



MINISTRY OF HUMAN RESOURCES

TalentCorp
GROUP OF COMPANIES

Impact Study of Artificial Intelligence, Digital, and Green Economy on the Malaysian Workforce

Volume 1



**Impact Study of
Artificial Intelligence,
Digital, and Green
Economy on the
Malaysian Workforce
Volume 1**



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Authors

Pharmaceutical Manufacturing

- 1. Dr. Devaki Nagaya
- 2. Ramzi Bustami

Medical Devices

- 1. Dr. Devaki Nagaya
- 2. Ramzi Bustami

Global Business Services

- 1. Dr. Devaki Nagaya
- 2. Ramzi Bustami

Information and Communications Technology

- 1. Diyana Azmi
- 2. Sureshram Mathurayar Ramayiah
- 3. Nurain Ramle

Food Manufacturing and Services

- 1. Nursyazwani Zulhaimi
- 2. Ayu Sabrina Abdul Samat

Electrical and Electronics

- 1. Diyana Azmi
- 2. Kamalia Musa

Aerospace

- 1. Mohd Ikhwan Abdullah
- 2. Adlina Sofia Afdzal

Wholesale and Retail Trade

- 1. Nursyazwani Zulhaimi
- 2. Ayu Sabrina Abdul Samat

Energy and Power

- 1. Nurain Ramle
- 2. Ayu Sabrina Abdul Samat

Chemical

- 1. Mohd Ikhwan Abdullah
- 2. Adlina Sofia Afdzal

Supported by

Pharmaceutical Manufacturing

- 1. Nor Asmahan Othman

Medical Devices

- 1. Nor Asmahan Othman
- 2. Azura Ahmad

Global Business Services

- 1. Nazliyah Mohd Ali

Information and Communications Technology

- 1. Nazliyah Mohd Ali

Electrical and Electronics

- 1. Azura Ahmad

Aerospace

- 1. Choong Wai Seng, Brian
- 2. Aiman Danish Abu Zarim

Wholesale and Retail Trade

- 1. Safrina Lasa

Energy and Power

- 1. Nazliyah Mohd Ali
- 2. Aiman Danish Abu Zarim

Chemical

- 1. Nazliyah Mohd Ali
- 2. Nurain Ramle

Group Strategy Office

- 1. Muhammad Afiq Rosman
- 2. Luqmanulhakim Mohd Jailani
- 3. Siti Noor Munirah Kamaruzaman
- 4. Syaza Nazura Noor Azmi

Editor

- 1. Nadia Zulkifli

Food Manufacturing and Services

- 1. Safrina Lasa

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Content

Prefaces	Minister of Human Resources	6
	Secretary General of Ministry of Human Resources	8
	Group Chief Executive Officer of TalentCorp	10
	Executive Summary	12
Chapter 1	Introduction of the Study	16
Chapter 2	Approach and Methodology	18
	• Approach	20
	• Research Techniques	20
	• Research Methodology	21
	• Key Stakeholders Engaged in the Study	22
Chapter 3	Overview of AI, Digital, and Green Economy	24
	• AI and Digital Overview	26
	• Green Economy Overview	32
	• State of Adoption in Malaysia	36
	• Impact to Talent Landscape	42
Chapter 4	Key Findings across 10 Sectors	48
	• Overview	50
	• Highly Impacted Roles Analysis and Career Pathways	53
	• Medium and Low Impacted Roles Analysis	61
	• Emerging Roles Analysis	66
	• In-Demand Skills	68
Chapter 5	Recommended Initiatives	72
	• Government	75
	• Industry Players	76
	• Academia	78
	• Training Providers	79
	• Enablers	80
	Conclusion	83
	Abbreviations	84

Preface by the Minister of Human Resources (KESUMA)

As we step into an era marked by the rapid rise of Artificial Intelligence (AI), Digital, and Green Economy,, Malaysia stands at a crossroads—faced with both challenges and exciting new opportunities. Our future competitiveness in an interconnected and tech-driven world depends on our ability to equip our workforce with the right skills to meet these changes head-on.

In the ASEAN region, Malaysia is not navigating this journey alone. As part of a dynamic regional economy, we have a unique opportunity—and responsibility—to help shape a workforce that drives regional growth on the global stage. Our goal is ambitious: to spearhead a workforce strategy that advances digital and green skills, fosters innovation, and supports the mobility of talent across borders.

The **Impact Study of Artificial Intelligence, Digital, and Green Economy on the Malaysian Workforce** - spearheaded by TalentCorp as KESUMA’s strategic think tank - is a timely effort in understanding these trends. This study offers a clear, forward-looking perspective on how these shifts are shaping key sectors of Malaysia’s economy and what we can expect in the next three to five years. Its recommendations will serve as a guide for investors, SMEs, and workers alike, pointing the way to a more resilient and future-ready workforce.

This study also aligns closely with Malaysia’s national agenda, including the MADANI framework, the Twelfth Malaysia Plan (RMKe-12), the New Industrial Master Plan 2030 (NIMP), and the National Energy Transition Roadmap (NETR). These findings reinforce the need for a united effort across sectors and policies to support Malaysia’s long-term economic growth and technological advancement.

Looking forward, let’s move with a spirit of collaboration. As emphasised in this report, government, academia, training providers, and industry must work together with a commitment to accountability and transparency. Together, we can lead Malaysia toward new heights of innovation, inclusivity, and economic prosperity, guided by the principles of Malaysia MADANI.

YB Steven Sim Chee Keong
Minister of Human Resources
(KESUMA)

“

This study offers a clear, forward-looking perspective on how these shifts are shaping key sectors of Malaysia’s economy and what we can expect in the next three to five years. Its recommendations will serve as a guide for investors, SMEs, and workers alike, pointing the way to a more resilient and future-ready workforce.

”

YB Steven Sim Chee Keong
Minister of Human Resources
(KESUMA)



Preface by the Secretary General of Ministry of Human Resources (KESUMA)

As we enter a new industrial era shaped by rapid technological advancements and the shift towards environmental sustainability, it is key to understand how these developments will transform our workforce. The **Impact Study of AI, Digital, and Green Economy on the Malaysian Workforce** offers much-needed insights, providing a detailed analysis of how these trends will affect key sectors.

Beyond a reflection of current trends, this report is a critical tool that will guide KESUMA's strategies as we work to ensure that our policies remain aligned with the needs of a rapidly changing economy. A core KESUMA mission is to develop and nurture a competent, productive, responsive, and resilient labour force. In this regard, the findings of this report highlight the importance of agility—our collective ability to swiftly adapt to new technologies, embrace sustainable practices, and equip our workers with the skills necessary to thrive in a future shaped by digitalisation and environmental responsibility.

Workforce transformation, however, cannot happen in isolation. A standout feature of this study is its inclusive methodology, developed through extensive collaboration with a broad range of stakeholders, including government bodies, industry leaders, academia, and training providers. This collaborative approach ensures that the report's conclusions are grounded in real-world needs and perspectives. I would like to extend my deepest appreciation to all who contributed their time, expertise, and insights to this important initiative.

Aligned with the vision of the MADANI economy, this report challenges us to rethink traditional workforce planning and encourages innovation to sustain Malaysia's competitive edge in the global arena. I am confident that the insights from this study will empower us to build a resilient, inclusive, and future-ready workforce, capable of meeting the demands of the 21st century.

YBhg. Datuk Azman Bin Mohd Yusof
Secretary General
Ministry of Human Resources (KESUMA)

“

A core KESUMA mission is to develop and nurture a competent, productive, responsive, and resilient labour force. In this regard, the findings of this report highlight the importance of agility—our collective ability to swiftly adapt to new technologies, embrace sustainable practices, and equip our workers with the skills necessary to thrive in a future shaped by digitalisation and environmental responsibility.

”

YBhg. Datuk Azman Bin Mohd Yusof
Secretary General
Ministry of Human Resources
(KESUMA)



Preface by the Group Chief Executive Officer of TalentCorp

As Malaysia stands on the threshold of a transformative era, we find ourselves driven by the accelerating forces of Artificial Intelligence (AI), Digital, and Green Economy. These global trends are reshaping industries, redefining the future of work, and challenging us to navigate both the opportunities for job creation and the realities of evolving role redundancies.

With a median age of 31, Malaysia leads a youthful ASEAN region where the median age is just 30. This demographic advantage presents a unique opportunity—a vibrant, dynamic workforce ready to harness the opportunities of a Digital and Green Economy. Yet, it also poses challenges. Youth unemployment and underemployment remain persistent issues across ASEAN, with Malaysia facing a youth unemployment rate of 11% and 36.3% of tertiary-educated employees grappling with skill-related underemployment. These figures demand immediate action. Reskilling and upskilling are not just important—they are imperative as the landscape of jobs continues to evolve.

At TalentCorp, we are honoured to serve as a strategic think tank under the Ministry of Human Resources' (KESUMA) mandate. This critical role allows us to leverage our networks and initiatives, providing data-driven insights that strengthen the government's intelligence capacity and support national policy development, advocacy, and long-term strategic planning.

One of our foremost initiatives in this capacity is the **Impact Study of AI, Digital, and Green Economy on the Malaysian Workforce**. This study is designed to offer key guidance to policymakers and industries, equipping them with the knowledge to prepare the workforce for upcoming shifts. It highlights essential reskilling and upskilling programmes to assist Malaysians affected by job displacement, ensuring they transition smoothly into new roles, fostering sustainable growth, and ensuring no one is left behind.

Through insights gleaned from this study, TalentCorp's MyMAHIR Future Skills Talent Council (FSTC)—an industry-led body dedicated to addressing skills needs—will drive efforts to close critical skills gaps. MyMAHIR's collaboration with industry leaders enables us to identify priority competencies and shape training programmes to meet the evolving demands of their sectors. Aligned with the MADANI Economy framework's focus on lifelong learning and guided by best practices from the International Labour Organization (ILO), TalentCorp will continue working closely with key ministries, agencies, and industry players to develop forward-looking curricula that meet the workforce needs of the future.

As Malaysia navigates this new landscape, the findings from this study will serve as an indispensable resource—providing policymakers, industries, and the workforce with the insights and tools required to stay competitive and resilient in an ever-evolving global economy.

On behalf of TalentCorp, I extend our deepest gratitude to our industry partners, colleagues, and experts for their invaluable contributions to this study. Together, we have crafted a comprehensive and impactful report that will serve as a guide for Malaysia's future of work, ensuring that we are prepared for the challenges and opportunities ahead.

Thomas Mathew

Group Chief Executive Officer
Talent Corporation Malaysia Berhad

“

As Malaysia navigates this new landscape, the findings from this study will serve as an indispensable resource—providing policymakers, industries, and the workforce with the insights and tools required to stay competitive and resilient in an ever-evolving global economy.

”

Thomas Mathew
Group Chief Executive Officer
Talent Corporation Malaysia Berhad



Executive Summary

The rapid surge of Artificial Intelligence (AI), Digital, and Green Economy is set to profoundly reshape the employment landscape in Malaysia. To address this, initiatives were undertaken to thoroughly analyse AI, Digital, and Green Economy trends and their adoption in Malaysia. The goal is to prepare our workforce to engage with the emerging opportunities by understanding these trends and ensuring readiness to capitalise on the evolving economy. This will arm the Malaysian workforce with the necessary skills to navigate and thrive in a dynamic, forward-looking economy, aligning with global movements toward technological innovation, environmental sustainability, and advanced economic growth.

The 'Impact Study of AI, Digital, and Green Economy on the Malaysian Workforce' covers several sectors, namely Information and Communications

Technology (ICT); Food Manufacturing and Services; Pharmaceutical Manufacturing; Medical Devices; Aerospace; Electrical and Electronics; Wholesale and Retail Trade; Energy and Power; Chemical; and Global Business Services. Collectively, they contribute approximately 60% of the country's gross domestic product (2023 GDP), amounting to RM933 billion, and employ 31% of Malaysia's skilled and semi-skilled workforce, equivalent to approximately 3.5 million individuals.

The outcomes of this study will contribute to the Malaysia National Skills Registry (MyNSR), a skills taxonomy that will be integrated into the MyMAHIR platform. This platform offers comprehensive insights into industry trends, job roles, required skills, career pathways, and available training programmes across all sectors.



Key Takeaways from the Impact Study

All sectors have adopted digitalisation, although at different paces

- Three (3) sectors indicated a higher degree of AI adoption as a result of advanced automation
- Three (3) others highlighted higher adoption of Green Economy practices due to regulatory requirements

A total of **949** roles were validated across the **10** sectors

- 889 roles (94%) represent existing positions
- 60 roles (6%) are emerging roles and are expected to be increasingly in demand in the next three (3) to five (5) years

Approximately **620,000** jobs are expected to be highly impacted in the next three (3) to five (5) years

- Represents approximately 18% of the total 3.5 million employees in the core business across the 10 sectors
- Including medium impacted employees, an estimated 1.8 million employees, or 53%, are projected to be affected

60 emerging roles will become increasingly important

- 43 roles (72%) are AI and Digital-related roles such as AI engineers and data scientists
- 11 roles (18%) are "Green" roles such as sustainability specialists and energy economists
- 6 roles (10%) are "New Tech" roles such as autonomous/remote operator

Highly Impacted roles can pivot to other roles within or across sectors

- Skills transferability will become increasingly desired and the norm
- Upskilling is a necessity to future-proof the workforce - No longer an option for talent development and retention for the next three (3) to five (5) years

In-demand Specific Skills are **AI, Digital, and Green Economy** related

- Specific skills in demand revolve around data, e.g., Data Engineering, Data Visualisation and Data Management
- Digital and AI Fluency and Sustainability Awareness are two (2) examples of basic skills that future workforce must have

A set of 10 recommended initiatives has been proposed in response to the diverse needs of various sectors. These recommendations are distributed across four (4) key stakeholder groups: Government, Industry Players, Academia, and Training Providers. The combined efforts of the 10 sectors have led to the identification of 326 recommended initiatives, including 114 from the Government, 80 from Industry Players, 59 from Academia, and 73 from Training Providers.



GOVERNMENT

1. Financial Incentives for Research and Development (R&D) Efforts
2. Financial Support to Upskill and Reskill Employees
3. Pool Existing Infrastructures to Serve as Training Centres



INDUSTRY PLAYERS

4. In-House Training and Development Programmes
5. Talent Retention Strategies
6. Strengthen Industry-Driven Collaboration



ACADEMIA

7. Refresh the Education Curriculum (Starting from Pre-School)
8. Extend Internship Programmes



TRAINING PROVIDERS

9. Develop Micro-Credentials Training Programmes
10. Onboard Certified Trainers

The impact study also proposed three (3) Whole-of-Nation Enablers, which will be vital to expediting the transformation of the Malaysian workforce. The success factors for implementing the approach include accountability and responsibility, transparency, linkages with multiple stakeholders, and disciplined execution. Accountability ensures collective efforts, transparency involves periodic progress reporting, effective communication engages stakeholders, and disciplined execution is essential for meeting milestones and objectives.



Enablers

1. Implementation and Monitoring Unit (IMU)
2. Policy to mandate upskilling/reskilling of workforce
3. Talent Data Repository (TDR)

Chapter 1:

Introduction of the Study

Introduction of the Study



Background

On 7 March 2024, Talent Corporation Malaysia Berhad (TalentCorp) was mandated to serve as the strategic think tank for Malaysia's Ministry of Human Resources (KESUMA). The mandate aims to develop the government's intelligence capacity to craft strategies for policy development, advocacy, and future planning. One of the first initiatives assigned to TalentCorp is to conduct a study on the impact of AI, Digital, and Green Economy on Malaysia's workforce. The study will help guide policymakers and industries in preparing for future workforce demands.

Purpose of the Report

The study could not have come at a more appropriate time. The integration of AI, Digital, and Green Economy trends in Malaysia is recognised as a game changer, fundamentally altering the nation's economic trajectory.

These trends are congruent with global movements towards technological innovation, environmental sustainability, and advanced economic growth.

Aligned with the aspirations of the MADANI Economy, Malaysia is undergoing a transformation from a labour-intensive, commodity-based economy to one that is knowledge-centric and technologically sophisticated. National blueprints such as, but not limited to, the New Industrial Master Plan 2030 (NIMP 2030), Malaysia Digital Economy Blueprint (MDEB), and Twelfth Malaysia Plan (RMKe-12) highlight the strategic shift towards AI, Digital, and Green Economy.

These research studies cover several sectors, namely ICT; Food Manufacturing and Services; Pharmaceutical Manufacturing; Medical Devices; Aerospace; Electrical and Electronics; Wholesale and Retail Trade; Energy and Power; Chemical; and Global Business Services. These 10 key sectors have played a pivotal role in

driving Malaysia's economic growth. Collectively, these sectors contribute approximately 60% of the country's GDP, amounting to RM933 billion, and employ 31% of Malaysia's skilled and semi-skilled workforce, which is equivalent to 3.5 million individuals. This substantial impact underscores the importance of these sectors to Malaysia's overall economic performance. The study is ongoing across various sectors, not limited to the 10 listed, with the objective of comprehensively covering all relevant sectors within Malaysia.

The outcomes of this study will contribute to the Malaysia National Skills Registry (MyNSR), a skills taxonomy that will be integrated into the MyMAHIR platform. This platform offers comprehensive insights into industry trends, job roles, required skills, career pathways, and available training programmes across all sectors.

Why AI, Digital, and Green Economy?

Malaysia's Strategic AI Investment and Challenges in Readiness

- In tandem with the rise of AI, the Malaysian government launched the Malaysia AI Consortium and the AI Talent Roadmap for Malaysia 2024-2033 to prepare the workforce. YAB Prime Minister Datuk Seri Anwar Ibrahim emphasised the importance of mastering AI and digital transformation, stating, "If we do not master AI and digital transformation, we will lose out because in all areas of government management, defence, police, immigration, private sector, and agriculture, AI will dominate."
- Malaysia's AI readiness has been showing a declining trend. Between 2019 and 2023, its ranking in the Asia Pacific (APAC) region dropped from 5th to 8th, though it remains the 2nd ranked country in ASEAN. This trend mirrors the performance of other Southeast Asian countries, such as Indonesia, Thailand, the Philippines, and Vietnam, which all scored below the APAC average, highlighting a disparity between mature and emerging digital economies in the region.

The Evolving Digital Economy and Malaysia's Competitiveness

- Digital economy is one of Malaysia's key economic pillars, contributing 22.6% to Malaysia's GDP, with projections to rise to 25.5% by 2025. The fast-evolving landscape of the digital economy necessitates a new strategy to remain relevant and resilient. To address this, Malaysia Digital, a national strategic initiative, was launched by the Malaysia Digital Economy Corporation (MDEC) in collaboration with the Ministry of Communications and Multimedia to drive adoption and opportunities in the digital economy.

- Malaysia's digital competitiveness has experienced fluctuations. In the recent IMD World Digital Competitiveness Ranking, Malaysia's position slipped from 26th in 2019 to 33rd in 2023. Despite being ranked 2nd in ASEAN, countries like Indonesia and Thailand are catching up as they recorded improvements. This contrast highlights the need for Malaysia to bolster its efforts in enhancing digital competitiveness and maintaining its edge in the region.

Malaysia's Green Economy Ambitions and Energy Transition Challenges

- Malaysia is also making significant strides in the Green Economy. The RMKe-12 outlines the nation's aspiration to achieve net-zero greenhouse gas (GHG) emissions as early as 2050. Complementing this, the National Energy Policy (2022–2040) sets the foundation for transforming the energy landscape towards sustainability. In line with these objectives, the Malaysian government has also developed the National Energy Transition Roadmap (NETR) to accelerate the shift from a traditional fossil fuel-based economy to a high-value green economy.
- Malaysia's efforts are reflected in its leading position in the World Economic Forum Energy Transition Index, where it ranked 1st in ASEAN and 35th globally. This is largely due to strong energy security driven by supply diversity and reliability. However, the country has demonstrated negative progress in three (3) out of five (5) sustainable dimension indicators over the past three (3) years, notably in Energy Intensity, CO₂ per Capita, and Share of Electricity. This underscores the need for aligning to existing national strategies to ensure balanced and sustained progress in all aspects of the energy transition and sustainability goals for the country.

The emergence of these transformative trends will fundamentally change the nature of work in Malaysia. In anticipation of this shift, the government aims to enable our workforce through upskilling and reskilling initiatives to ensure Malaysian professionals possess the essential competencies in AI, Digital, and Green Economy, equipping them to excel in a dynamic, future-oriented economy.

