assist businesses with adopting generative AI technologies.

Ensuring conducive digital policies and regulations

4. There will be a need to take stock of the national and local data ecosystems and legislate strong data protection frameworks that enable responsible data collection, management, and sharing which will be a key driver of generative AI adoption.^{xlix} Efforts currently underway to update Malaysia's data protection laws^{l, li} can support the country's ability to leverage on AI, and should be accompanied with appropriate capacity building to ensure that businesses and individuals are equipped to implement and leverage on the protections offered by the regulatory framework that will be in place.
5. Businesses should review their operations to ensure compliance with existing safeguards for data protection and data privacy, as well as keep up to date with any revisions to Malaysia's personal data protection laws,^{lii} which will enable generative AI models to process unstructured data while ensuring that personal data remains protected.^{liii, liv}

Supporting the AI-transition for businesses, and ensuring workforce-readiness

6. Existing digital literacy programs should be leveraged to promote generative AI-specific skills through reskilling and upskilling initiatives aimed at different population segments including women, youths, mid/late-career workers, and the elderly to facilitate adoption and effective use of generative AI technologies and ensure a fair transition for workers at all levels.
7. A review of initiatives to support MSMEs to identify the specific job roles and the tasks within these roles that would be affected by generative AI implementation will be useful to facilitate the MSMEs in leveraging on the technology and mitigating potential risks. Based on this insight, job roles should be rescoped and relevant training could be offered to employees to improve labor market outcomes.
8. Government and businesses should work closely to ensure support for the workforce to develop basic skills around learning, as well as social skills and management skills, which will continue to be an important part of a workers' toolkit.

5.2 Mitigating risks

The policy and regulatory framework within the national vision should consider the necessary guard rails needed to minimize risks and prevent the harmful use of the technology. Such guardrails should encompass national, sectoral, and organizational-level measures to guide the use and deployment of generative AI in a fair and safe manner that respects human rights and organizational values.

Guiding responsible use of AI

9. The adoption of responsible and ethical AI principles at the national level as articulated in the AI Roadmap is a good start to address unintended consequences such as discrimination, bias and malicious use, and businesses should be supported to implement it. Such national guidance, and subsequent frameworks and standards adopted should remain in line with global best practices and focus on protecting human rights and ensuring digital safety.
10. Businesses should review and adhere with national guidelines and consider implementing organizational-level AI governance frameworks with policy/standards for research and deployment that are aligned with the company's core mission and vision.

Establishing organizational checks and balances when using AI

11. Initiatives to promote awareness of the limitations and risks of generative AI and support efforts of industry associations to develop guidance to businesses in the form of organizational roadmaps with risk management frameworks, with a focus on MSMEs, should be considered.
12. Support for MSMEs, with a view to considering support for conducting assessments for risk identification and prevention for especially high-risk generative AI applications, will be helpful in ensuring the implementation of national principles on responsible use of AI.
13. Businesses should undertake risks assessments ahead of implementing generative AI, and proactively work to align their AI risk management framework with the organization's broader risk management efforts.

5.3 Inspiring innovation

Close collaboration will be required between government and the private sector to enable an innovative environment that ensures generative AI can fulfil its role as an accelerator of innovation.

Protecting innovation incentives

14. Broader innovation policy frameworks should be reviewed bearing in mind the context of generative AI, with a view to achieving the right balance between adequate intellectual property protection and maintaining incentives for human innovation.

Accelerating innovation activity

15. In efforts to drive innovation, an assessment of the innovation landscape should take into account the need to identify existing gaps and potential opportunities to promote research, development, and implementation of generative AI to foster an AI-ready culture at regional and national levels.
16. Governments, businesses, industry associations and community groups should collectively explore open data initiatives and Public Private Partnership (PPP) models to leverage diverse sets of data and knowledge to boost AI-enabled innovation.^{xlvi}



Appendix A: Methodology

The purpose of this section is to describe the modeling techniques and data sources used in estimating the economic impacts presented in this report. There are other published studies that estimate various aspects of AI's potential economic impact. Each of these studies will have different objectives, adopt different methodologies, and use different data sources. Comparing the findings of each study will need to factor in such differences.

The potential of generative AI is a ground-up estimation, comprising two related assessments of the expected effect of generative AI on: (1) the undertaking of specific work activities (i.e., tasks); and (2) the need for specific skills. The analysis starting with such a ground-up estimation reflects that generative AI will have implications for tasks within jobs. A limitation of the quantitative estimates is that it does not consider new jobs that could be created as generative AI becomes increasingly prevalent—that is, it only reflects the impact on existing types of jobs ("occupation").

The size of the reported impact of generative AI on jobs represents the share of tasks within a particular occupation that could be affected by implementation of generative AI. It does not reflect the number of jobs that will be replaced. It is likely that generative AI will change what tasks people focus on in their work rather than replacing entire occupations.

The determination of the skills most affected by generative AI is based on an assessment of the skills that are most prevalent (i.e., most frequently in use) among the tasks impacted by generative AI, how prevalent those tasks are among occupations, how prevalent those occupations are within industries, and the industry-structure of the country.

The analysis uses the following data sources:

- This analysis leverages O*Net data on tasks involved in all occupations, developed by the National Centre for O*Net Development. While the data are based on US surveys, it is expected that the types of tasks involved in an occupation should not materially differ between countries. That is, the tasks of a retail bank teller are the same whether it is based in the US or Malaysia.
- The analysis also leverages O*Net data on occupations related to the Work Context, including degree of automation; groupings of occupations by Job Zone, which is an assessment of the extent of preparation required; and its mapping of basic and cross-functional skills to occupations.
- The mapping of basic and cross-function skills to tasks, was developed by Access Partnership, was mapped at a detailed work activity-level.
- The mapping of occupations to industry is based on data by the US Bureau of Labor Statistics. The assumption is that the composition of the workforce by industry does not vary significantly between countries.
- The analysis of sector-level impacts by country uses data on workforce composition by sector from the UN International Labor Organization (ILO), and supplemented by data from national statistics offices where necessary.
- The analysis of production impacts by country uses data on gross output from Asian Development Bank, as well as employment data from the ILO and national statistics offices. This assumes that each task within an occupation in an industry has an equivalent value – which is proxied by a pro rata of gross output per worker within the relevant industry.

This analysis in this report provides an initial assessment of the potential economic impact of generative AI. It can provide a basis for future research to understand the broader implications of generative AI for economies, including in terms of gender, poverty, and regional dimensions.

Appendix B: Disentangling generative AI from automation

Generative AI is not the same as automation. Previous research on the impact of digitalization on the workforce had a focus on the idea of automation, where the jobs most affected contained mostly routine tasks, and were generally in lower paid occupations.

It is expected that generative AI will transform tasks across a wide range of occupations, particularly occupations that involve tasks that are more complex. In these types of occupations, the use of generative AI is unlikely to supplant human participation—there will still need to be human judgement to account for algorithmic bias, as well as person-to-person interaction to manage important stakeholder relationships.

Used well, generative AI is not about replacing people in jobs. Instead, it is about supporting greater effectiveness and efficiency in their work tasks.

There are three findings that show how the impact of generative AI is different from automation, as it could transform: (1) non-routine work activities; (2) work activities that contribute to decision-making; and (3) occupations requiring greater preparation and demanding higher pay.