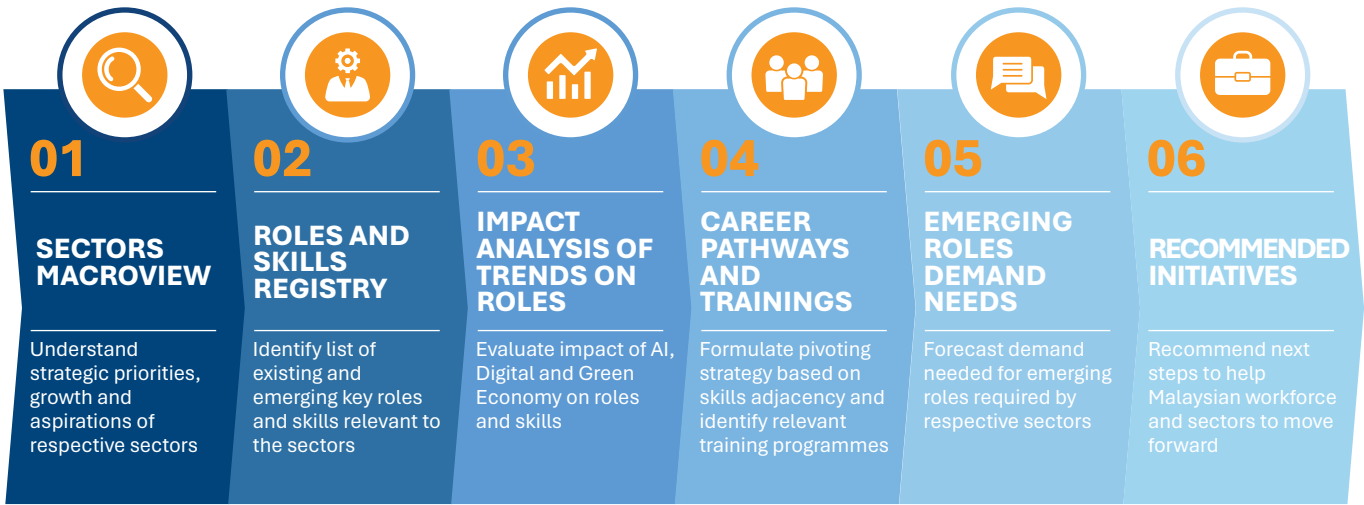
Chapter 2:

Approach and Methodology

Approach	20
Research Techniques	20
Research Methodology	21
Key Stakeholders Engaged in the Study	22

Approach

A six-pronged approach entailed a blend of qualitative and quantitative research techniques that generated insights and met the objectives desired from this study. The study’s outcomes reflect what is happening in each industry today and what is expected of each sector in the next three (3) to five (5) years.



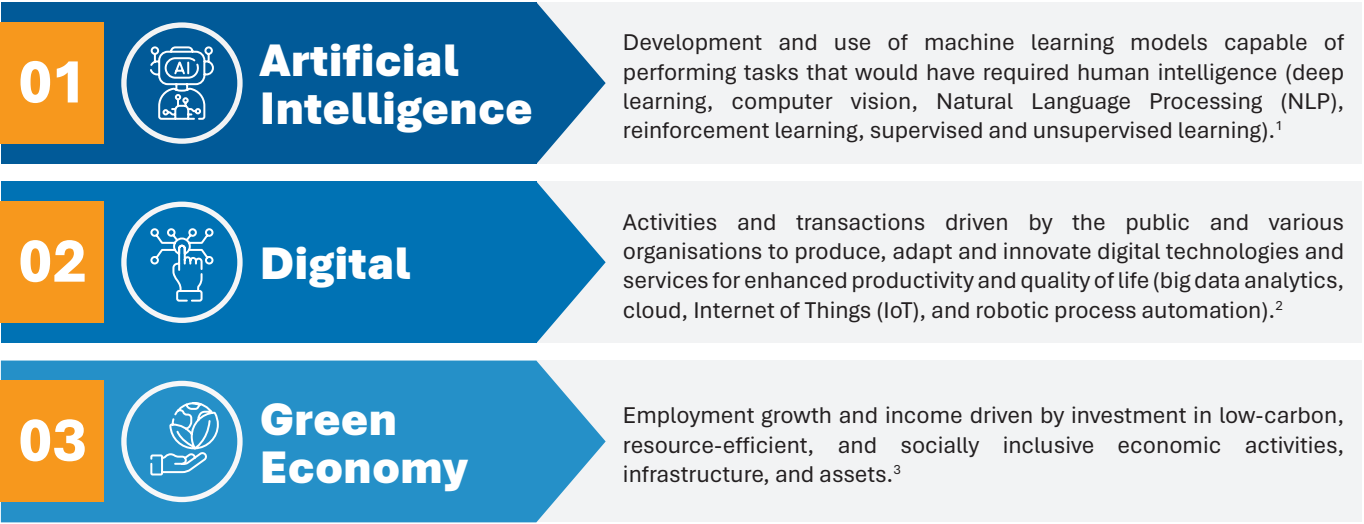
Research Techniques

The qualitative and quantitative research techniques were as follows:



Research Methodology

The study focused on three (3) key trends shaping today’s workforce: **AI**, **Digital**, and **Green Economy**. Their definition is outlined below:



To effectively analyse how the key trends impact existing roles, four (4) key parameters have been defined in the assessment process, as stated below:



1. World Economic Forum
2. Malaysia Digital Economy Corporation (MDEC)
3. United Nations Environment Programme (UNEP)

Based on the parameters above, the impact assessment of AI, Digital, and Green Economy on roles will result in one of the following outcomes:

HIGH
Roles at risk of convergence or displacement
Need to pivot to adjacent role and reskill

MEDIUM
Roles still relevant
Need to evolve and upskill to deliver beyond what would traditionally be expected

LOW
Roles not severely impacted
Require ongoing self-improvement to stay relevant

The impact assessment results inform individuals and organisations about the levels of risk faced by job roles in the sector. This information can aid in strategising career development and workforce planning, ensuring relevance amidst advancements in the three (3) key trends.

Key Stakeholders Engaged in the Study

Recognising the importance of on-the-ground perspectives, the impact study gathered insights from key stakeholders across the country, including Government, Associations, Industry Players, and Training Providers. The contributions from these four (4) groups enriched and fine-tuned the study’s findings.

Stakeholders and their Contributions to the Study				
Stakeholder Groups	Government	Associations	Industry Players	Training Providers
	Entities responsible for enforcing industry regulations and ensuring compliance with standards	Organisations facilitating networking, advocacy, and knowledge exchange among industry players	Companies actively involved in producing and distributing goods or services within the industry	National and state-specific institutions that offer courses to develop skills and knowledge in various fields
Key Contributions	- Share inputs on industry trends - Validate high-level impact assessments - Recommend initiatives	- Identify selected industry players - Share inputs on industry trends - Validate high-level impact assessments - Recommend initiatives	- Validate industry trends - Validate detailed impact assessments - Identify future roles and skills requirement - Provide a view of capacity demand and number of highly impacted workforce - Recommend initiatives	- Recommend training providers and suitable programmes mapped to skills - Suggest new training programmes to close existing and future gaps - Recommend initiatives

Stakeholders’ Selection Criteria

Selecting the right stakeholders ensures the impact study benefits from diverse perspectives and relevant expertise. The four (4) criteria used to identify stakeholders for engagement are:

01
HOLISTIC SECTOR COVERAGE
Comprehensive coverage of industry players across all sub-sectors and the entire value chain

02
STRONG BRAND PRESENCE
Widespread visibility and influence within the sector

03
SIZEABLE EMPLOYMENT COVERAGE
Comprehensive coverage and employee counts across all roles included in the assessment

04
SIGNIFICANT TURNOVER
Ensure a diverse mix of industry players, including large firms with high turnover

Key Facts and Figures of Impact Study Stakeholder Engagements

Industry Players Engaged	Number of Engagement
190 Organisations Engaged Government Agencies / Regulators, Associations, Local Companies, MNCs and Training Providers	~150 Workshops, 1-on-1 Meetings, In-Depth Interviews

Example of Organisations
Non-exhaustive list

Senior Leadership interviews
conducted

Input from C-Suites
COOs, CHROs, CSOs, CTOs, Head of Sustainability, etc.

~300 stakeholders
engaged during workshop and/ or 1-1 engagement

Stakeholders’ Role Beyond the Impact Study

To ensure the study’s continued relevance, TalentCorp will actively engage and collaborate with Government, Associations, Industry Players, and Training Providers beyond the completion of the impact study. These collaborative efforts may occur in the following forms:

Expertise and Knowledge Sharing

- Participate in platforms for ongoing knowledge exchange and best practices (i.e., MyMAHIR Future Skills Talent Council)
- Form potential partnerships for resource sharing and joint projects
- Share projections and forecasts about future trends in respective areas, helping to anticipate changes and prepare accordingly

Education and Training Programme

- Provide feedback/ participate in refining curriculum development of training and certification programmes
- Implement upskilling and retraining initiatives tailored to industry needs for preparing the workforce

Public Awareness and Engagement

- Raise awareness about the importance of skills development in AI, Digital, and Green Economy
- Engage with the public to foster understanding and support for workforce adaptation efforts

Impact Study of Artificial Intelligence, Digital, and Green Economy on the Malaysian Workforce 23



Chapter 3:

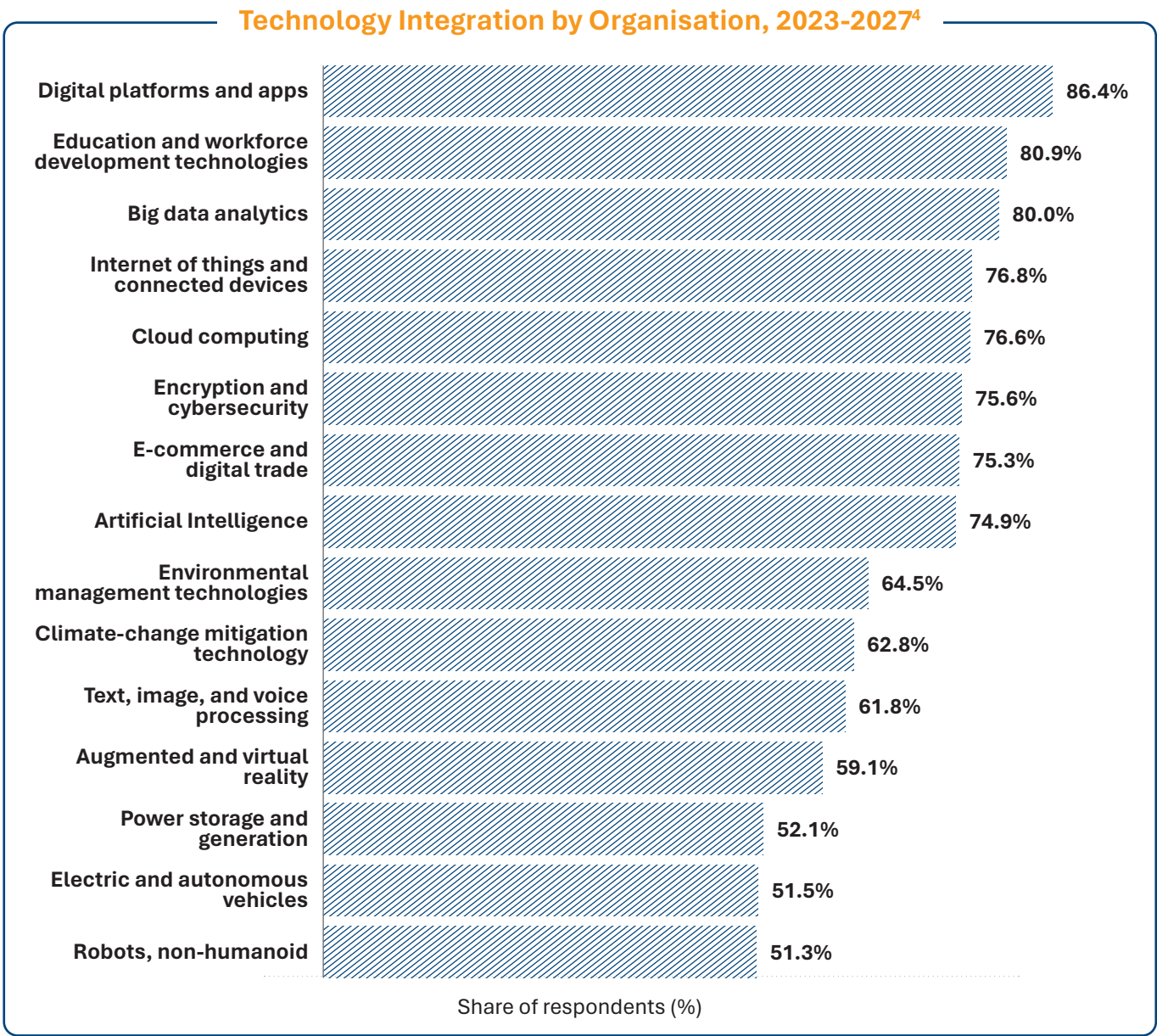
Overview of AI, Digital, and Green Economy

AI and Digital Overview	26
Green Economy Overview	32
State of Adoption in Malaysia	36
Impact to Talent Landscape	42

AI and Digital Overview

Global Trends

On a global scale, the market is positioned for significant growth, driven by businesses’ continuous development and experimentation with integrating technology into their services and products. Technology integration will remain the engine driving business transformation in the next five (5) years. The acceleration of AI is reshaping our world at its core. More than 85% of organisations recognise the rapid adoption of cutting-edge technologies and the expansion of the digital frontier as pivotal trends steering their transformation. Meanwhile, shifts in the labour market are largely propelled by technological advancements, such as the coming of age of Generative AI (Gen-AI).



The input of the research suggests that more than 75% of companies are likely to adopt big data, cloud computing, and AI in the next five (5) years.⁵ The digitalisation of commerce—E-Commerce and digital trade—is also showing significant improvements, with digital platforms and apps being the technologies most likely adopted by the organisations surveyed. 86% of the companies expect to incorporate them into their operations in the next five (5) years.

4. World Economic Forum (WEF), *Future of Jobs Report 2023: Insight Report*, May 2023
5. Ibid

Additionally, education and workforce technologies are on the radar for 81% of companies by 2027. However, the adoption of robots, power storage technology, and distributed ledger technologies are predicted to rank lower on the list. Also, the Fourth Industrial Revolution (Industry 4.0) is accelerating technology adoption, reshaping the relationship between humans and machines across different sectors and regions, and altering the nature of work and required skills.

Sectors that are most affected or disrupted by technological advancement:

ICT is by far the most affected sector as IT professionals rank amongst the fastest-growing roles, with jobs in software development expected to grow 25% compared to the 8% average growth for other professions. Technological developments have necessitated advancements in existing infrastructure, which could progress beyond binary computing into Graphics Processing Units (GPUs), AI chips, and even quantum and neuromorphic computers.

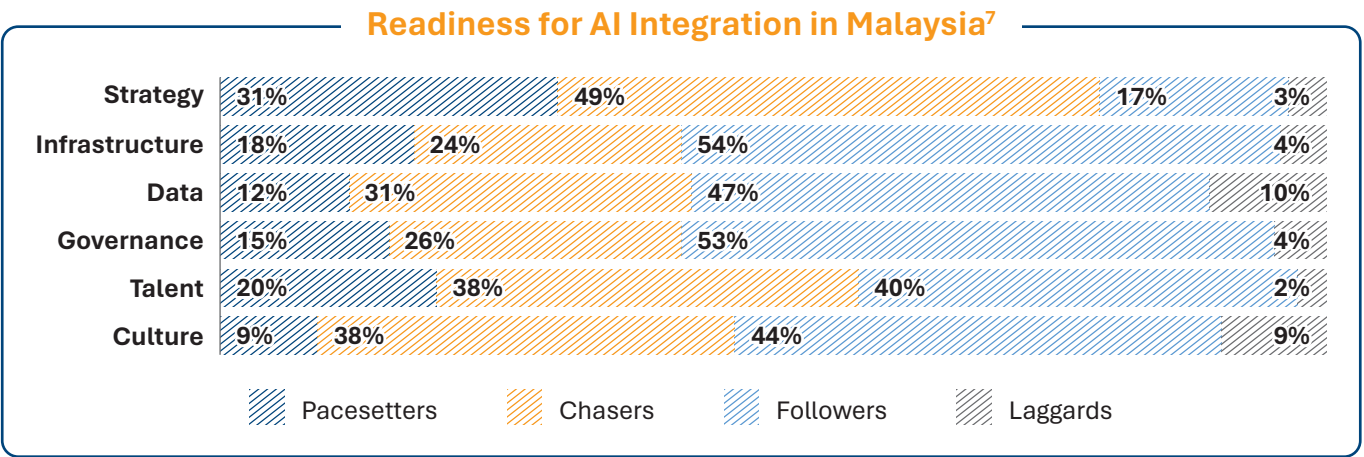
In **Pharmaceutical Manufacturing and Medical Devices**, AI has become the game-changer with the potential to significantly improve clinical trials by enhancing recruitment rates and sample size diversity, thereby accelerating drug development. For instance, Johnson & Johnson is leveraging AI and Machine Learning (ML) to gain unique insights to execute targeted and inclusive clinical trials. Deep Learning tools, such as DeepMind, are also being used to delve into the mechanisms of diseases and identify potential therapeutic solutions.

Global Business Services (GBS) is another sector that is adapting to the digital revolution. Many GBS jobs, particularly in Accounting, Legal, and Finance, are on the brink of transformation into global digital roles, accounting for 40% of the projected 73 million global digital jobs. This shift is facilitated by advanced analytical solutions, enabling GBS to develop new service offerings, such as tracking and reporting ESG performance.

In the **Wholesale and Retail Trade sector**, Deep Learning is increasingly utilised in automatic product recognition, while AI chatbot assistants with NLP technology are implemented to enhance consumer experience through personalised service, primarily online. AI is also being utilised to streamline in-store operations and processes.

Malaysian Trends

In Malaysia, the rapid pace of technological transformation has heightened the stakes for industry players, raising stakeholders’ expectations to unprecedented levels. Failing to adapt not only jeopardises market leadership but also threatens profitability. Therefore, businesses must become AI-ready in a flexible and scalable manner while ensuring interoperability across the industry. According to Cisco’s inaugural AI Readiness Index, published in 2023, only 13% of companies in Malaysia were fully prepared to deploy and leverage AI-powered technologies. This leaves the majority, 87%, lagging behind, with 33% categorised as chasers (partially prepared), 53% as followers, and 1% as laggards (not prepared).⁶



6. Malaysian Investment Development Authority (MIDA), *Malaysia’s AI preparedness level only at 13% — Cisco*, 16 November 2023, <<https://www.mida.gov.my/mida-news/malysias-ai-preparedness-level-only-at-13-cisco/>>
7. Cisco, *AI Readiness Index 2023: Intentions Outpacing Abilities*, 2023

An observation of Cisco’s inaugural AI Readiness Index: ⁸	
Strategy	Only 31% of respondents in Malaysia said AI deployment has been given the highest priority for budget allocation and incremental budget funding. Organisations must consider how they plan to fund AI deployments over the long run.
Infrastructure	In Malaysia, most industry players rate their organisational readiness as average, with over half admitting their infrastructure needs to be upgraded, particularly in power management.
Data and Governance	Most organisations need help in data centralisation, impacting AI performance and security. Data privacy is yet another key risk. In addition to the lack of governance and compliance, industry players mentioned that more significant efforts are needed to install comprehensive AI policies and protocols.
Talent and Culture	Organisations acknowledge the shortage of AI talent yet remain hopeful about its future availability in the market. Key priorities for industry players include investing in training to address skills gaps and implementing robust change management plans for AI adoption to bridge the receptiveness gap between leadership and staff.

Industry players in Malaysia report that the swift pace of technological transformation has elevated stakeholders’ expectations. Companies that do not keep up with this pace may jeopardise their market leadership and capitalisation. Below are some of the initiatives that Malaysian companies are undertaking to ensure they remain competitive:



Case Studies

Microsoft USD2.2 billion (RM9.6 billion) investment to fuel Malaysia’s AI and cloud transformation⁹

Microsoft announced it will invest RM9.6 billion over the next four (4) years to support Malaysia’s digital transformation. This includes building cloud and AI infrastructure in Malaysia and creating AI skilling opportunities for an additional 200,000 people. The investment is intended to enable Microsoft to meet the growing demand for cloud computing services and allow Malaysia to capitalise on opportunities presented by the latest AI technology.¹⁰

“Our investments in digital infrastructure and skilling will help Malaysian businesses, communities, and developers apply the latest technology to drive inclusive economic growth and innovation across the country.”