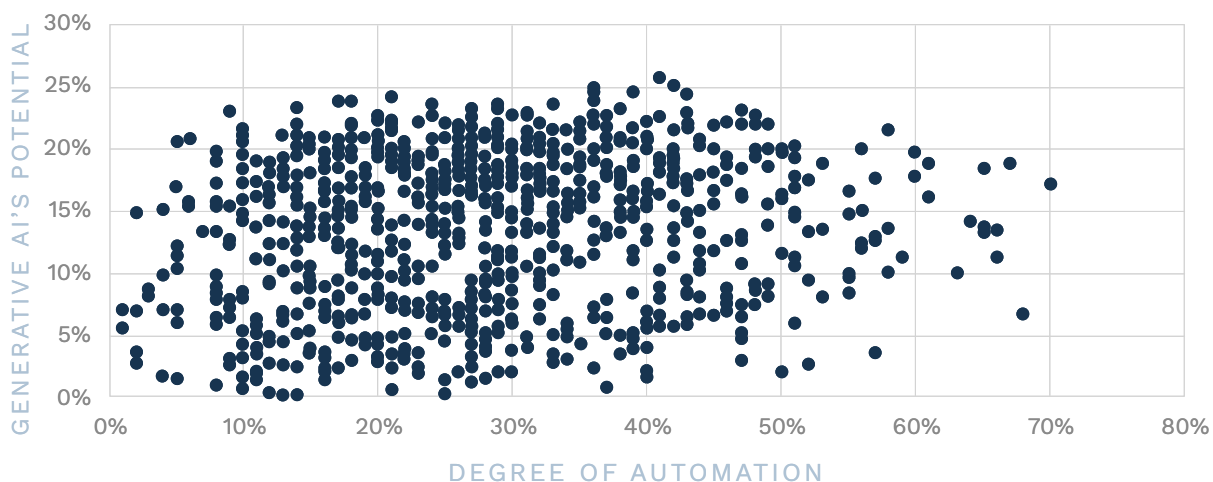
B.1 Generative AI holds potential for non-routine work activities

Generative AI is not expected to have the same workforce impact as digitalization. It holds potential for occupations that have a higher share of non-routine work activities, moving away from the idea of digitalization only affecting the most “automatable” jobs. For example, the job of a post-secondary school teacher is considered less automatable (that is, less routine), but they could benefit from the application of generative AI to support curriculum planning and delivering more personalized learning.

The occupations for which generative AI holds potential cuts across all occupations, including those assessed to have low degrees of automation (Exhibit B.1). That is, there does not appear to be a strong relationship between occupations with higher generative AI potential and their degree of automation.