Satya Nadella, CEO of Microsoft

8. Cisco, *AI Readiness Index 2023: Intentions Outpacing Abilities*, 2023
9. Microsoft, *Microsoft announces US\$2.2 billion investment to fuel Malaysia’s cloud and AI transformation*, 2 May 2024, <<https://news.microsoft.com/apac/2024/05/02/microsoft-announces-us2-2-billion-investment-to-fuel-malysias-cloud-and-ai-transformation/>>
10. Ibid

Case Studies

Global Business Services (GBS) Malaysia Strategic Plan¹¹

In July 2022, the Digital Global Business Services Council Malaysia (GBS Malaysia), a chapter of PIKOM (formerly known as Outsourcing Malaysia), led the publication of the Global Business Services (GBS) Malaysia Strategy Report, with support from MDEC, Invest Penang, Iskandar Investment Berhad (IIB), Invest KL, Invest Selangor, Cyberview, Sarawak Digital Economy Corporation Berhad (SDEC), and Contact Centre Association Malaysia (CCAM). This report serves as a guide for organisations transitioning from traditional business processes to digital, enabling them to move up the value chain. It outlines a five-year strategic roadmap for the GBS sector, addressing emerging technologies such as AI, automation, and robotic process automation (RPA), and discusses the evolution of roles within GBS companies.

“Malaysian human capital needs to be on a constant learning curve – which means digital, analytical, automation upskilling and reskilling – so that they can better ‘future-proof’ their careers while contributing towards the growth of our country’s digital economy.”

Anthony Raja Devadoss, Chairperson of Global Business Services Malaysia

Automated Warehouse System at Coca-Cola Bottling Production Plant¹²

The Automated Storage and Retrieval System (ASRS) has significantly increased productivity. A dedicated maintenance team has been established for warehouse and supply chain management to reduce dependency on external vendors. Coca-Cola’s focus on repurposing internal capabilities has not drastically impacted jobs, as traditional roles now support automation rather than being replaced by it.

“Facilities have been developed with a focus on empowering the workforce to repurpose job roles.”

Zubair Raffiq, Talent Director of Coca-Cola Beverages MY

11.PIKOM, *Press Release - OM’S New Committee To Launch Five-Year Strategic Roadmap For GBS Industry*, 16 February 2022, <<https://pikom.org.my/press-release/>>
12.Stakeholder Engagement, Wholesale and Retail Trade Sector

Malaysia is rapidly integrating advanced technology into its market, and this transition is accompanied by exciting opportunities. While challenges such as control limitations, security issues, and data privacy concerns have emerged, industry players are actively addressing these roadblocks to ensure the smooth adoption of advanced technology. Their concerted efforts are paving the way for significant progress in this area.

Data Privacy and Protection

- AI relies on vast data, raising concerns about its collection, usage, and accessibility
- Data security risks include threats to personal data and General Data Protection Regulation compliance due to potential data sharing with third-party entities

Sector: ICT
Cybersecurity concerns arising from increased digitalisation and AI usage¹³

AI is a double-edged sword, as while it can defend against attacks by detecting suspicious activities, cybercriminals can also use AI and Machine Learning (ML) to find and exploit vulnerabilities to attack. On the digital frontier, public cloud services can heighten security risks, mainly if organisations have scattered data and a lack of backup methods. Additionally, the IoT expansion increases opportunities to attack devices that are often poorly secured.

Data Quality and Algorithm Limitations

- Incorrect decision-making for users due to skewed data sets
- The biassed algorithm has the potential to reproduce or even amplify existing biases

Sector: Medical Devices
Data complexity challenges and small margins for error¹⁴

The wide-ranging and heterogeneous data sources within the sector often mean it is difficult to filter out inconsistencies in data that could affect AI algorithms. This is particularly important in the Medical Devices sector, where poor data quality or algorithmic errors can directly impact patient safety. Thus, stringent regulatory requirements are in place before technologies can be deployed. Additionally, the lack of transparency in many AI models leads to distrust amongst medical professionals regarding its results.

13.Stakeholder Engagement, ICT Sector
14.Stakeholder Engagement, Medical Devices Sector

Governance and Ethics

- The lack of comprehensive and consistent policies has left industry players uncertain of AI use
- Compliance with emerging AI regulations that emphasise transparency, accountability, and fairness in the use of AI may be a challenge

Sector: Aerospace
Complex and uncoordinated regulatory processes impede application¹⁵

Organisations face challenges due to the complex certification processes of various regulatory bodies, particularly the Civil Aviation Authority of Malaysia (CAAM), as well as limited understanding of standards and requirements, and insufficient awareness of sector demand. To improve efficiency, firms have proposed adopting paperless initiatives for documentation. Additionally, the lack of coordination between different bodies hampers the effective dissemination of information across the sector, as many players meticulously guard their information.

High Cost and Investments

- The availability of high computing power alongside other emerging technologies, such as 5G and cloud computing, requires significant financial investment

Sector: Pharmaceutical Manufacturing
High entry costs and lack of demand due to difficulties justifying Return on Investments (ROIs)¹⁶

One of the main issues facing the Pharmaceutical Manufacturing sector is the substantial initial investment required to adopt the latest AI and Digital developments. This challenge is particularly pronounced in small and medium-sized enterprises (SMEs), which may struggle to secure the necessary funds and justify ROIs. This difficulty is compounded by the fact that local Pharmaceutical Manufacturing firms often lag technologically compared to their international counterparts, thus needing to build a stronger foundation to support the implementation of these technologies.

In light of these challenges, industry players have identified some emerging roles and have acknowledged the necessity for upskilling in AI and Digital skills, namely in the domain of AI Ethics (refer to key finding, emerging roles section), to ensure responsible innovation and that ethical standards are rigorously upheld as technology evolves.

15.Stakeholder Engagement, Aerospace Sector
16.Stakeholder Engagement, Pharmaceutical Manufacturing Sector

Green Economy Overview

Global Trends

Numerous governments worldwide have recently unveiled substantial Green Economy initiatives, including significant stimulus packages. These measures are unlocking a wealth of opportunities for embedding sustainable practices across diverse sectors.¹⁷ Furthermore, many governments are demonstrating a strong commitment to cutting GHG emissions and actively working to mitigate the impacts of climate change.



The world is at a crucial turning point as the climate crisis, once perceived as a distant concern, now calls for immediate attention. More countries worldwide have endorsed the Glasgow Climate Pact and made new pledges on deforestation, methane and coal emissions, climate finance, etc. The world’s largest emitters made national carbon pledges to reach net-zero GHG emissions. The United States (US) and the European Union (EU) aim to achieve this by 2050, China by 2060, and India by 2070.¹⁹

Climate finance saw significant commitments, with more than 450 financial institutions from 45 nations representing USD13 trillion (RM54.36 trillion) of private capital pledging to achieve net zero and provide finance for green technology. Additionally, more than 40 nations have announced a plan for clean technologies to reduce costs rapidly. The focus will initially be on five (5) hard-to-abate sectors, namely, power, road transport, steel, hydrogen, and agriculture.²⁰

In transportation, more than 30 countries and several automotive companies have agreed to collaborate to ensure that new cars sold are zero-emission by 2035 in leading markets and by 2040 globally.²¹

17. United Nations, *UNEP Green Industry Insights Plastic Recycling Report*, 2023

18. Brice Richard and James Lambert, *The Global Green Economy: Capturing the Opportunity*, Arup and Oxford Economics, 2023

19. EY Knowledge sharing on the Green trends and impact on skillsets within key industries

20. Ibid

21. Ibid

Sectors that are most affected or disrupted by Green Economy actions:	
Energy and Power	International efforts to reduce carbon emissions, as a significant part of mitigating climate change, such as the COP28 energy targets, mean that this sector is the most directly affected. Job creation due to green transition is the highest in this sector, with 10% of companies expecting job creation and half of all energy-related jobs being clean. Additionally, clean energy infrastructure investments reached USD1.8 trillion (RM7.56 trillion) in 2023, and global renewable energy capacity surged by 50% compared to 2022. ²²
Chemical	Changes in regulatory environments can facilitate the transition to environmentally friendly businesses within the sector. For example, the global plastic recycling market is projected to grow to around USD59.6 billion (RM249.22 billion) by 2026, partially due to United Nations Environment Programme (UNEP) regulations. Moreover, production demands from other industries, such as increased demand for Sustainable Aviation Fuel from Aerospace or critical minerals from Energy and Power, will likely facilitate job creation.
Food Manufacturing and Services	Climate change has significantly affected food production by degrading global soil by 33% and increasing natural disaster damage to USD383 million (RM1.6 billion) per day. Current resources are increasingly strained as they strive to meet the needs of a projected global population of 9.1 billion by 2050. This demographic surge demands a 70% boost in production beyond current levels to sustain future growth. ²³
Aerospace	Air travel contributes 2–3% of global carbon dioxide (CO ₂) emissions, and the projected demand for aviation fuel could surge by over 50% by 2050, increasing this share significantly. While solutions such as improved operational efficiency and electric aviation will help the sector decarbonise, it is the consensus that Sustainable Aviation Fuel will account for the most emission reduction by 2050. ²⁴

Malaysian Trends

ASEAN countries, including Malaysia, are committed to mitigating the impact of climate change and advancing sustainability. Recently, Malaysia has taken a significant step by revising its Nationally Determined Contributions (NDC) to achieve a 45% reduction in economy-wide carbon intensity by 2030.²⁵

The RMKe-12 laid the groundwork, while the National Energy Transition Roadmap (NETR) ensures industries advance the sustainability agenda. National frameworks and guidance are shaped by local ESG aspirations, such as the New Industrial Masterplan 2030 (NIMP 2030).

22. United Nations, *UNEP Green Industry Insights Plastic Recycling Report*, 2023

23. Ibid

24. Ibid

25. United Nations, *UNDP Climate Promise Malaysia NDC Status*, July 2021, <<https://climatepromise.undp.org/what-we-do/where-we-work/malaysia>>

Malaysia's NDC Commitments

In July 2021, Malaysia revised its Nationally Determined Contributions (NDC) to:

- Reduce GHG emissions intensity (by GDP) by 45% by 2030 based on a 2005 baseline
- Support the Global Methane Pledge
- Support the Glasgow Leaders Declaration on Forests and Land Use

Current standing:

- Malaysia has reduced the intensity of GHG emissions per unit of GDP by 35.90% compared to the levels recorded in 2005
- Acknowledges an inclusive development process
- Outlines specific commitments in climate adaptation and disaster risk reduction
- Highlights the vulnerability of women and young people to climate-related disasters

This move demonstrates Malaysia's commitment to environmental responsibility and sustainability.



Case Studies

The Chemical Industry Roadmap 2030 (CIR2030) is a Roadmap dedicated to the Chemical Industry in Malaysia²⁶

The Chemical Industry Roadmap 2030 (CIR2030) was launched in 2023 with the aim of making Malaysia a leading player in the Asia Pacific by increasing value-added products and improving sustainability. This will be achieved by introducing a regulatory framework for the circular economy and establishing platforms for industry players to discuss sustainable practices and receive guidance as well as support.



We aim to increase competitiveness... while positioning Malaysia as a strong chemical hub within the Asia Pacific region as well as improving the sustainability of the industry.



**YB Senator Tengku Datuk Seri Utama Zafrul Tengku Abdul Aziz,
Minister of Investment, Trade and Industry**

Case Studies

Tenaga Nasional Berhad (TNB) – Battery Energy Storage System (BESS)²⁷

TNB has initiated a 400 MWh BESS pilot project to address intermittency issues with renewable energy adoption. This project marks Malaysia's first-ever utility-scale battery storage project, operated by a Grid System Operator (GSO) and overseen by the Energy Commission. The periodic production of many renewable energy sources, particularly solar, requires battery storage to ensure consistent usage at all times, and the implementation of this project is intended to strengthen the security of the electricity supply grid network.



The BESS programme was implemented to ensure solar is a firm energy source, without the risks of fluctuations or inconsistencies in consumer supply.



**Tuan Delakan Ratha Krisnak,
Board Member of Energy Commission**

However, industry players have identified high costs as the primary challenge in adopting Green Practices

High Initial Investment

Green technologies, such as solar panels, wind turbines, and energy-efficient appliances, often require a higher upfront investment than conventional technologies. This can pose as a deterrent for individuals and businesses with limited capital.

Lack of Financial Incentives

Without sufficient subsidies, tax breaks, or financial incentives from the government, the cost burden of adopting green practices falls heavily on businesses and consumers, which can slow down the rate of adoption.

26. Ministry of Investment Trade and Industry (MITI), *New Industrial Master Plan 2030: Chemical Industry*, 2023

27. Adam Aziz, *TNB to undertake 400MWh battery storage project, says ministry*, *The Edge Malaysia*, 26 January 2024, <<https://theedgemalaysia.com/node/698695>>

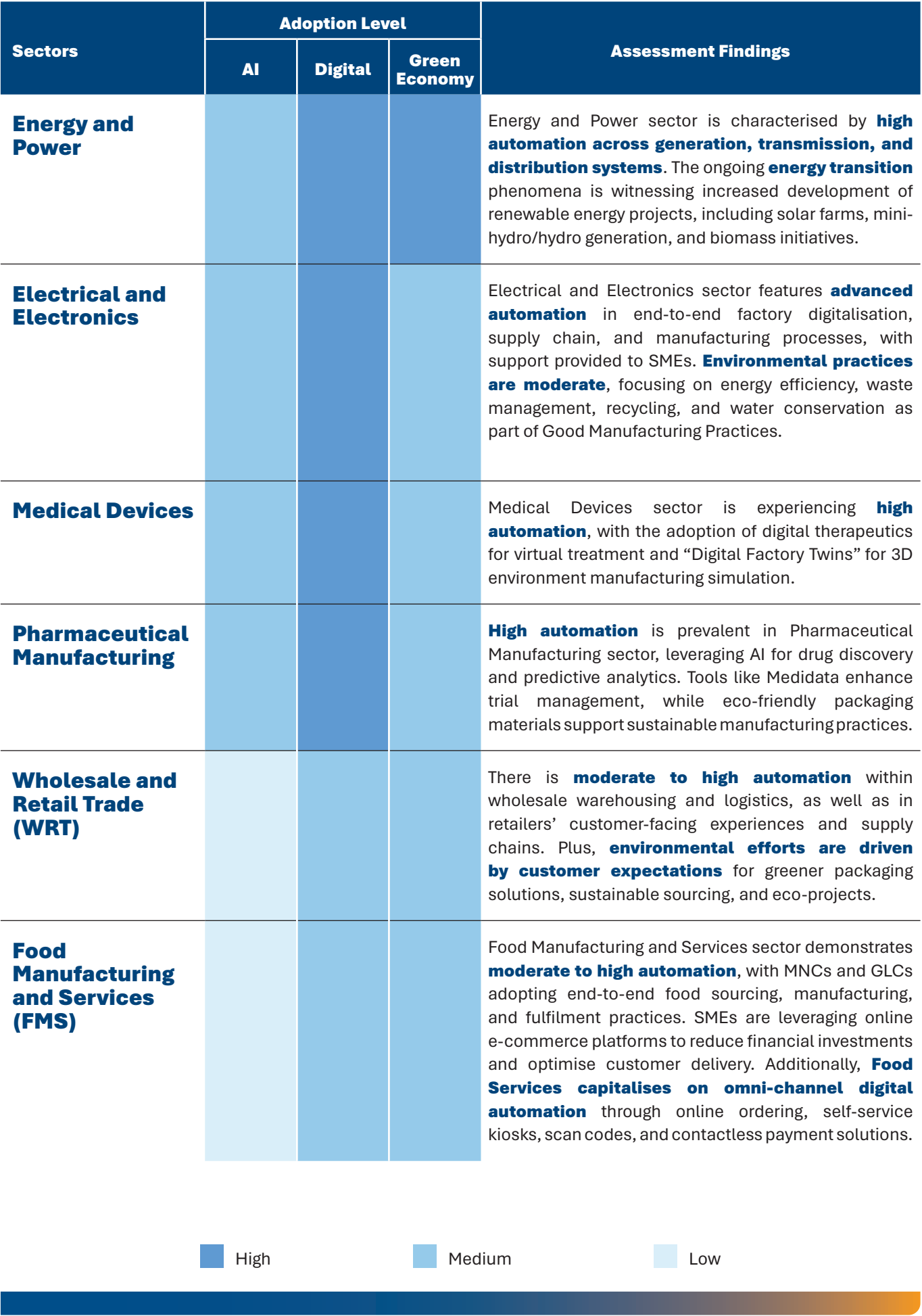
State of Adoption in Malaysia

The adoption of AI, Digital, and Green Economy practices varies across the 10 sectors, each progressing at its own pace. While some sectors are rapidly embracing these trends, others remain predominantly human-centric.²⁸

Level of Adoption of AI, Digital, and Green Economy in Malaysia across 10 sectors

Sectors	Adoption Level			Assessment Findings
	AI	Digital	Green Economy	
Aerospace				Aerospace is a high-tech sector that leverages AI algorithms to detect performance data anomalies and employs AI-guided painters to enhance manufacturing efficiency. However, it must navigate strict regulatory requirements on emissions management, focusing on waste reduction, recycling, and reusing materials . The adoption of energy-efficient aircraft is also essential to minimise environmental impact. Balancing technological innovation with sustainability will be key to the sector’s future success.
Global Business Services (GBS)				Global Business Services sector is characterised by high automation of routine, repetitive, and transactional processes . Significant adoption of AI has streamlined operations, reducing the need for rules-driven processing and decision-making, particularly in tasks such as back-office claims processing and managing customer feedback. This shift towards automation and AI enhances efficiency and allows organisations to focus on more strategic initiatives.
Information and Communications Technology (ICT)				ICT sector is leading the digital frontier through extensive use of Big Data analytics, AI applications, and the Internet of Things (IoT). Data centres are essential for supporting storage and processing needs, while cybersecurity ensures the protection of sensitive information. This integration of technologies drives innovation and efficiency across industries.
Chemical				Chemical sector is characterised by high automation in end-to-end supply chain management and manufacturing processes . It faces strict environmental requirements , that aim to increase the recycling rate of plastics and synthetic rubber to 50% and reduce GHG emissions by 35% by 2030. Additionally, there is a notable shift towards biochemicals , such as oleochemicals, for the production of bioplastics and specialty chemicals.

28. The analyses are based on one-on-one engagements and feedback from the industry players, including MNCs, LLCs, and Associations representing SMEs



Overall, Aerospace, Global Business Services, and ICT have higher degrees of AI adoption. On the other hand, Aerospace, Chemical, and Energy and Power are leading in Green Economy adoption:

Artificial Intelligence

The rate of AI adoption varies across the 10 sectors

- The top three (3) sectors, Aerospace, Global Business Services, and ICT, indicated a higher rate of AI adoption.
- These sectors are significantly influenced by the advancements and developments of AI technology globally.
- Most of the leading players in these sectors are MNCs and global heavyweights that are leading the charge in introducing and adopting cutting-edge technologies such as Gen-AI and large language models (LLM) in their operations.
- The SMEs that form the ecosystem providing goods and services to these global players indicated during the study workshops and engagements that they find it challenging to keep pace with the investments required to adopt the latest AI technologies due to inadequate financial resources.



Case Study in the Aerospace sector²⁹



UMW Aerospace, the first Asian company to manufacture fan cases for **Rolls-Royce**, is benefiting from the presence of large global firms by developing precision hard metal machining capabilities. Their Serendah plant has implemented an in-line production monitoring system that uses Machine Learning and real-time analytics to detect anomalies and predict failures, reducing manual inspections. As an SME supporting a global player, UMW Aerospace is shifting its workforce towards data analysis and process optimisation, improving efficiency and product quality.

Digital

The adoption of digital and automated technologies is moderate to high across the ten sectors

- Eight (8) of the 10 sectors indicated that they have automated and digitised core areas of their business, including production planning, supply chain management, manufacturing processes, and logistics and warehousing in the manufacturing sectors. Additionally, front office customer functions such as customer orders, servicing, and payments, along with back-office customer delivery or fulfilment functions in the services sectors, have also been digitised.
- Two (2) sectors—namely, Wholesale and Retail Trade and Food Manufacturing and Services—still predominantly require significant human interaction between service providers and customers, and have indicated medium adoption of digital technologies.
- Another reason for their medium level of technology adoption is that many SMEs prioritise financial survival, especially in the aftermath of the COVID-19 pandemic, over the investments needed to digitalise or automate their operations.