EXHIBIT B.1

Generative AI impact on occupations, by occupation degree of automation



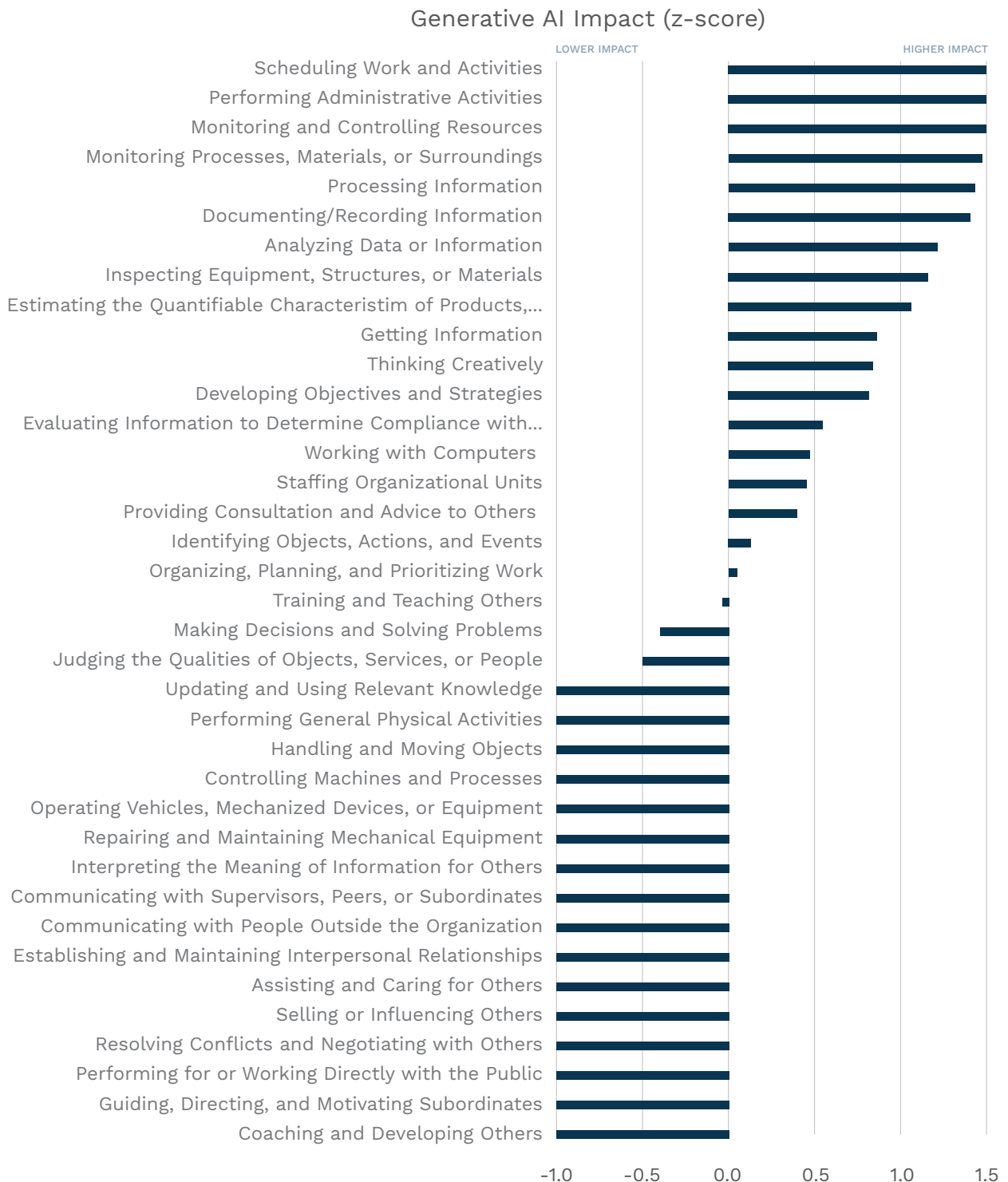
Notes: The analysis is done on a global level. n=873; each dot represents one occupation, e.g., investment fund manager. “Generative AI’s potential” for each occupation is based on the share of work activities within each occupation that could be transformed by generative AI. “Degree of Automation” for each occupation is based on an assessment of occupations against a scale of being “not at all automated” to “completely automated”, based on the O*Net Work Context data.
Sources: Access Partnership analysis, National Center for O*NET Development

B.2 Generative AI will transform work activities contributing to decision-making

Generative AI will be most transformative for work activities contributing to decision-making – those work activities related to monitoring and optimizing processes (e.g., work schedules), analyzing and processing large information (e.g., estimating and evaluating information and situations) (Exhibit B.2).

EXHIBIT B.2

Generative AI potential for work activities (z-score)



Notes: The analysis is done on a global level. "Generative AI impact" for each work activity is based on the share of sub-tasks within each work activities that could be transformed by generative AI. The work activities listed are groupings of detailed work activities based on O*Net defined work activity elements. Z-score of greater than 0 represents an above average impact, while a z-score below 0 represents a below average impact.
Sources: Access Partnership analysis, National Center for O*NET Development