29. Stakeholder Engagement, Aerospace Sector



Case Study in the Food Manufacturing and Services sector³⁰



Venon Tian, the Chief Operating Officer (COO) of ZUS Coffee, emphasised that digitising a business, especially for SMEs, requires significant investment, which includes costs for technology infrastructure, staff training, and maintaining the tools. ZUS is able to prioritise digitalisation to enhance business processes and stay competitive due to resource availability and financial advantage.

Case Study in the Wholesale and Retail Trade sector³¹



Dr Kasuma, the Chief Human Resources Officer (CHRO) of AEON, stated that job roles in the sector still require a significant human touch for customer service, physical handling of goods, and on-the-spot decision-making—tasks that current technology cannot fully replicate.



Green Economy

Green Economy adoption varies depending on the emphasis on ESG in their activities

- Aerospace and Chemical sectors emphasise the significance of ESG in their activities due to regulatory requirements, particularly for products exported to European countries with strict environmental regulations.
- The Energy and Power sector falls into the high adoption category due to the low emissions target (net zero by 2050) established in the National Energy Transition Roadmap (NETR).
- The remaining sectors with low to medium adoption are beginning to incorporate various green-related initiatives into their business practices, including energy and water conservation, waste treatment, and conversion.



Case Study in the Chemical sector³²



PETRONAS Chemicals Group (PCG) employs a comprehensive Waste Management System to manage hazardous waste responsibly and reduce its environmental footprint. The system focuses on reducing, reusing, recycling, and recovering waste materials. Hazardous waste, including solvents and lubricants, is recycled for beneficial reuse, while spent catalysts are sent to specialised facilities for precious metal recovery.

30. Stakeholder Engagement, Food Manufacturing and Services Sector

31. Stakeholder Engagement, Wholesale and Retail Trade Sector

32. Stakeholder Engagement, Chemicals Sector



Case Study in the Energy and Power sector²⁹



Universiti Malaysia Perlis (UniMAP) became the first public university in Malaysia to secure a 1.0-megawatt solar panel tariff quota, aligning with NETR by generating revenue through energy sales to **Tenaga Nasional Berhad (TNB)** and advancing renewable energy education.

Case Study for Electrical and Electronics sector



Micron, a key Electrical and Electronics player, fully powers its operation in Malaysia using renewable energy sources to lower carbon emission.

Adoption of AI, Digital and Green Economy in Small Medium Enterprises (SMEs)

SMEs’ readiness to adopt AI and Digital is a strategic priority that requires government support to achieve the government’s economic growth agenda. In this study, SMEs are the backbone of several key sectors, including Electrical and Electronics; Aerospace; Wholesale and Retail Trade; and Food Manufacturing and Services.

Overall, key sectors in the study have observed financial challenges in investing in emerging technologies and adopting green practices. Therefore, this highlights the need to support SMEs in integrating AI, Digital, and Green Economy practices in their businesses.

Challenges Faced by SMEs in Key Sectors

- During the workshop for the **Electrical and Electronics** sector conducted as part of the study, large MNCs emphasised the importance of SMEs, which have been pivotal to their success over the past 50 years, investing in upskilling and reskilling their workforce in AI and digital technologies to keep pace with MNCs. Given the current geopolitical tensions between the world’s two largest economies (the US and China), the prolonged conflict in Eastern Europe, and ongoing hostilities in the Middle East, there is a limited window of opportunity for the Malaysian Electrical and Electronics sector to capitalise on the “next wave” of success.
- Aerospace’s** SME players revealed that SMEs often face intensified challenges in adopting AI and Digital due to their limited financial resources. The substantial initial investments required for equipment, software, infrastructure, and employee training are often challenging to manage. Moreover, the increased scrutiny around ESG compliance adds another layer of complexity. SMEs must balance meeting environmental and regulatory goals while maintaining financial viability, which can be overwhelming without adequate funding.
- Food Manufacturing and Services** industry players emphasised that implementing AI, Digital, and Green Economy initiatives involves significant upfront costs. These expenses cover equipment, software, infrastructure, and training, which can be a substantial financial burden for SMEs with limited capital and access to funding. As a result, companies are hesitant to make large investments in these technologies, particularly when there is no clear evidence of a quick return on investment. Many food manufacturers still rely on older, established systems that may not be compatible with new and advanced technologies. This creates integration challenges and often requires significant system overhauls.

- Key concerns raised by SME players in the **Wholesale and Retail Trade** sector include the high investments required and the vital technical challenges associated with Gen-AI implementation. For example, the availability of high computing power, along with other emerging technologies like 5G and cloud computing, necessitates substantial financial investment.

Potential Imperatives / Global Learning

Several countries have adopted different approaches to support and encourage SMEs to ride the AI and Digital wave:



Case Study

United Kingdom (UK): Match-funding for AI training

Case for change:

AI adoption is hindered by a lack of AI skills within businesses, particularly due to low investment in AI upskilling by UK businesses, especially for smaller companies

In March 2024, the UK government’s Department for Science, Innovation & Technology provided grant funding of GBP6.4 million (RM35.58 million) to subsidise AI skills training for SMEs in the Professional Business Services sector. SMEs can apply for funding of up to 50% of the cost for various AI skills training options, including off-the-shelf training courses, online classroom learning, distance learning certification, or accreditation programmes.

Examples of AI skills covered include Predictive Analytics, Data Intelligence, AI Governance, and Risk.

Such training enables employees to enhance their technical skills and understanding of AI, equipping them to develop, deploy, or utilise AI in their roles. Employers are encouraged to invest in AI training to address the skills gaps within the UK workforce that are hindering AI adoption and to measure the impact of AI upskilling on business productivity and outcomes.

Singapore: Financial incentives for MNCs - SMEs collaboration / incentives

The Partnerships for Capability Transformation (PACT) scheme promotes collaboration between multinational companies (MNCs) and local SMEs by offering financial support for investments and training, along with a programme manager to facilitate and de-risk these business partnerships.

For example, Google and Enterprise Singapore jointly introduced the Digital Practitioner Programme in May 2023 to help SMEs develop digital capabilities. Through a two (2) month training programme and a three (3) to six (6) month practicum with dedicated Google specialists, SMEs can enrol their employees in courses to develop skills in areas such as information technology support, project management, data analytics, user experience design, and digital marketing, helping them set up online stores and grow new sales channels.

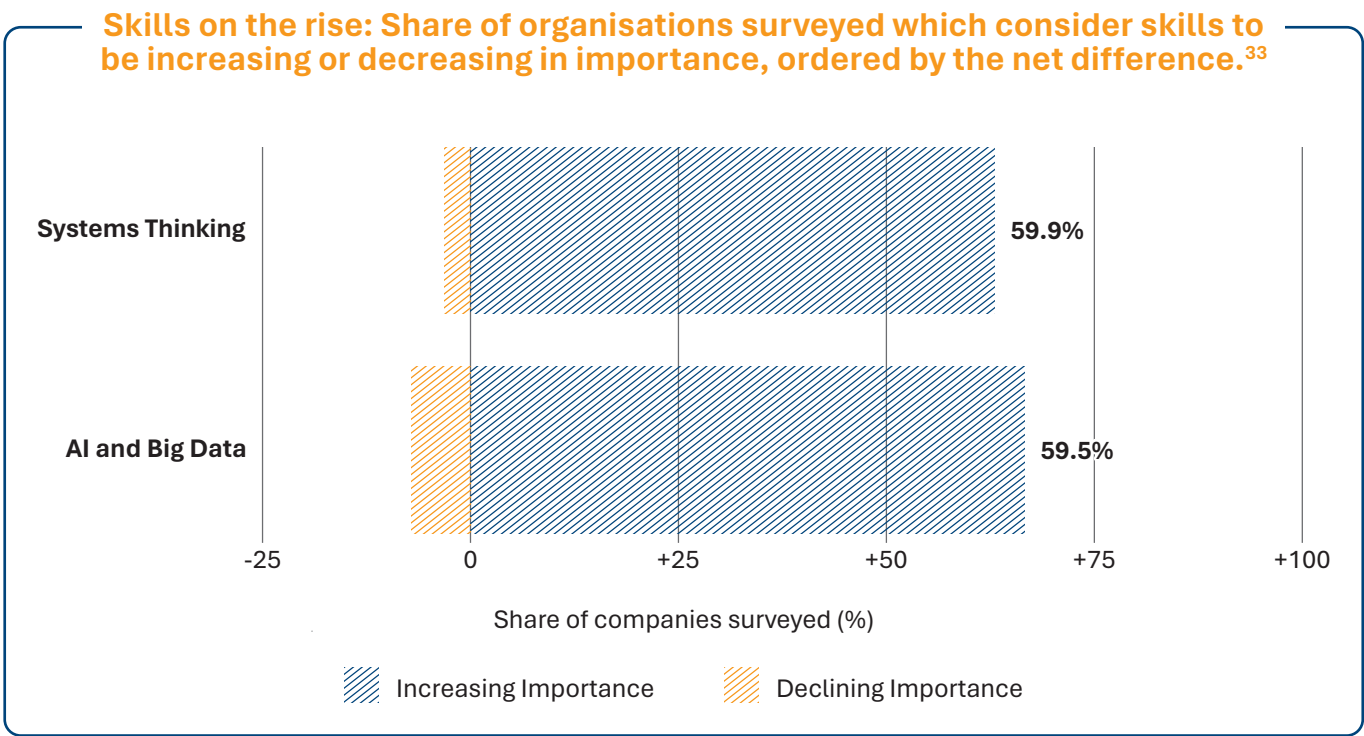
As tech players roll out more AI-powered solutions targeting SMEs, the PACT programme, which leverages the network, expertise, and solutions of major tech companies to diffuse these technologies through workshops, on-site development, and training to develop operational use-cases, will accelerate the adoption of artificial intelligence among SMEs. This, in turn, will benefit the tech companies providing these solutions.

Impact to Talent Landscape

AI and Digital advancements are accelerating workforce upskilling, creating skilled jobs, and boosting productivity. But how will these shifts redefine the talent ecosystem and shape the future of work?

01 Accelerate Upskilling & Reskilling

Basic digital and AI skills are becoming integral to core business functions across sectors.



According to the 2023 Future of Jobs report,³⁴ Systems Thinking, AI, and Big Data round out the top 10 growing skills. Additionally, AI and Big Data in particular, are expected to comprise more than 40% of technology training programmes, highlighting their importance to the future workforce.

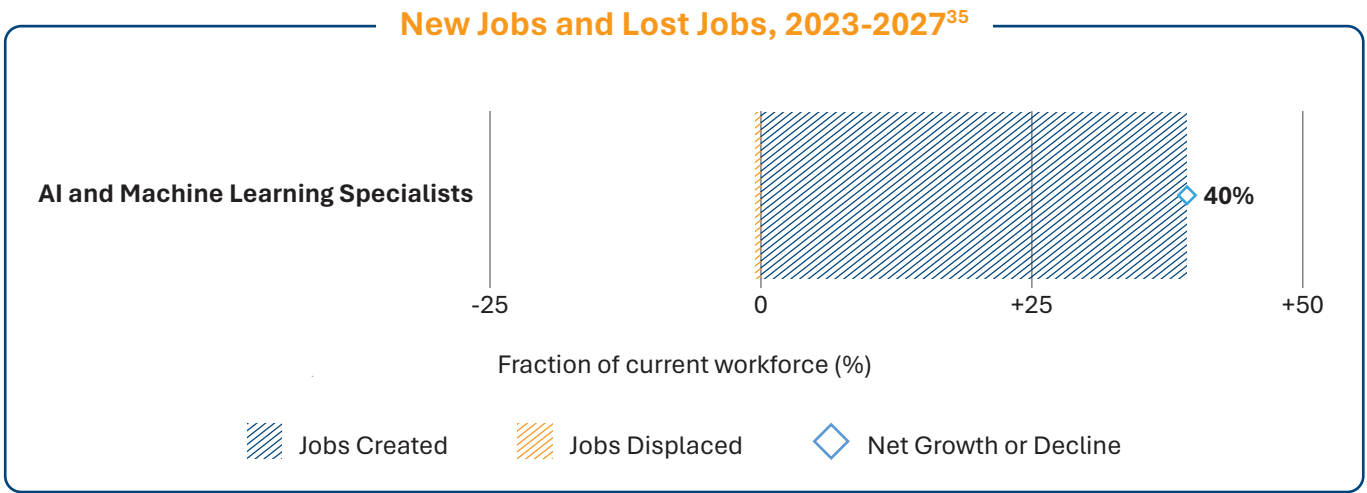
“While all see the transformative potential of AI technology, all underestimate the need for workforce reskilling.”

Pharmaceutical Manufacturing Validation Workshop

33. World Economic Forum (WEF), *The Future of Jobs Report 2023: Insight Report*, May 2023
34. World Economic Forum, *The Future of Jobs Report 2023*, May 2023

02 Creation of High-Skilled Jobs

Increasing demand for talents that have digital and AI skills to drive strategic business decisions.



The majority of the fastest-growing roles in 2023 are technology-related, with AI and Machine Learning Specialists in particular topping the list. An increase in jobs related to big data will likely result in creating 1.4 million jobs globally, while demand for AI and Machine Learning Specialists will create 1 million jobs.

“Most emerging roles are needed to amplify technological capabilities and drive productivity with cutting-edge tools, rather than displacing existing jobs.”

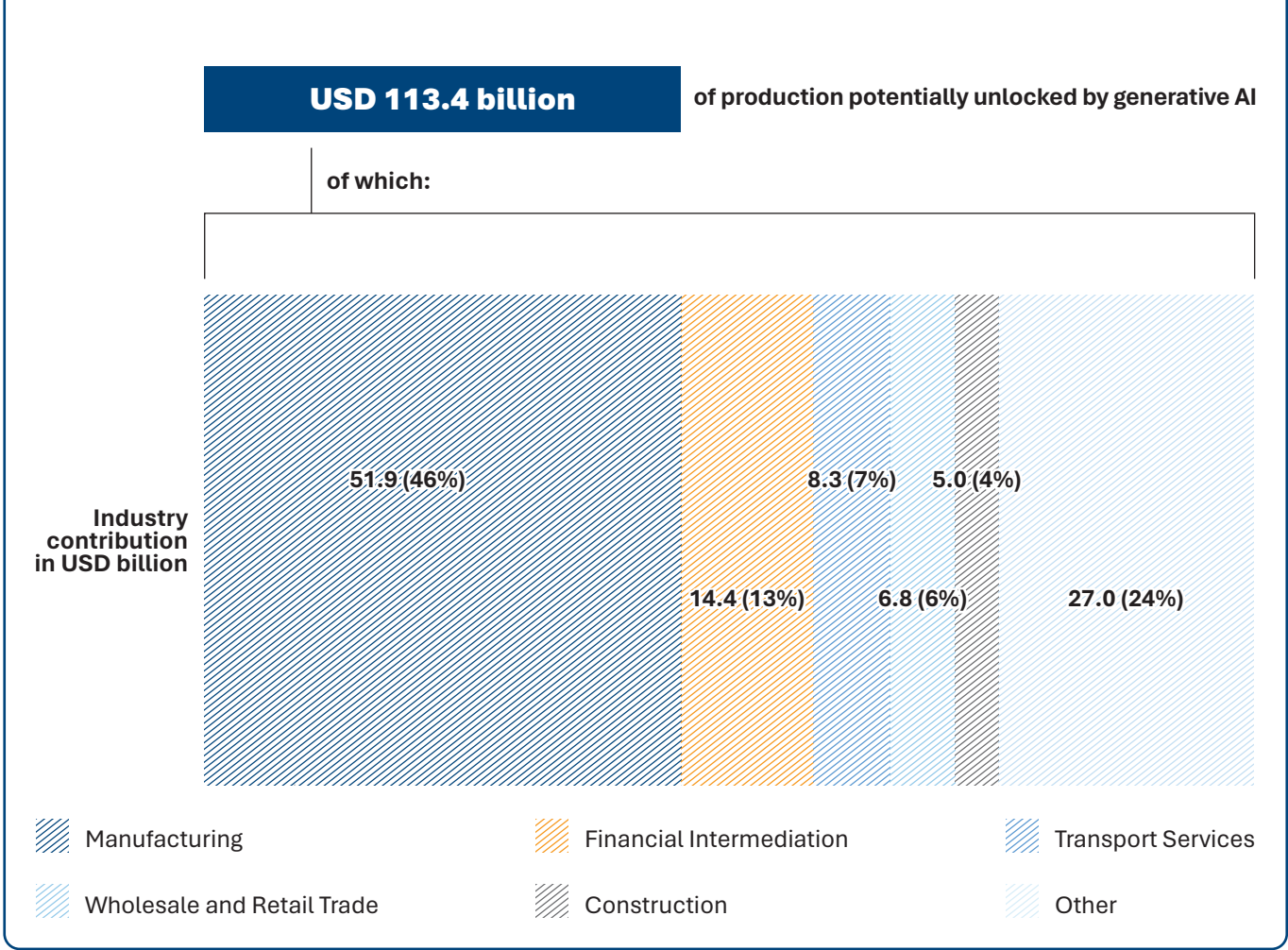
ICT In-Depth Interview

35. World Economic Forum, *The Future of Jobs Report 2023*, May 2023

03 Improve Workforce Productivity

Shift in talent focuses on solving strategic and tactical matters over transactional rule-based tasks.

Potential Production Boost in Malaysia from Gen-AI (USD Billion)³⁶



The Malaysia Centre for the 4th Industrial Revolution (MYCentre4IR) estimates that Gen-AI use can unlock USD113.4 billion of productive capacity, which is equivalent to a quarter of total GDP in 2022.³⁷

“Company productivity has improved over the last 2-3 years due to advancement of technology.”

Food Manufacturing and Services In-Depth Interview

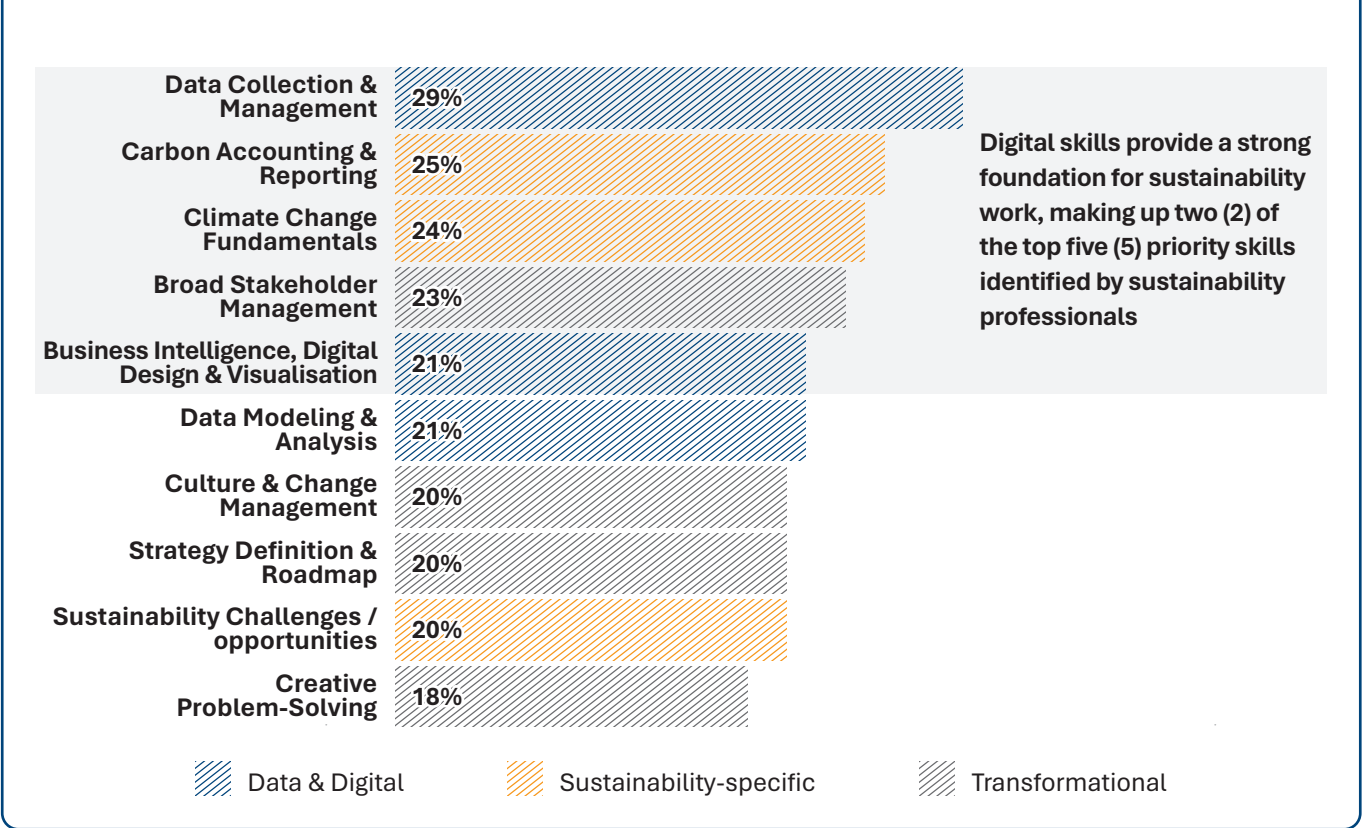
36. Malaysia Centre for the Fourth Industrial Revolution, *The Economic Impact of Generative AI: The Future Of Work In Malaysia*, September 2023
37. Ibid

As sustainability emerges as a fundamental core competency, it will drive the creation of green jobs and significantly enhance employee retention and engagement. How will this transformative shift reshape the talent ecosystem and influence future workforce strategies?

01 Sustainability as a Core Competency

Knowledge about sustainability is visible, but most roles are in the early stages, focusing on compliance.

Highest Priority Skills for Sustainability Work³⁸



The World Economic Forum highlights that corporations need structural, behavioural changes whereby employees in all business areas must incorporate sustainability in daily decision-making. This is reinforced by research from Microsoft, which highlights that the most successful companies in their sustainability journeys integrated them across all business areas.³⁹

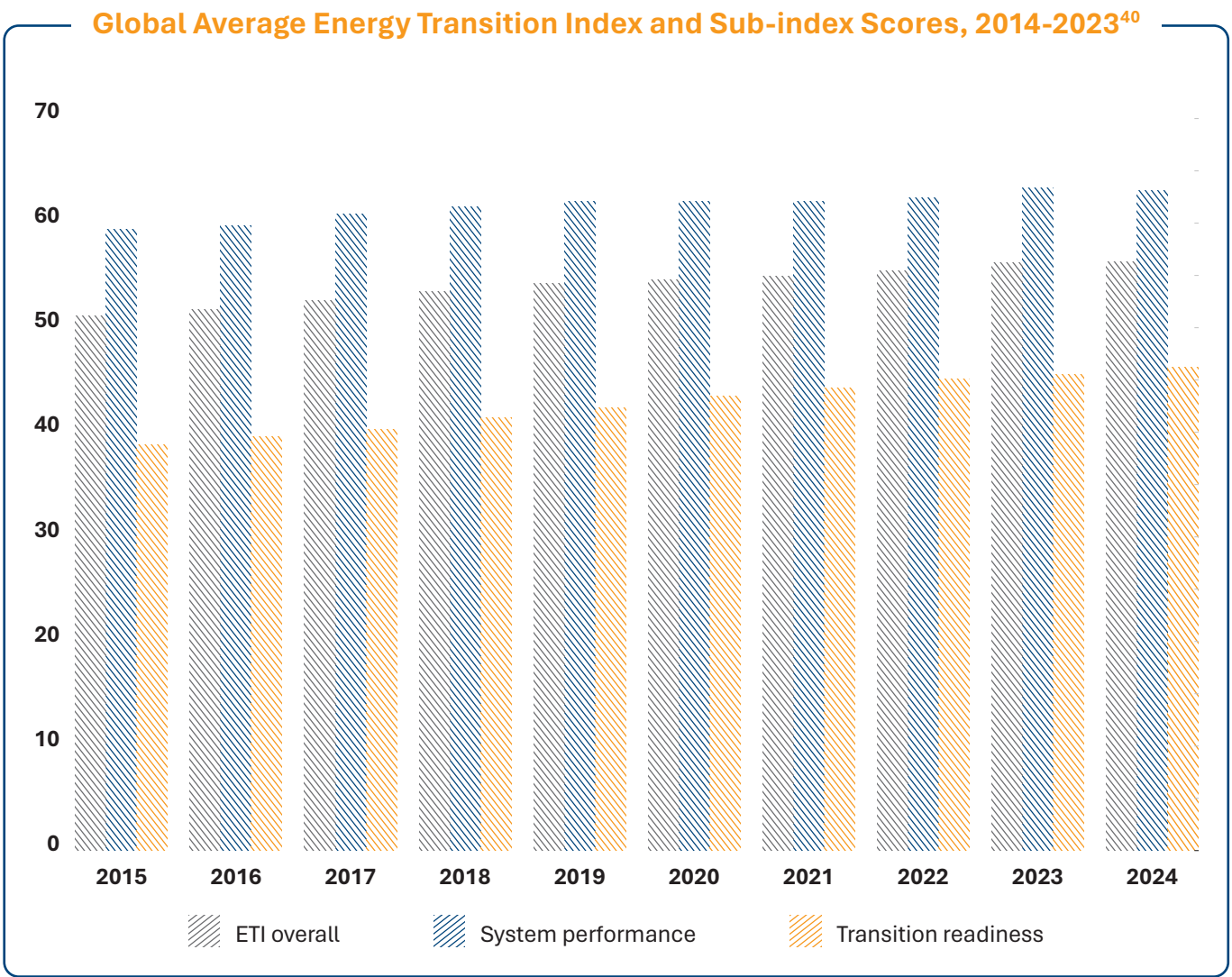
“In my view, awareness of sustainability is fundamental. It transcends job titles and hierarchies, understanding how to be sustainable facilitate better decision for the organisation.”

Wholesale and Retail Trade Validation Workshop

38. Microsoft and the Boston Consulting Group (BCG), *Closing the Sustainability Skills Gap: Helping businesses move from pledges to progress*, 2 November 2022
39. Ibid

02 Creation of Green Jobs

Employment opportunities in environmental preservation and restoration for both traditional and emerging fields.



The year 2024 saw the highest global average scores in the history of the Energy Transition Index (ETI), with a growth of 2%. However, energy equity this year has taken a step backward this year. It is essential to navigate a smooth transition towards greener sources. Although the green transition is anticipated to drive the largest job-creation, fossil fuel industries in Malaysia continue to cast a long shadow, representing a significant portion of the workforce.⁴¹

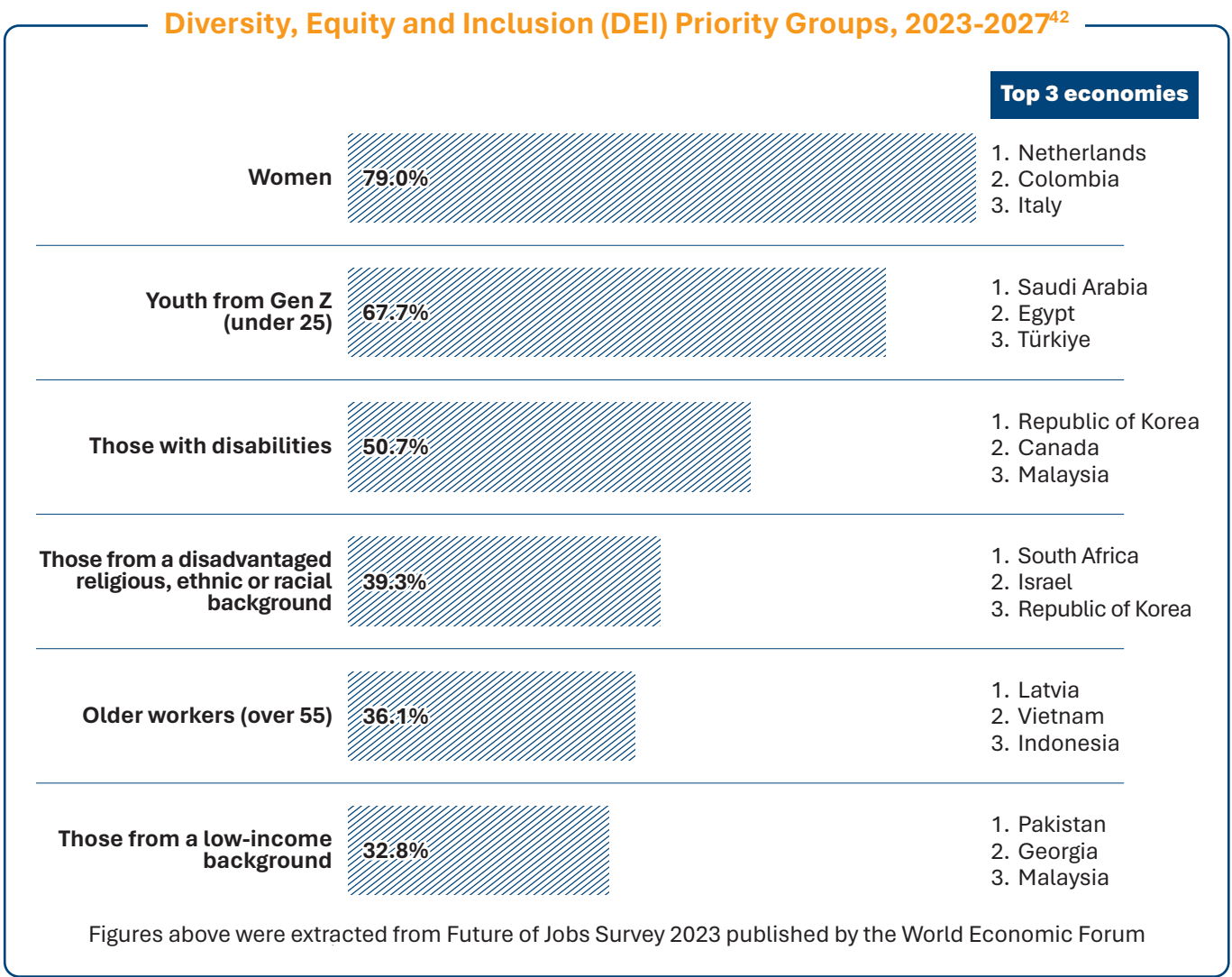
“As we move away from fossil fuels, jobs in traditional energy sectors like coal, oil, and gas may decline. Workers in these industries may need to transition to new roles or sectors.”

Energy and Power In-Depth Interview

40. World Economic Forum and Accenture, *Fostering Effective Energy Transition 2023 Edition*, June 2023
41. Ibid

03 Improve Employee Engagement

Millennials and Gen Z are increasingly drawn to companies that place importance on sustainability.



Companies worldwide are increasingly implementing Diversity, Equity, and Inclusion (DEI) programmes in their recruitment processes, targeting marginalised groups such as women (79%), workers with disabilities (51%), and low-income workers (33%). These initiatives reflect a broader global trend towards enhancing diversity and equity in the workforce while boosting overall labour force participation rates.⁴³

“A commitment to sustainability helps attract new talent who are looking for employers that align with their values, further enhancing the company’s ability to retain a passionate and dedicated workforce.”

Global Business Services In-Depth Interview

42. World Economic Forum (WEF), *The Future of Jobs Report 2023: Insight Report*, May 2023
43. Ibid

Chapter 4:

Key Findings across 10 Sectors

Overview	50
Highly Impacted Roles Analysis and Career Pathways	53
Medium and Low Impacted Roles Analysis	61
Emerging Roles Analysis	66
In-Demand Skills	68

Overview

This section will highlight the key findings of the Impact Study across the 10 sectors:

ICT	Wholesale and Retail Trade	Food Manufacturing and Services	Medical Devices
9 domains	8 value chain segments	12 sub-sectors	6 sub-sectors
1. Cybersecurity 2. Data & Artificial Intelligence 3. Infrastructure 4. Strategy & Governance 5. Product Development 6. Software & Applications 7. Operations & Support 8. Sales & Marketing 9. Telecommunications	Wholesale 1. Supply Chain Operations 2. Business Development & Marketing 3. Sales Retail 4. Merchandise 5. Brand & Marketing 6. Property 7. Store Operations & Support 8. E-Commerce	1. Grain Mill & Starch Products 2. Dairy Products 3. Vegetable & Animal Oils and Fats 4. Beverages 5. Meat 6. Seafood 7. Vegetables 8. Animal Feed 9. Other Food Products 10. Restaurants & Mobile Food Services 11. Beverages Services 12. Event Catering & Others	1. Consumables 2. Surgical Instruments, Implants & Clinical Devices 3. Health Equipment 4. Point of Care 5. Non-Minimal Invasive Product 6. Medical Devices from Convergence of Technology

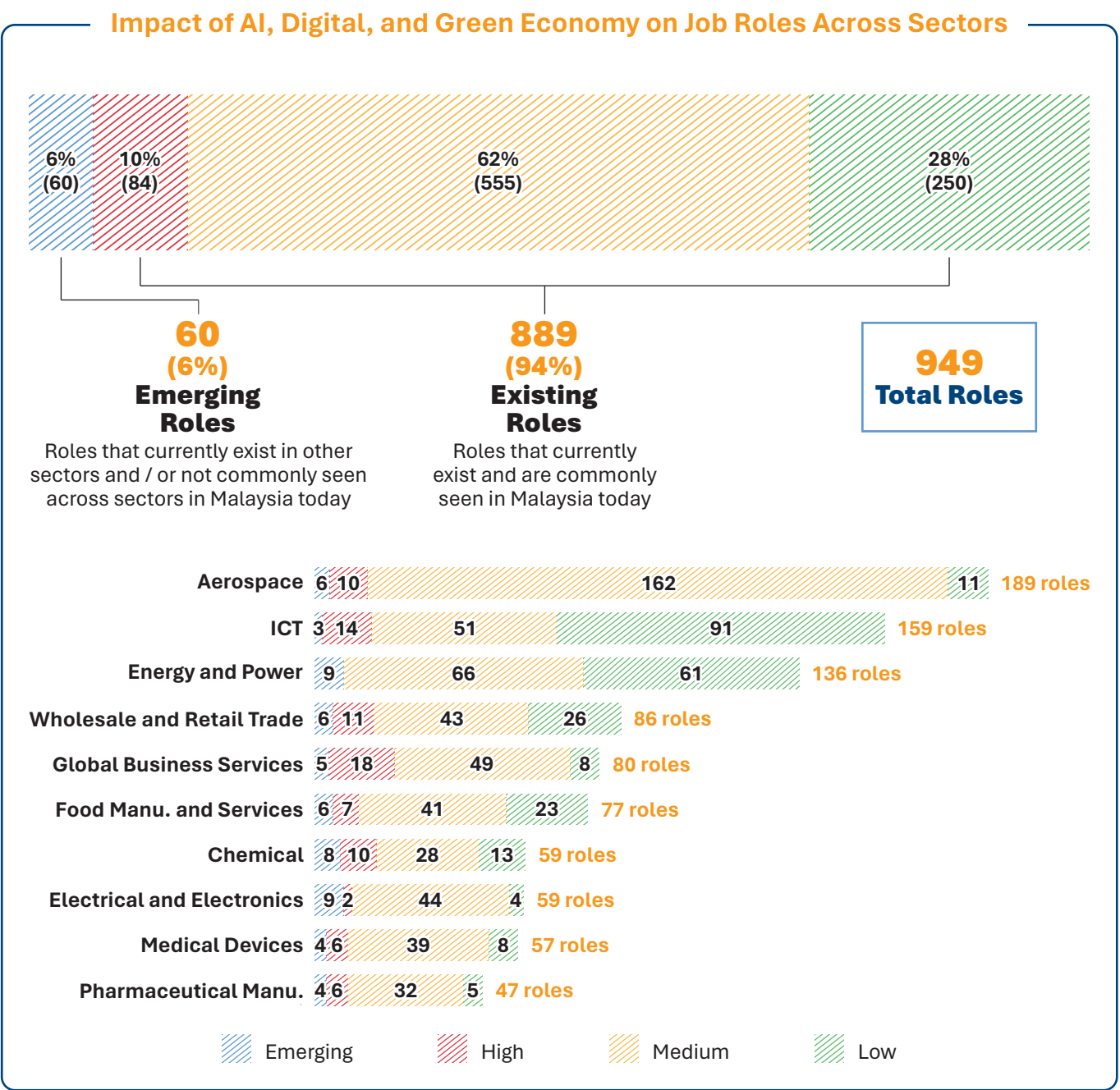
Aerospace	Chemical	Electrical and Electronics
2 sub-sectors	3 sub-sectors	3 value-chain segments
1. Maintenance, Repair & Overhaul (MRO) 2. Aero-Manufacturing	1. Organic Chemical 2. Inorganic Chemical 3. Bio-based Chemical	1. Design & Development 2. Manufacturing 3. Assembly, Test & Packaging

Energy and Power	Global Business Services	Pharmaceutical Manufacturing
3 value-chain segments	6 core functions	4 sub-sectors
1. Generation 2. Transmission 3. Distribution Across Conventional Power and Renewable Energy	1. Finance & Accounting 2. IT & Technology 3. Human Resources 4. Procurement 5. Customer Services 6. Cross Functions	1. Pharmaceutical Products 2. Health Supplements 3. Veterinary Products 4. Traditional Medicine

The study has revealed a total of **949** key roles across **10** sectors, of which **94%** (889) are existing roles, and **6%** (60) are emerging roles

In a comprehensive analysis of 949 roles across various sectors, significant differences emerge based on sector size and technical complexity. Larger and more technical sectors, such as Aerospace (189 roles), ICT (159 roles), and Energy and Power (136 roles), contribute a higher number of roles. Of the 889 existing roles, around 10% (84) are identified as highly impacted due to trends in AI, Digital, or Green Economy, while 62% (555) are expected to be medium impacted. This distribution underscores the extensive influence of these developments across the workforce, highlighting the need for most workers to adapt to evolving sector demands.

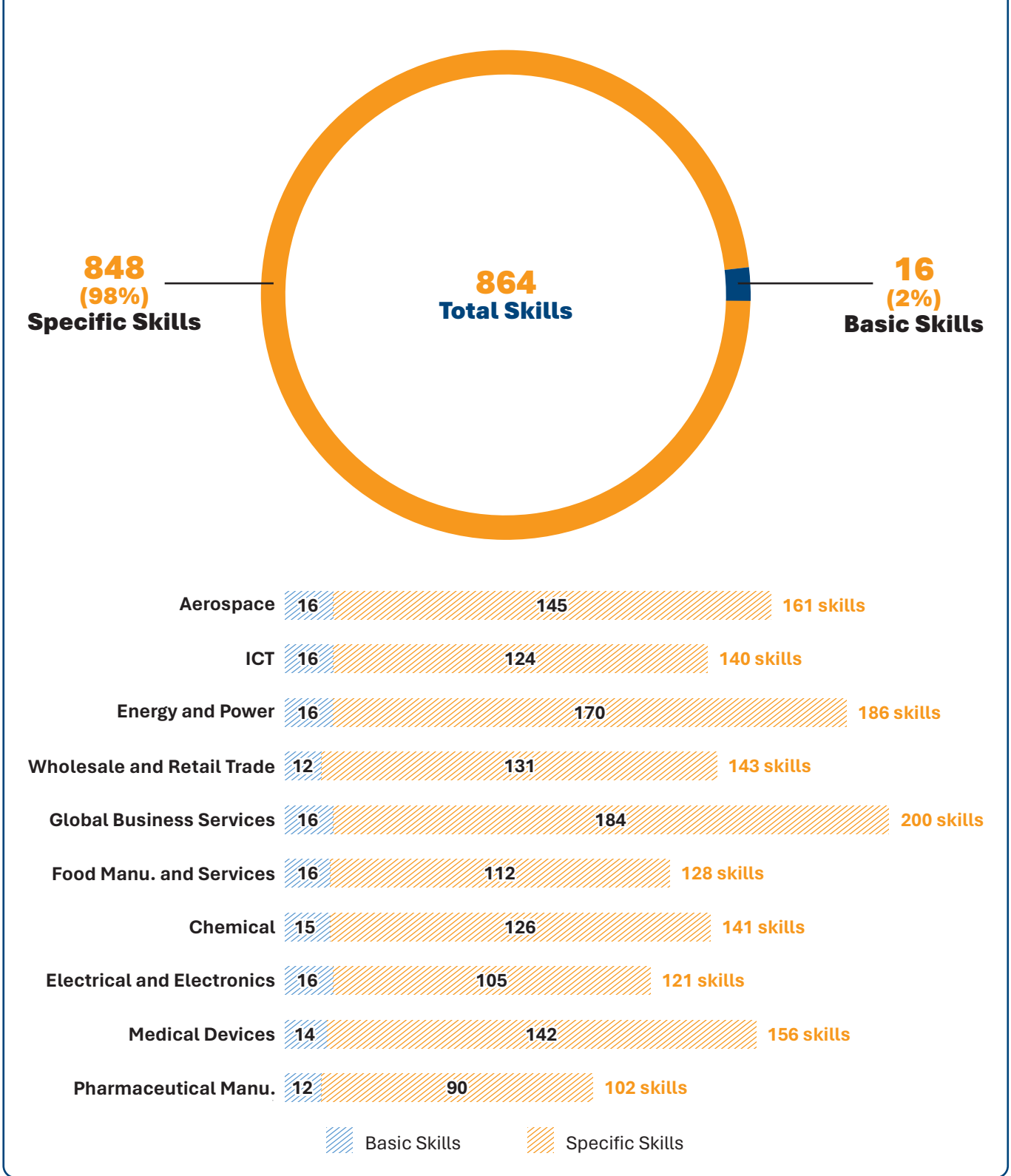
Emerging roles constitute 6% (60) of the total roles investigated, highlighting the substantial role these trends play in the economy’s job creation. The 28% of low impacted roles predominantly arise from sectors that are more advanced in adopting AI, Digital, and Green Economy trends, such as ICT, which has embraced numerous AI and digital advancements, and Energy and Power, which is leading the way in Green Economy transition.