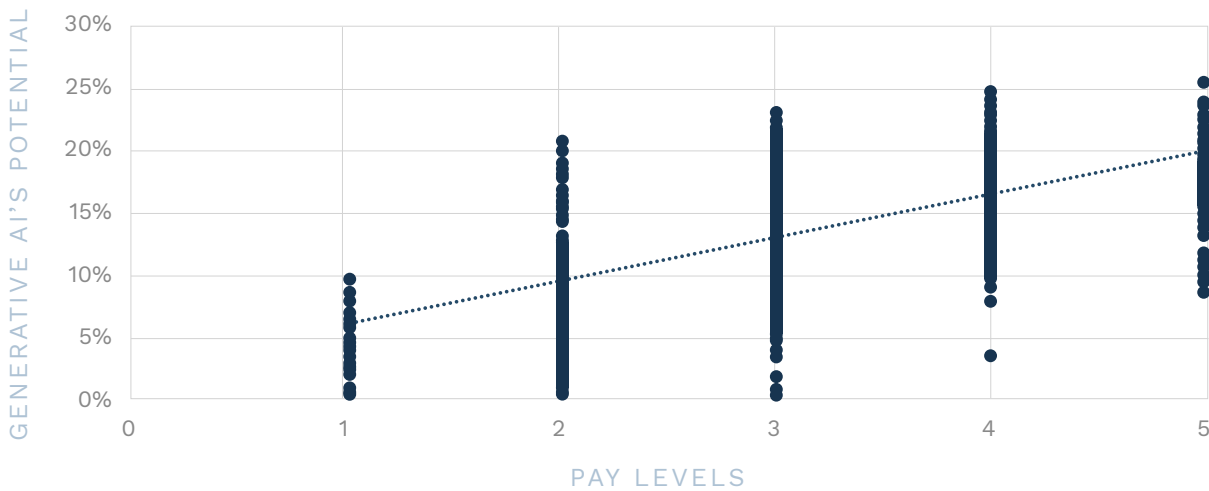
B.3 Generative AI will transform occupations demanding higher pay

Generative AI will transform occupations requiring greater preparation—that is, more years of education and training—and those demanding higher pay (Exhibit B.3). That is, there appears to be a positive relationship between occupations with higher generative AI potential and their pay level. For example, the job of a biologist is associated with considerable preparation and often higher pay, and they could benefit significantly from the use of generative AI to support their research and development efforts.

Again, this diverges from the impact of digitalization being attributed to highly automatable, and generally lower paid occupations that involve more routine tasks.

EXHIBIT B.3

Generative AI impact on occupations, by occupation pay level



Notes: The analysis is done on a global level. n=873; each dot represents one occupation, e.g., investment fund manager. "Generative AI's potential" for each occupation is based on the share of work activities within each occupation that could be transformed by generative AI. "Pay Levels" is a grouping of occupations proxied according to the extent of preparation required for an occupation, based on the O*Net Job Zones data.
Sources: Access Partnership analysis, National Center for O*NET Development



Appendix C: Roundtable on “Artificial Intelligence – Opportunities and Impact”

On 5 July 2023, the Malaysia Centre for the Fourth Industrial Revolution, in collaboration with Access Partnership and supported by Microsoft, organized a roundtable discussion on “Artificial Intelligence – Opportunities and Impact” in Putrajaya, Malaysia. The roundtable brought together key stakeholders from the industry, academia, think-tanks, and government, to engage in a discussion on:

- the potential opportunities that generative AI holds for Malaysia;
- barriers to adoption and emerging risks; and
- actions that government, industry, and civil society could take to harness the benefits of generative AI and manage emerging risks.

Roundtable participants contributed to a discussion around their experiences, concerns, and considerations for the development and use of generative AI in Malaysia. Inputs from the discussion are summarized in the sub-sections below and have helped inform the final research of this report.

C.1 The potential opportunities for Malaysia

Roundtable participants agreed that generative AI presents a significant economic opportunity for Malaysia that would considerably improve the wellbeing and livelihood of the population. Participants discussed the application of generative AI in different key sectors for Malaysia, and recognized the technology’s potential to facilitate further innovation, scientific discovery, and drive better educational outcomes. Many roundtable participants noted that the technology could enhance productivity across various industries, which could also help workers take on more value-adding roles.

1. Generative AI has the potential to enhance and upskill customer service roles.

Participants noted that customer service roles typically have a high attrition rate. A consequence of this is that companies have to invest significant resources to train new hires. The use of generative AI-enhanced chatbots could help reduce attrition rates by providing efficient and effective service to customers. For instance, the use of generative AI-enhanced chatbots could help handle high volumes of customer inquiries simultaneously, providing instant responses to common queries. This could in turn reduce customer wait time and frustration, which can contribute to attrition. Generative-AI chatbots can also be integrated with knowledge-based product information, troubleshooting guides, FAQs and more. It can quickly retrieve relevant information or point agents to a ‘source of truth’ quicker and provide accurate answers to customers, thereby reducing the need for escalations and increasing customer satisfaction. Beyond this, generative AI can also be used to help train and upskill workers to offer more personalized recommendations or tailored solutions to customers. Agents that are trained to use the technology can offer more value-added services when interacting with a customer, thereby transforming their role from merely addressing a customer’s query to offering personalized solutions and recommendations. Customers in turn could feel more valued and engaged with this proactive approach.