Furthermore, of the 864 skills identified, **2% (16)** are **basic skills**, and **98% (848)** are **specific skills**, highlighting the highly specialised nature of the workforce. Given the study’s focus on the manufacturing and service sectors, all 10 sectors feature a high number of specialised skills, with over 100 skills in each sector, predominantly specific skills.

Global Business Services has the highest number of skills (200) due to the numerous functions within the sector, while sectors such as Aerospace and Chemical have similarly high numbers of skills due to the many different processes within the sector and the unique requirements to perform them. Pharmaceutical Manufacturing has the lowest number of skills (102) due to the limited scope of the sector within Malaysia.

Skills Breakdown by Sector: Specific and Basic Skills

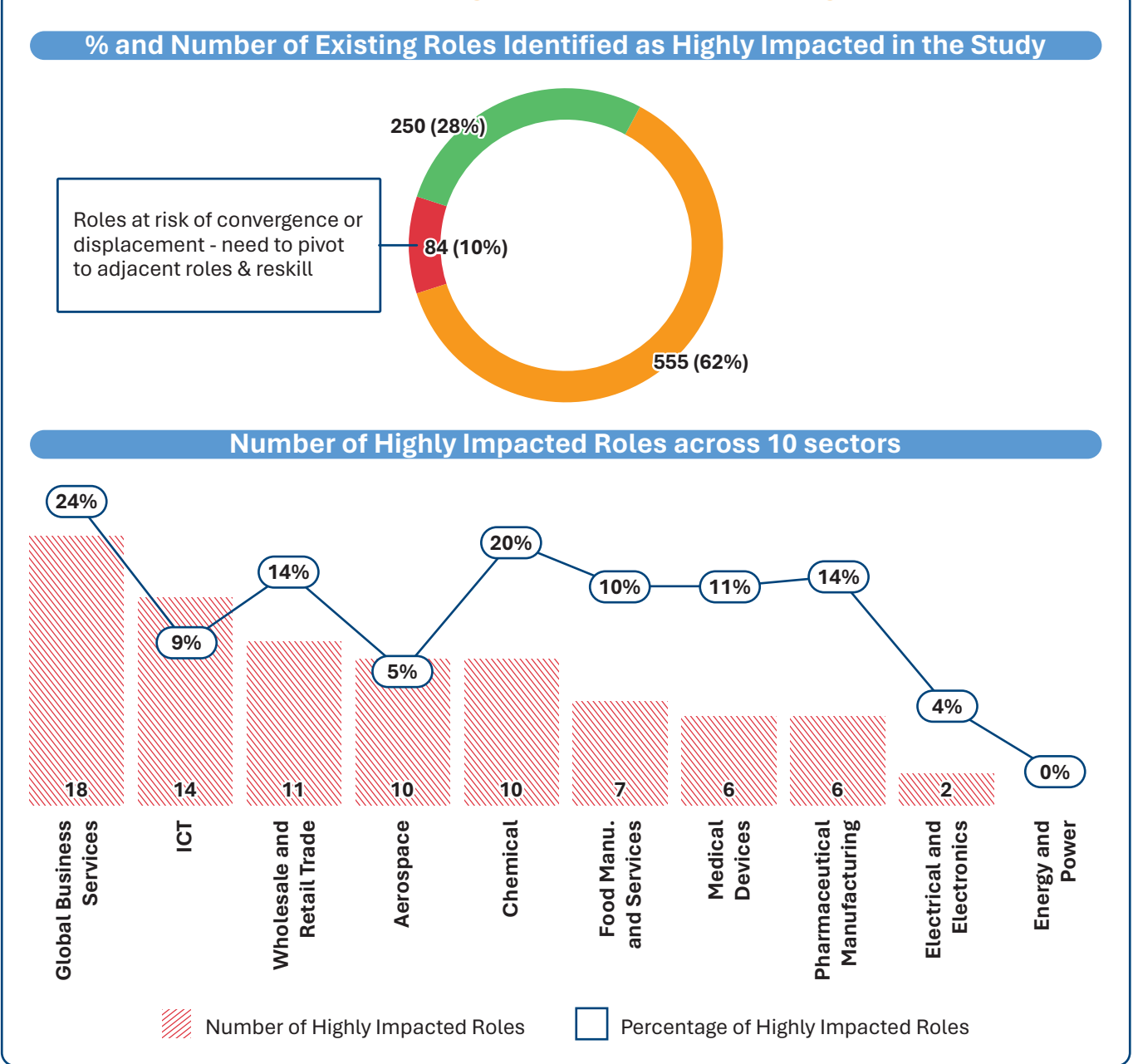


Highly Impacted Roles Analysis and Career Pathways

The study’s key findings reveal that out of **889 existing roles** across 10 sectors, approximately **10% (84)** are **classified as highly impacted roles**. Global Business Services faces the highest number of highly impacted roles at risk, totaling 18. This is largely due to its repetitive and transactional nature, which makes it more vulnerable to automation and technological advancements. In contrast, sectors such as ICT, Aerospace, and Electrical and Electronics exhibit the lowest percentage of highly impacted roles at risk, each with less than 10%. This lower risk is attributed to the specialised skills and expertise required in these fields, which are inherently more human-centric and less susceptible to automation. AI and Digital technologies primarily support human roles rather than replace them.

Additionally, Energy and Power has no highly impacted roles at risk due to its heavily regulated nature, which necessitates human oversight for safety and compliance, particularly during the energy transition. This regulatory environment further diminishes the need for automation in core roles.

Overview of Highly Impacted Roles Findings

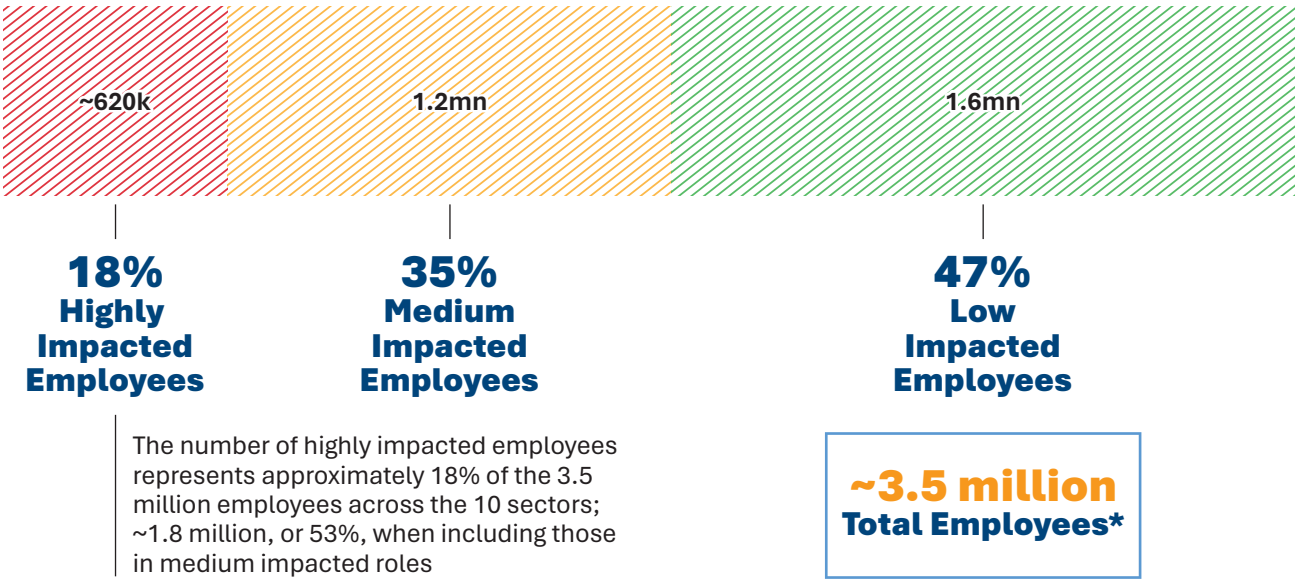


The study also projects that approximately 620,000 employees will be highly impacted over the next three (3) to five (5) years due to the influence of AI, Digital, and Green Economy trends. These employees face potential job displacement and convergence as a result of these evolving technologies and practices.

Due to their large employee populations, the Wholesale and Retail Trade and Food Manufacturing and Services sectors have the highest number of highly impacted employees. Global Business Services is notable for its 32% rate of highly impacted employees, largely due to the extensive use of automation through AI and Digital for routine or transactional tasks. On the other hand, the Aerospace and Energy and Power sectors exhibit the lowest percentage of highly impacted employees. The Aerospace workforce has already integrated AI and Digital technologies, while in E&P, existing roles are only moderately impacted, likely due to the sector’s stringent regulations.

Overview of Highly Impacted Employees Findings

The provided charts illustrate the projected numbers of highly impacted employees due to AI, Digital, and Green Economy. These are the employees whose jobs are at risk of displacement and convergence. The analysis entails the distribution of approximately 3.5 million skilled and semiskilled employees as well as those in the core business across 10 sectors.



Wholesale and Retail Trade	245,817	~1.6mn emp. 15% High
Food Manu. and Services	203,110	~731k emp. 28% High
Global Business Services	89,046	~276k emp. 32% High
Electrical and Electronics	37,336	~363k emp. 10% High
ICT	20,167	~237k emp. 9% High
Chemical	18,228	~157k emp. 12% High
Pharmaceutical Manu.	3,474	~21k emp. 16% High
Medical Devices	2,368	~11k emp. 21% High
Aerospace	397	~11k emp. 4% High
Energy and Power	0	~34k emp. 0% High

Total employees reflect only those who are skilled and semi-skilled and are in the core businesses of the sectors

Estimated Highly Impacted Employees

As AI and Digital reshape the nature of work, the highly impacted roles identified are predominantly manual and routine, requiring minimal skills, operating in predictable environments, and driven by data.

Highly Impacted Roles Common Characteristics	Description	Recurring Ways AI / Digital Impact Key Activities of Roles in the Study	Sample Roles	Sector Highlights
Manual and Routine Tasks	What: Roles involve repetitive physical labour, data entry, or simple rule-based decision-making. Why: These tasks are easily replicable by machines and algorithms, leading to automation and potential job displacement.	Robotic Process Automation (RPA): Automates repetitive tasks such as data entry and report generation. Automated Assembly Lines: Robots handle repetitive manufacturing tasks like assembling product. Self-Checkout Systems: Automated kiosks replace human intervention in services-related sectors.	- General Worker / Operator - Weighbridge Operator - Assembler (Production Operator) - Server / Service Crew / Runner	General Worker / Operator – Robotic systems can handle repetitive cleaning tasks efficiently and consistently, reducing the need for manual labour in maintaining large aerospace facilities.
Entry Level Jobs	What: Roles require minimal training or specialised knowledge to perform the job adequately. Why: AI and automation can be readily trained or programmed to execute these standard tasks, making them less reliant on human labour to automation and potential job displacement.	AI-Powered Document Processing: Extracts and processes information from documents, reducing manual data entry jobs. Virtual Assistants: AI-powered virtual assistants manage scheduling, reminders, and simple administrative tasks, reducing the need for administrative support roles. Automated Scheduling Tools: Manages meeting schedules and calendar events, reducing administrative workload.	- Store Assistant - Cashier, Customer Care - Associate / Assistant, Warehouse	Store Assistant, Receiving – AI can assist in inventory management by using image recognition technology to identify and categorise halal goods upon receipt. It can also predict demand patterns based on historical data and optimise stock levels accordingly.

Highly Impacted Roles Common Characteristics	Description	Recurring Ways AI / Digital Impact Key Activities of Roles in the Study	Sample Roles	Sector Highlights
Predictable and Structured Environments	What: Roles operate in well-defined settings with clear rules, procedures, and expected outcomes. Why: AI excels in pattern recognition and can efficiently handle tasks within such environments, potentially replacing human workers.	Chatbots: Handle routine customer service inquiries across various industries. Automated Call Centre Systems: Interactive Voice Response (IVR) systems manage customer interactions. Predictive Maintenance Systems: Monitor equipment and schedule maintenance based on data.	- Customer Service Representative - Document Controller - Production Planner - Warehouse Storekeeper / Inventory Coordinator	Production Planner – AI can assist in automating repetitive or rule-based tasks such as scheduling, inventory management, and order tracking

Data-Driven Analysis & Decision Making	What: Roles rely heavily on analysing and interpreting data to make informed choices. Why: Advancements in machine learning and data analytics enable AI to process vast amounts of data and generate insights, potentially replacing human analysts in certain areas.	Predictive Analytics Tools: Analyse data to forecast trends and support decision-making. Algorithmic Trading Systems: Execute financial trades based on data analysis. AI-Powered Fraud Detection: Identifies and prevents fraudulent activities by analysing transaction data.	- Accounts Receivable (AR) Analyst - R&D Assistant / Laboratory Technician - Data Analyst - Biostatisticians	Accounts Receivable Analyst – AI can assist in invoice generation and payment processing by automating data entry, matching payments to invoices, and identifying discrepancies for review.
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Additionally, three (3) groups of well-defined roles have been clearly identified across all highly impacted roles in the study:

Well-Defined Roles	Key Observations	Percentage of Impacted Roles in Organisations	Sector Highlights ⁴⁴
Production Production Operators - Food Manufacturing and Services - Electrical and Electronics Operate, monitor, and maintain machinery and equipment to ensure efficient manufacturing processes.	- Automated systems and AI-driven robots optimise repetitive tasks, reducing manual intervention. - Predictive maintenance uses AI to anticipate machine failures, minimising downtime. - Data analytics platforms help operators monitor real-time performance, improving efficiency.	MNCs: 4% – 27% SMEs: 40-70% Large MNCs have rapidly embraced AI and digital technologies, resulting in significant workforce reductions due to automation efficiency and reliability. In contrast, SMEs, which represent 90% of the E&E sector, are adopting these technologies more slowly. However, as AI and digital solutions become increasingly affordable, this transition is becoming inevitable.	Jabil Circuits' AI-driven Collaborative Robots (Cobots) can work alongside human operators, taking over repetitive, labour-intensive tasks. This increases efficiency and allows human operators to focus on more complex and value-added activities.

Customer Service Customer Service Representative - Global Business Services Cashier, Customer Care - Wholesale and Retail Trade Server / Service Crew / Runner - Food Manufacturing and Services Interact with customers to process transactions, provide services, and resolve issues.	- AI-driven chatbots and self-service kiosks handle routine inquiries and transactions, reducing human workload. - AI-based personalisation improves customer experience through tailored recommendations. - Automation in payment processing (e.g., contactless payments) speeds up transactions.	MNCs: 0.2% - 5% PLCs: 0.1% - 13% SMEs: 5% - 17% Adopting AI and Digital-related tools is widespread in MNCs and PLCs, cutting the need for many customer-facing employees. SMEs are gradually integrating these tools as they become more accessible, showing a positive trend towards adoption.	Olive Garden implemented AI-driven kiosks and tablet devices at tables to enhance ordering. These devices allow customers to browse the menu, place orders, and make payments without a server's assistance. Servers spend less time taking orders and processing payments, allowing them to focus more on customer interaction, upselling, and ensuring overall customer satisfaction.
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Well-Defined Roles	Key Observations	Percentage of Impacted Roles in Organisations	Sector Highlights ⁴⁴
Warehousing • Warehouse Storekeeper / Inventory Coordinator – Wholesale and Retail Trade • Associate / Assistant, Warehouse – Chemical • Store Assistant, Receiving – Wholesale and Retail Trade Manage, organise, and track inventory, ensuring accurate stock levels, and efficient warehouse operations.	• AI-powered inventory management systems track stock in real-time, minimising manual counting. • Automated sorting and packing robots increase productivity and reduce errors. • Predictive analytics optimise stock levels, reducing overstock and shortages.	• MNCs: 0.2% - 5% • PLCs: 0.9% - 8% • SMEs: 6% - 13% In MNCs and PLCs, AI and Digital have sharply decreased manual roles, as warehouses operate more efficiently with fewer errors. SMEs are gradually embracing digital tools to streamline operations, despite initial hurdles related to costs.	MYDIN , as a trailblazer in the local industry, was the first to digitalise its warehouse operations. They have implemented a warehouse management system (WMS) featuring mobile computers and cloud-based software. This system has streamlined processes from receiving and stocking to picking and dispatching, significantly increasing order processing capacity. The automation of traditional tasks by AI and digital tools may reduce the need for associates/ assistants in the warehouse.

Career Pathways of Highly Impacted Roles

Three (3) guiding principles have been used to identify the possible roles that highly impacted roles can transition into. Career pathways for highly impacted roles will include movement both within and across sectors, where applicable. These principles will serve as a checklist to ensure that the recommended pathways are logical and practical for the relevant roles.

Career pathways between **roles within** and **across job clusters** are identified based on:

- Similarities in **Basic Skills** and **Specific Skills**
- Job **roles description**

Requirement of **professional certification** for job roles that can only be **obtained through long term studies and/ or practical experience** will be considered

Common precedent(s) of career pathways based on **industry players' practical experience** will be included

In the study, two (2) distinct career paths were identified. One path involves a Technical role, such as Engineering, which requires specialised knowledge and skills in areas like Science, Technology, and Mathematics. The other path entails a Non-Technical role, such as Customer Service, which emphasises Communication, Problem-Solving, and Relationship-Building abilities.