2. Generative AI can help manufacturers go from predictive to prescriptive maintenance.

One participant noted that while some manufacturers have started to explore the use of other 4IR technology such as IoT sensors and big data analysis to predict when assets will require maintenance, the potential that generative AI provides is that it could enable manufacturers to move from predictive maintenance to prescriptive maintenance. The latter involves collecting and analyzing data on equipment conditions to provide specialized recommendations that help reduce overall operational risks. Generative AI can be applied to simulate different scenarios based on historical data and real-time inputs. By modelling equipment behavior under various conditions, manufacturers could identify potential maintenance needs and predict impact on performance. This allows manufacturers to develop more proactive maintenance plans and take immediate action to prevent or mitigate equipment issues before they escalate, in turn reducing unplanned downtime and costs. To this end, participants stressed the importance of using reliable data to obtain accurate analyses.

3. Generative AI can help companies meet reporting requirements and improve reporting processes.

Generative AI can be used to analyze large volumes of financial and non-financial data to identify patterns, trends, and anomalies. It can help companies extract relevant information from multiple sources such as financial statements, transaction records, and operational data, to facilitate reporting. This could lead to cost savings for publicly listed companies with significant reporting requirements. However, participants acknowledged the issue of data quality, of which, issues of poor data quality would affect the accuracy of outputs from generative AI applications. This means that data governance as well as clear lines of accountability for reporting would become even more important.

4. Generative AI has the potential to enhance education and provide personalized learning experiences.

Roundtable participants discussed the use of generative AI applications in education. Some noted that generative AI-powered chatbot tutors can simulate the experience of one-on-one tutoring, including answering questions, providing explanations, and adjusting the learning journey based on the student's progress. This means that it may be possible to provide more personalized and effective learning experiences for students. However, generative AI models can be subject to risks of errors and bias, which mean that continued teacher and parental supervision are important – it is not a replacement for human teachers.

C.2 Barriers to adoption and emerging risks

In addition to opportunities application of generative AI could pose, roundtable participants discussed potential barriers to adoption and emerging risks around the use of generative AI:

1. Cost of adopting generative AI may be significant.

- a. Implementing generative AI solutions can be costly, requiring investments in hardware, software, data management and skilled personnel. Organizations need to carefully evaluate the potential return on investment and weigh it against the upfront and ongoing costs associated with implementing generative AI solutions. This can be a particular challenge for MSMEs that are typically time and resource constrained but can also affect larger businesses.
- b. The estimated financial and environmental costs to build and operate the digital infrastructure needed to support broad-based adoption of generative AI and increased use of generative AI applications could be significant, given its high computing power and energy requirements. Nevertheless, it was recognized that some of these costs may decline over time with economies of scale and more efficient computing methods to generate answers. Additionally, participants noted the need to improve and add to existing digital infrastructure such as broadband connectivity and adoption of cloud technologies, insofar as cloud technology serves as a pre-requisite to the adoption of generative AI.

2. Poor data quality and cybersecurity create risks.

- a. Given the importance of input data (i.e., training data) for generative AI models (and any other data-driven model), roundtable participants raised concerns on the quality of data used in training generative AI models and emphasized the need for robust data governance practices within organizations looking to build or use generative AI applications.
- b. Participants also noted that for some businesses, the hesitation to adopt generative AI may stem from the perceived risks of inputting proprietary data into public generative AI systems, which while potentially cheaper to use than building an in-house proprietary system, could be vulnerable to data leaks or breaches.