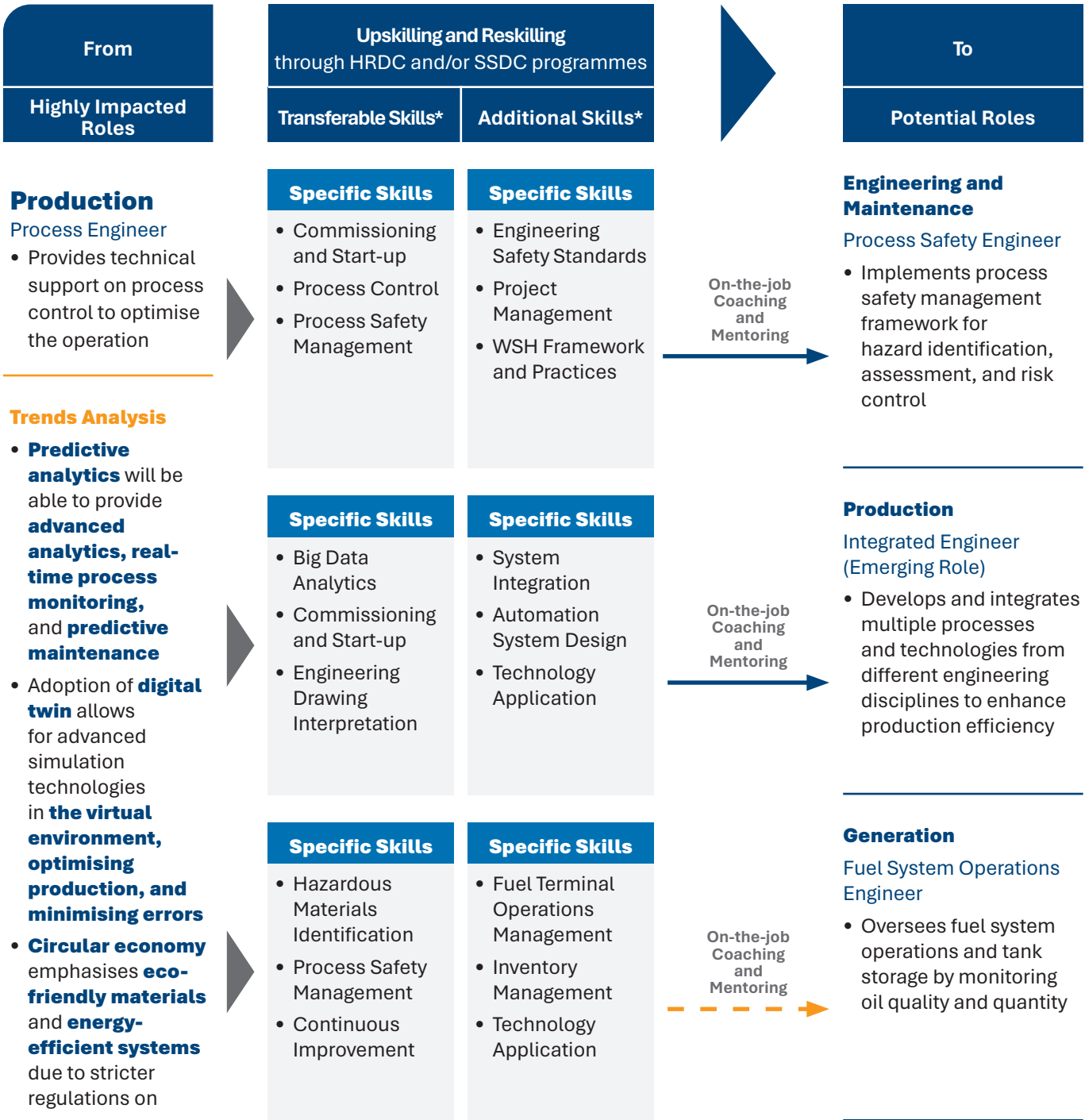
Example of Highly Impacted Roles Transitioning to New Roles: Technical Role

Process Engineer | Chemical

The role of a Process Engineer in the Chemical sector is significantly impacted by advancements in AI, Digital, and Green Economy. AI, through predictive analytics, enables advanced analytics, real-time process monitoring, and predictive maintenance. Digital adoption, particularly with digital twins, allows for advanced simulations in virtual environments,

optimising production and minimising errors. Green Economy, emphasising circular economy principles, focuses on eco-friendly materials and energy-efficient systems, driven by stricter environmental regulations.

As a result of these trends, Process Engineers will need to upskill or reskill by acquiring transferable or additional skills. Potential career pivots include roles such as Process Safety Engineer within the Engineering and Maintenance division, where they can implement process safety management frameworks for hazard identification, assessment, and risk control. Alternatively, within the same sector, Process Engineers can transition into the role of an Integrated Engineer within the Production division, where they integrate multiple processes and technologies from different engineering disciplines to enhance production efficiency. They may also pivot to a role such as Fuel System Operations Engineer within the Generation division of the Energy and Power sector, where they would oversee fuel system operations and tank storage by monitoring oil quality and quantity.



* The list is non-exhaustive

→ Within Sector

→ Across Sector

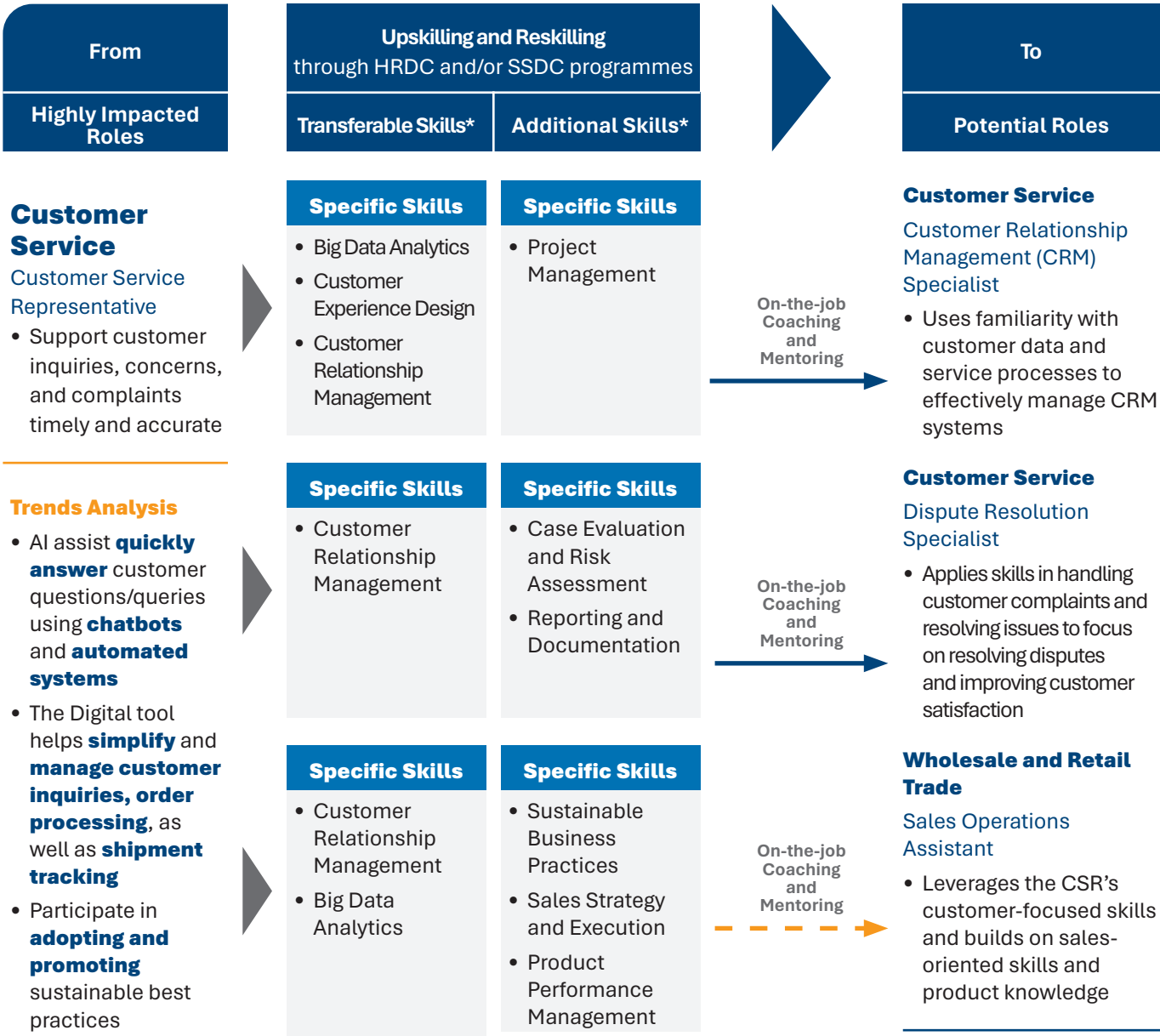
Example of Highly Impacted Roles Transitioning to New Roles: Non-Technical Role

Customer Service Representative | Global Business Services

The role of a Customer Service Representative (CSR) is significantly impacted by advancements in AI, Digital, and Green Economy. AI, through chatbots and automated systems, can efficiently handle customer queries, while digital tools streamline and manage inquiries, order processing, and shipment tracking. Green Economy encourages the adoption and promotion of sustainable practices.

As a result of these trends, CSRs need to upskill or reskill by acquiring transferable or additional skills. Potential career pivots include roles such as a Customer Relationship Management (CRM) Specialist, where familiarity with customer data and service processes is used to manage CRM systems effectively, or a Dispute Resolution Specialist, where skills in handling complaints and resolving issues are applied to improve customer satisfaction.

Alternatively, a CSR in the Global Business Services sector may transition to another sector, such as a Sales Operations Assistant in the Wholesale and Retail Trade sector, leveraging their customer-focused expertise while building sales-oriented skills and product knowledge.



* The list is non-exhaustive

Within Sector

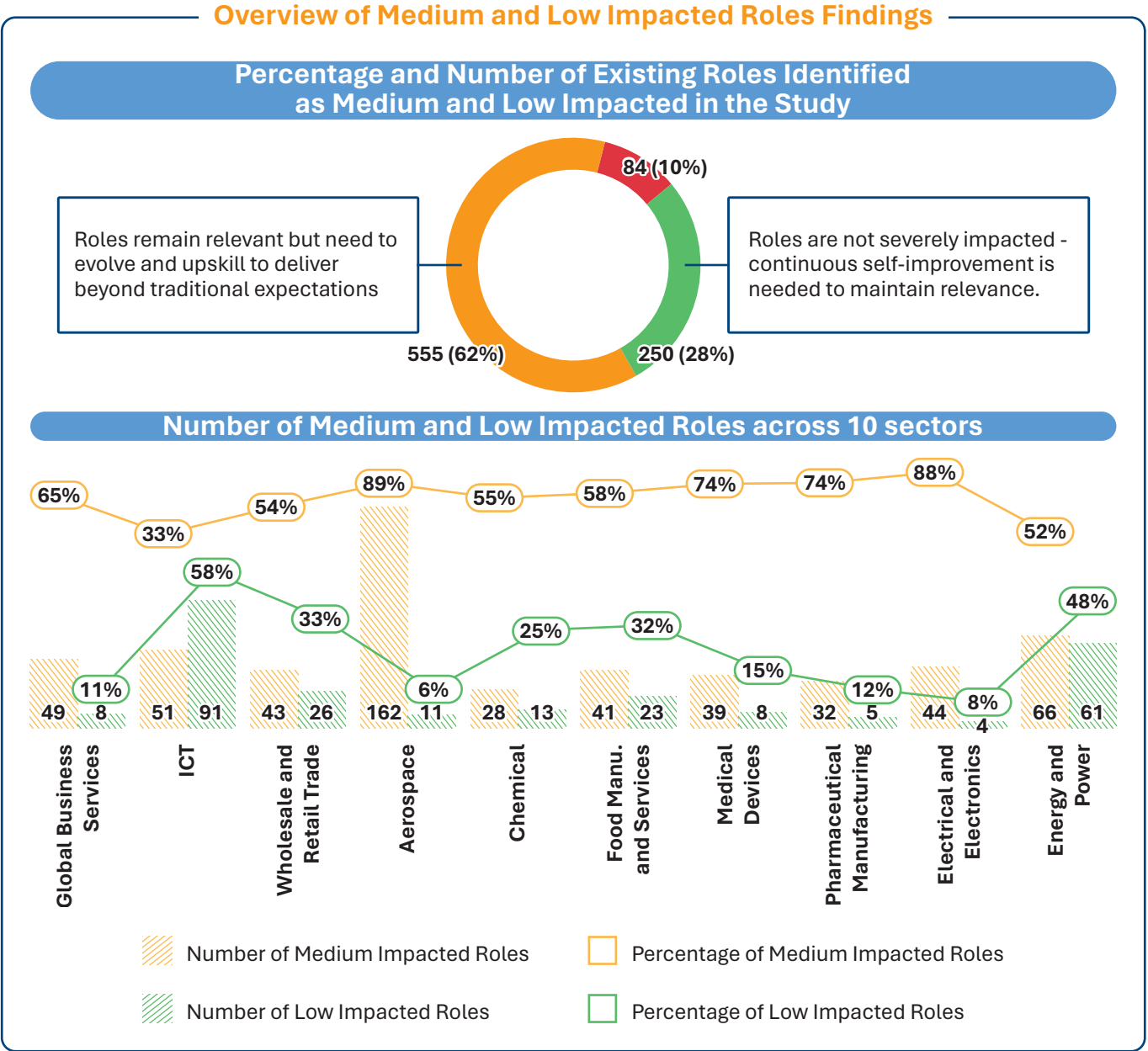
Across Sector

Medium and Low Impacted Roles Analysis

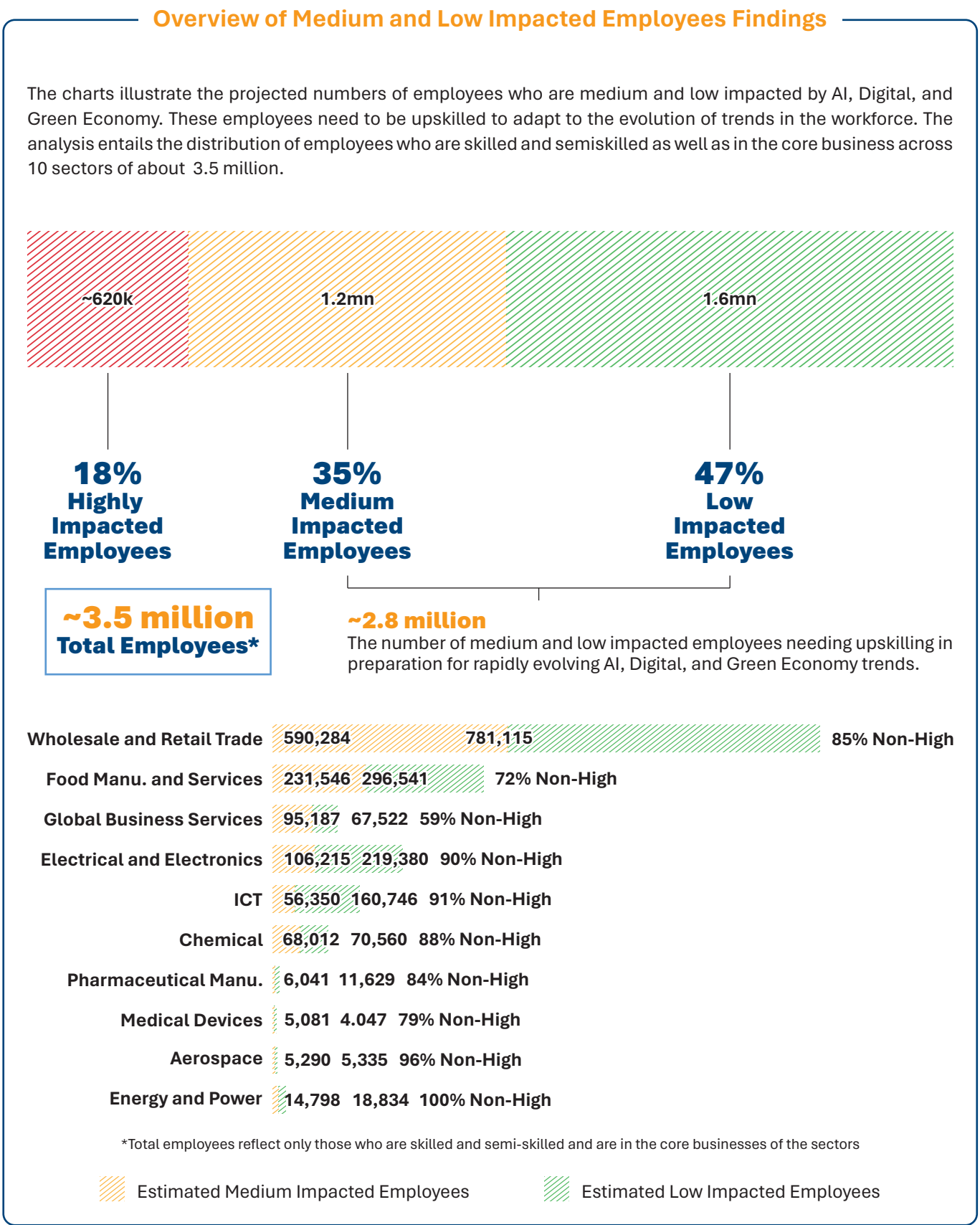
As technology automates repetitive tasks, professionals are empowered to pursue new or higher-value activities, creating opportunities for medium impacted roles in AI, Digital, Green Economy. It has been identified that 90% of roles in the study are not highly impacted by AI, Digital, and Green Economy trends; among these, 62% are moderately impacted, while the remaining 28% experience low impact.

The impact of AI, Digital, and Green Economy trends on various sectors reveals that the majority of roles (90%) remain moderately or minimally impacted by these developments. This suggests that these advancements aim to enhance and complement the existing workforce as opposed to replacing it. However, specific sectors such as Aerospace and Electrical and Electronics exhibit high percentages of medium impacted roles – 89% and 88%, respectively. This indicates that while these roles remain relevant, they must evolve and upskill to keep pace with the automation and technological advancements transforming these sectors.

On the other hand, the ICT sector stands out, with most roles falling under the low impacted category. This is attributed to the sector's widespread adoption of AI and digital initiatives, which has effectively mitigated high levels of job displacement.



With 2.8 million medium and low impacted employees requiring upskilling in AI, Digital, and Green Economy over the next three (3) to five (5) years to exceed traditional expectations, the Wholesale and Retail Trade sector in Malaysia stands out. It has the highest number of medium impacted (590,284) and low impacted employees (781,115) due to its labour-intensive nature and extensive scope. On the other hand, sectors such as Energy & Power (100%); ICT (91%); and Electrical and Electronics (90%) have a high percentage of medium and low impacted employees due to their proactive adoption of AI and digital trends.