3. Potential misuse of generative AI could spread misinformation with negative consequences.

- a. The ability for generative AI applications to create convincing “fakes” mean that there may be a heightened risk of its use as a tool to spread misinformation, particularly if it touches on sensitive topics such as race and religion which could have broader implications for social harmony within the country. This means that appropriate guardrails must be put in place around the use of generative AI tools, and it will also be important to educate the broader population of the risks and how to manage them.
- b. Participants raised questions around accountability for the negative consequences stemming from the use of generative AI – with acknowledgment that accountability could sit with different entities. For example, responsible AI should be built into the design by developers of foundational models as well as applications; and organizations using generative AI tools should have in place relevant checks and balances.

C.3 Actions to harness the benefits of generative AI

To realize the opportunities from generative AI, there was a sense among roundtable participants that digital transformation must “begin with people”. While some participants did question if the “train has already left the station” for Malaysia to get ahead of the generative AI opportunity, other participants noted that given the significant potential of applying generative AI across different industry sectors, and that use cases continue to unfold, meant that there may be “multiple trains coming through”. It would be important for stakeholders to act now and introduce the right policies and actions to ensure that Malaysia is able to realize the potential economic opportunity. Specifically, participants identified the following to help position Malaysia to maximize the benefits of generative AI:

1. A population educated about generative AI.

- a. As a community, it will be important to emphasize education in core skills of reading, writing, and critical thinking, as well as on cultural and societal values. This will be important to help the population make use of generative AI applications effectively as well as responsibly, and to guard against the population losing ‘fundamental skills’ as each generation becomes more reliant on technology.
- b. For educational institutions and industry, as part of efforts to build an AI-ready workforce, beyond developing the right courses and curriculum, it would be important for the educational experience to also be complemented with internships and industry attachments.
- c. For businesses, to minimize the financial and environmental costs related to running inquiries through generative AI applications (related to the use of significant computing power), employees should be provided training on efficient use of generative AI application such as how to enter the right prompts.

2. A business sector that is aware of the possibilities of generative AI.

- a. Government and industry associations could support initiatives to increase awareness among micro, small and medium enterprises (MSMEs) about how they could use generative AI in their business, including about the range and potential of generative AI tools that are available, beyond just the most prominent ones, such as ChatGPT. As part of these efforts, it will be important to recognize that some global use cases may not be as relevant to Malaysia, and there may be a need for them to be adapted to the local context.
- b. Government and industry associations could develop sector-specific roadmaps, or support firms to develop roadmaps tailored to their circumstances. These roadmaps would help businesses, particularly MSMEs, identify the appropriate generative AI tools for their use cases.

3. A policy of digital inclusion.

- a. There is a need for policies to ensure that the digital divide—such as between urban and rural areas, large businesses and MSMEs, and the young and old populations—is not exacerbated with the mass adoption of generative AI.

4. An emphasis on accountability.

- a. Governments, businesses, and other users of generative AI should have in place guidelines and policies that establish clear accountability around its use. Particularly in situations where generative AI models ‘fail’ or provide incorrect information, it must be clear the decision to use outputs from generative AI applications remains with a human decision-maker.

The role of government

Roundtable participants noted that the government had an important role in working together with the private sector, academia, civil society, and the broader community to realize this opportunity. Roundtable participants noted that government had an important role to:

- communicate and educate the population, particularly given the potentially far-reaching applications of generative AI;
- lead coordination of stakeholders across the private sector, academia, civil society, and the broader community, to encourage meaningful engagement around how Malaysia should use generative AI and manage its risks;
- guide the development of guardrails around the use of generative AI, including setting out expectations for responsible use, such as around protection of intellectual property and data privacy; and
- lead the formulation of enabling policies and the development of industry roadmaps. In this instance, participants emphasized the need to develop a people-first digital transformation agenda.

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MyDIGITAL Corporation is tasked to monitor the progress of the Malaysian Digital Economy Blueprint (MDEB) and the National 4IR Policy (N4IR), as well as to evaluate implementation performance and results. It also acts as the secretariat of the National Digital Economy and 4IR Council (MED4IRN). The MED4IRN is chaired by YAB Prime Minister to provide leadership and policy direction related to the digital economy and 4IR technology.



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