While the majority of roles will continue to be relevant, they will encounter technological changes driven by AI and Digital advancements, necessitating ongoing skill adaptation:

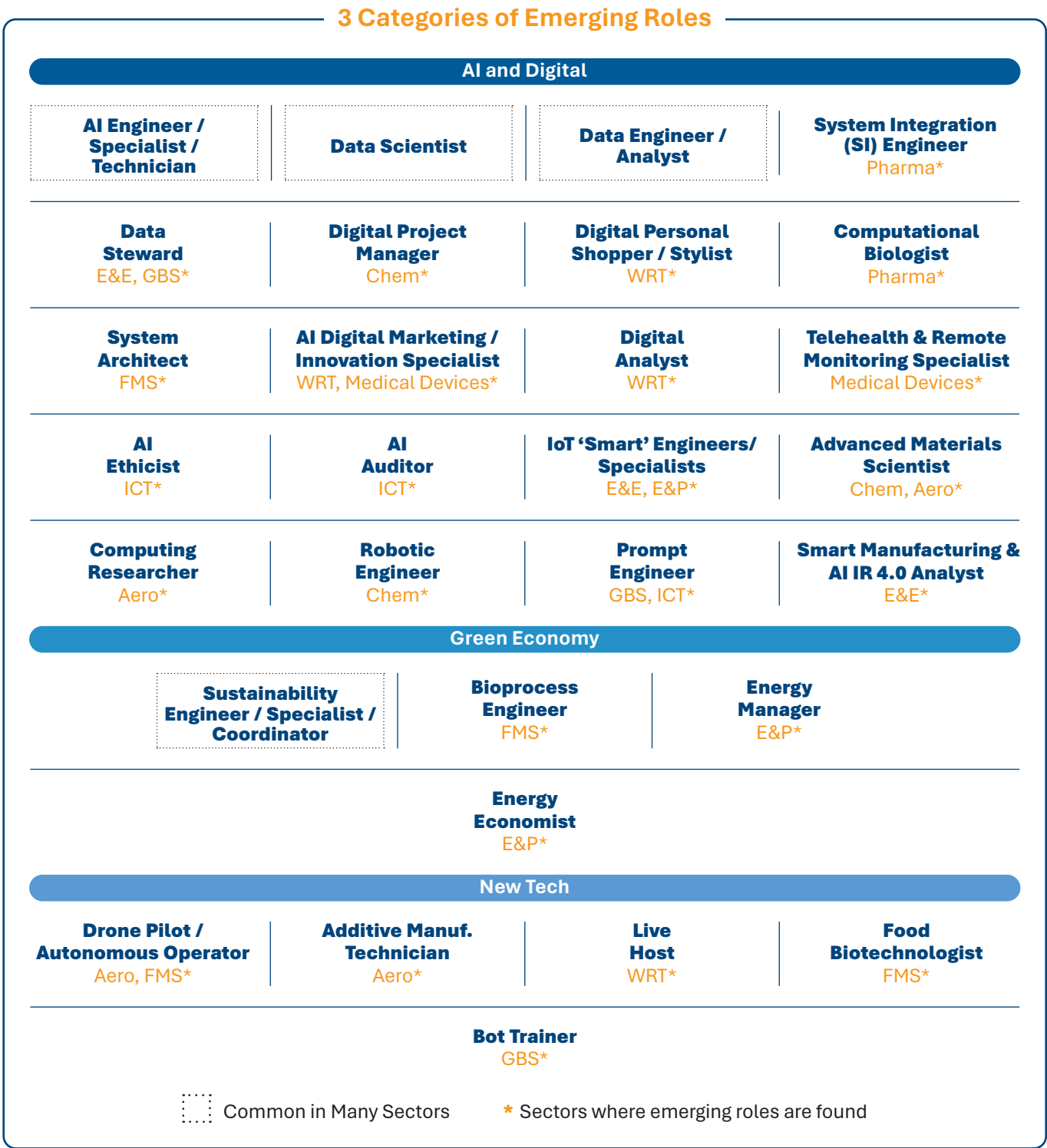
Medium and Low Impacted Roles Common Characteristics	Description	Recurring Ways AI / Digital Impact Key Activities of Roles in the Study	Sample Roles	Sector Highlights
Human-Centric Interaction	What: Roles requiring direct human interaction and empathy. Why: These tasks need a human touch and emotional intelligence that AI and digital tools can't replicate.	AI-Assisted Virtual Assistants: Tools like Siri or Google Assistant help with task management and information retrieval. AI-Powered CRM Systems: Provide insights to assist customer service representatives in managing client relationships.	- Manager, Brand/ Customer Loyalty - Sales Assistant, Operations - Representative, Customer Service	Manager, Brand/ Customer Loyalty – AI virtual assistants help them enhance brand loyalty by analysing customer data, automating responses, and offering personalised engagement strategies. This allows managers to focus on more strategic tasks.
	What: Roles focused on overseeing teams, making long-term decisions, and guiding organisational direction. Why: These require complex judgement, foresight and adaptability that AI and digital systems lack.	Business Intelligence (BI) Platforms: Analyse business data to offer insights for strategic decision-making. AI-Driven Project Management Tools: Assist managers in tracking project progress and resource allocation.	- Chief Technology Officer - Head of Department, E-Commerce - Head of Department, Business Development & Marketing	Chief Technology Officer – AI-driven project management tools optimise planning and execution for C-Suite Officers by automating tasks, predicting risks, and providing data-driven insights. This boosts efficiency and helps make informed decisions in Business Development and Marketing.
Creativity and Innovation	What: Roles that involve generating new ideas, designing original content, and driving innovation. Why: Creativity and innovation are inherently human processes that are difficult to be imitated by technology.	Generative Design Software: AI tools suggest design solutions and optimise product development. AI-Assisted Content Creation: Helps writers and content creators generate text and ideas.	- Graphic Designer - Specialist, Search & Social Media - Product Technologist / Innovation Manager - R&D Executive	Graphic Designer – AI-assisted content creation tools aid graphic designers by automating routine tasks and offering creative suggestions. This boosts productivity and allows designers to focus more on innovative aspects of their work.

Medium and Low Impacted Roles Common Characteristics	Description	Recurring Ways AI / Digital Impact Key Activities of Roles in the Study	Sample Roles	Sector Highlights
Specialised Technical Expertise	What: Roles that require deep, specialised knowledge in a technical field. Why: These require expert skills that AI and digital tools haven't mastered.	Digital Simulation Tools: Virtual models and simulations allow experts to test hypotheses and predict outcomes without physical trials, reducing time and cost. Automated Data Processing: AI-powered tools process large volumes of data quickly, enabling focus on higher-level decision-making.	- Automation & Orchestration Engineer - Cloud Developer - Infrastructure Architect - Integrated Circuit (IC) Design Engineer - Firmware Design Engineer	IC Design Engineer – Digital simulation tools enable IC design engineers to model and test circuits virtually, optimising design and reducing development time. They provide insights that enhance accuracy and reliability before physical prototypes are made.
	What: Roles that involve manual tasks requiring fine motor skills, physical agility, and mobility. Why: Such tasks depend on human physical capabilities, which remain difficult for technology to fully replicate.	Collaborative Robots (Cobots): Work alongside human operators in tasks requiring precision and dexterity. Robotic Exoskeletons: Enhance mobility and reduce strain for workers in manufacturing and construction.	- Forklift Operator - Welder - Technician (Assembly) - Painter - Barista - Pastry Chef	Welder – Collaborative robots (cobots) work alongside welders to improve precision and efficiency. They handle repetitive tasks, allowing welders to focus on complex operations and enhancing overall productivity and quality.

Upskilling Opportunities in Green Economy		
Green Economy is revolutionising the job market and creating fresh avenues for professionals to enhance their skills and contribute to a sustainable future through ESG initiatives. This transformation offers a valuable opportunity for individuals in non-highly impacted roles to broaden their knowledge and experience in the ESG sphere. In this study, two (2) key opportunities were identified spanning 10 sectors, highlighting the potential for all professionals to engage with and benefit from the trends in Green Economy:		
	Compliance: Skill Set Increase	Emerging: Complete Role Transformation
Description	Roles that focus on compliance need to adapt to new regulations, standards, and best practices related to environmental and sustainability issues.	Roles will need to take on new responsibilities and tasks driven by innovations or shifts towards greener practices that were not previously part of the role.
Opportunities for Skill Diversification	Regulatory Knowledge: Relevant roles must stay updated on evolving green regulations and standards. This requires enhancing their knowledge of environmental laws and policies. Environmental Impact Assessment: The ability to assess the environmental impact of business practices and implement measures to minimise adverse effects is an important aspect of green practices, making these skills crucial for relevant roles. Reporting and Documentation: Enhanced abilities in reporting and documenting compliance with green standards, including creating sustainability reports and audits, are key for maintaining transparency and accountability in green initiatives. Stakeholder Engagement: Developing communication skills and the ability to negotiate with stakeholders about sustainability initiatives and compliance.	Green Technologies: Learning about and working with new green technologies, such as renewable energy systems, energy-efficient materials, or sustainable production processes. Sustainability Strategy: Developing and implementing strategies that align with sustainability goals, including circular economy principles and eco-friendly product development. Interdisciplinary Skills: Acquiring skills that blend different fields, such as combining environmental science with data analytics to optimise sustainability efforts.
Examples	Compliance and Governance Specialist (Global Business Services): Focus on acquiring expertise in new environmental regulations and integrating sustainability standards into compliance frameworks.	Energy Economist (Energy and Power): Focus on analysing the economic impacts of renewable energy projects and climate policies.

Emerging Roles Analysis

Emerging roles are set to drive future advancements and innovations across the 10 sectors, playing a vital role in navigating the changes brought about by AI, Digital, and Green Economy. These roles are essential for maintaining competitiveness and sustainability in a rapidly evolving global market. Over the next three (3) to five (5) years, 29 distinct emerging roles will gain increasing significance.

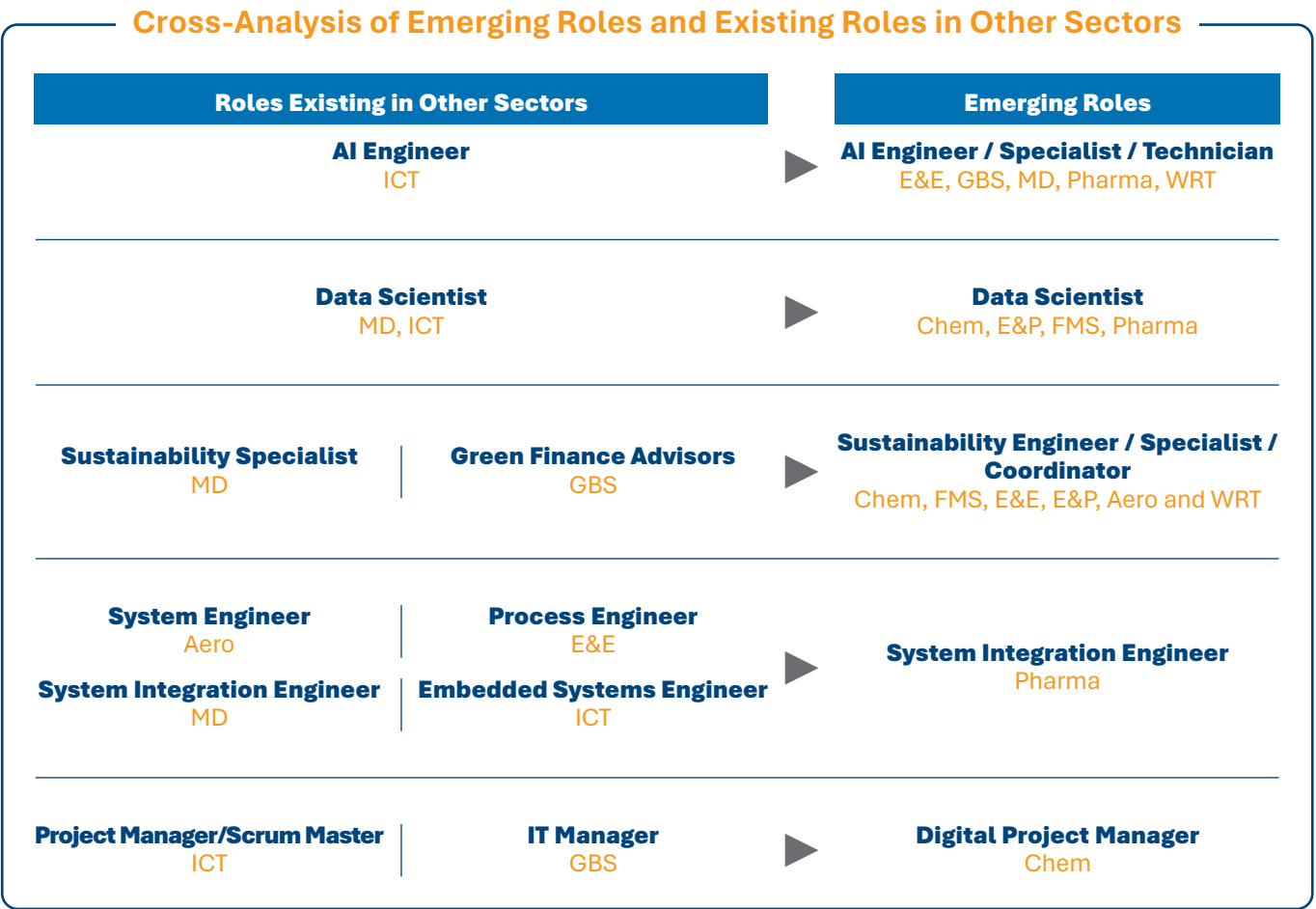


The study highlights the increasing demand for AI and Digital roles, such as AI Engineers/Specialists/Technicians, Data Scientists, and Data Engineers/Analysts. These roles are increasingly essential as Big Data development drives large volumes of data, and businesses seek to analyse this data to enhance efficiency and improve customer experiences.

Additionally, there is a surge in demand for Sustainability Engineers/Specialists/Coordinators, reflecting the rising emphasis on sustainability across various sectors. The ICT sector, in particular, is focusing on AI ethics and governance, highlighting the importance of new technologies in improving operational effectiveness.

Furthermore, sector-specific trends underscore the adoption of innovative technologies to enhance operational processes. Roles such as Drone Pilot/Autonomous Operator, Additive Manufacturing Technician, and Live Host exemplify this ongoing evolution in technology and its impact across sectors.

As shown in the following graph, five (5) emerging roles identified within a specific sector may be considered as existing roles in other sectors depending on the maturity of the sector’s AI, Digital, and Green Economy adoption.



Overall, many emerging roles relating to AI/Digital trends can be found pre-existing in the ICT sector, such as AI Engineers, highlighting how the sector acts as a trendsetter for implementing these trends due to the required expertise for firms within the Digital space. Data Scientists can be found in the ICT and Medical Devices sectors due to their high reliance on data to drive decision-making and processes.

The existing presence of System Integration Engineers within many sectors, particularly ones highly reliant on digital processes such as Aerospace and Electrical and Electronics, suggests that their emergence within other sectors reflects their growing digitalisation and a need for roles dedicated to monitoring and connecting these different systems for overall business objectives. Similarly, the strategic role of Digital Project Managers within the ICT and Global Business Services sectors is now emerging within the Chemical sector. This signals the Chemical sector’s recognition of the importance of digital projects in fulfilling strategic objectives.

Meanwhile, the presence of Sustainability Specialists across various sectors reflects the growing urgency to address environmental issues in processes. This is either to prevent redundancy, as seen in Energy and Power, or because stakeholders increasingly hold companies accountable for these efforts, as observed in the Global Business Services and Medical Devices sectors. An emerging role could pivot into adjacent existing roles (or vice versa), where most core skills are transferable, requiring only adaptation of sector-specific knowledge.

In-Demand Skills



From the study, it has been identified that there are two (2) types of skills: basic skills and specific skills. A total of 16 basic skills and 848 specific skills have been identified across the 10 sectors, and all roles require a combination of either basic and specific skills. The top 10 in-demand basic skills are not only common but also versatile, relevant across various roles and sectors, making them highly transferable.

Interestingly, **Digital and AI Fluency**, as well as **Sustainability Awareness**, are now central to these skills, serving as significant differentiators from traditional competencies. These skills are vital for meeting evolving job market demands and thriving in today's workforce.

Additionally, industry players have highlighted six (6) basic skills that are essential for managerial roles: Business Acumen; Change Management; Influencing and Negotiation; Coaching and Mentoring; Conflict Management, and Planning and Organising. Industry players further emphasised that effective leadership requires mastering key basic skills or mastering a combination of key basic skills, including Communication, Critical Thinking, Empathy, Teamwork, and others, all of which are key for organisational success.

Moreover, advanced AI and Digital skills, such as Narrative Design in Product Development, Applications Integration, and Emerging Technology Synthesis, are increasingly vital. Industry experts concur that expertise in primary data, cloud computing, and sustainability is essential for thriving in the realms of AI, Digital, and Green Economy. These competencies are essential for meeting the demands of the evolving job market.

Highlights for In-Demand Skills of Roles across all 10 sectors

Top 10 In-Demand Basic Skills

01	Adaptability and Resiliency	02	Cognitive Skills	03	Communication
04	Critical Thinking	05	Digital and AI Fluency	06	Empathy
07	Innovative Thinking	08	Learning Agility	09	Sustainability Awareness
10	Teamwork and Collaboration	Total Basic Skills: 16			

Specific skills related to AI, Digital, and Green Economy are increasingly in demand across various non-technical roles such as Procurement and Sourcing, Sales, and Marketing. These skills support business planning, decision-making, and overall productivity. Additionally, green skills are becoming crucial for roles that involve compliance with environmental regulations and resource conservation, such as Renewable Energy Design Engineer and Environment Officer. Employees in these roles should prioritise acquiring in-demand skills for AI, Digital, and Green Economy to enhance their adaptability and ensure relevance in the modern workplace.

In-Demand Specific Skills in relation to AI, Digital, and Green Economy

01	Big Data Analytics	02	Cloud Computing	03	Data Engineering
04	Data Management	05	Data Visualisation	06	Data Storyboarding
07	Network Security	08	Eco-Design Principles	09	Sustainable Business Practices
10	Waste Management	Total Specific Skills: 848			

In-Demand Skills Analysis for AI, Digital, and Green Economy within each Sector

Identifying and understanding the in-demand skills that are becoming increasingly vital as organisations adapt to technological and environmental changes is crucial for shaping the future workforce. These in-demand skills are key to preparing the workforce to address evolving challenges and seize opportunities within their respective sectors.

	Aerospace	Chemical	Electrical and Electronics	Energy and Power	Food Manufacturing and Services
AI / Digital Skills	- Robotics and Automation Application - Big Data Analytics - Advanced Technology Integration - Digital Business Model Innovation - Data Modeling and Design	- Advanced Technology Integration - Big Data Analytics - Robotic and Automation Technology - Robotic and Automation System	- Data Engineering - Programming, Coding and Scripting - Factory System Management - Big Data Analytics - Automated Process Control	- Big Data Analytics - Technology and Systems Application - Internet of Things Management - Applications Development - Data Mining and Modelling	- Advanced Technology Integration - Digital Business Model Innovation - Big Data Analytics - Data Modeling and Design
Green Skills	- Sustainable Transportation Management - Eco-Design Principles - Environmental Awareness - Sustainable Business Practices - Sustainable Manufacturing	- Sustainable Business Practices - Green Business Innovation - Environmental Management System	- Good Manufacturing Practices Implementation - Waste Water and Gas Emission System - Sustainable Business Practices	- Sustainability Management - Environment and Social Governance - Eco-Design Principles - Energy Management and Audit - Environmental Awareness	- Sustainable Transportation Management - Sustainable Business Practices - Eco-Design Principles - Green Business Innovation

On the whole, upskilling in AI and Big Data Analytics is essential for enhancing operational efficiency across all sectors, such as Global Business Services, ICT, and Aerospace. For instance, Global Business Services professionals trained in AI and Big Data Analytics can automate routine financial reporting and data processing, significantly increasing productivity within their organisations.

In another view, sectors such as Chemical; Energy and Power; and Wholesale and Retail Trade are embedding green skills into their core operations, contributing to a healthier environment. To fulfil their responsibility towards

Global Business Services	ICT	Medical Devices	Pharmaceutical Manufacturing	Wholesale and Retail Trade
- Big Data Analytics - Data Validation - Applications Integration - Structured Query Language (SQL) - Data Management	- Big Data Analytics - Software Configuration - Data Centre Facilities Management - Database Administration - IT Asset Management	- Automated Process Control - Big Data Analytics - Automated Process Design - Process Analytical Technology Implementation - Analytical Method Validation	- Analytical Method Validation - Automated Equipment and Control Systems Configuration - Process Analytical Technology Implementation - Big Data Analytics	- Advanced Technology Integration - Big Data Analytics - Business Environment Analytics - Website Design
- Sustainable Business Practices - Environment, Health and Safety - Green IT Practices - Eco-Design Principles	- Sustainable Business Practices - Eco-Design Principles - Green Business Innovation - Waste Management - Sustainability Management	- Health, Safety and Environment Procedures Implementation - Green Manufacturing Design and Implementation - Sustainable Manufacturing - Waste Management	- Green Manufacturing Design and Implementation - Sustainability Manufacturing - Environmental Compliance - Sustainability Laboratory Practice	- Sustainable Business Practices - Consumer Sustainability Education - Sustainable Facilities Management - Eco-Design Principles

sustainability, professionals must incorporate green practices into their roles, such as implementing renewable energy systems in Energy and Power and eco-friendly logistics in the Wholesale and Retail Trade, to fulfil their responsibility towards sustainability.

Strikingly, to remain relevant in the Pharmaceutical Manufacturing, Food Manufacturing, and Electrical and Electronics sectors, professionals must increasingly master advanced technologies and adhere to sustainability criteria such as sustainable packaging and energy-efficient processes.

Chapter 5: Recommended Initiatives

Government	75
Industry Players	76
Academia	78
Training Providers	79
Enablers	80

Across 10 sectors, the industry players have recommended 326 initiatives in total: 114 for the Government, 80 for the Industry Players, 59 for Academia, and 73 for Training Providers. There are 10 distinct recommended initiatives identified, which span across the majority of the 10 sectors. Furthermore, the study emphasised three (3) Whole-of-Nation Enablers that are critical to accelerating the transformation of Malaysia’s workforce.

GIAT10



Government

01 Financial Incentives for R&D Efforts

- Low-interest loans
- Infrastructure subsidy

02 Financial Support to Upskill and Reskill Employees

- Co-funding model
- Tax rebate for AI, Digital, and Green Economy training cost

03 Consolidate Existing Infrastructure to Serve as Training Centres

- TVET
- Centres of Excellence



Industry Players

04 In-House Training and Development Programmes

- AI-driven learning platform
- Digital/Sustainability Academy

05 Talent Retention Strategies

- Career pathway – within organisation or adjacent sector
- Talent mobility for future roles

06 Strengthen Industry-Driven Collaboration

- Public-Private Partnership
- Sector-driven councils (MyMAHIR Future Skills Talent Council (FSTC))



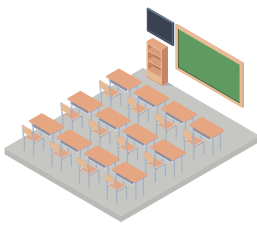
Academia

07 Refresh Education Curriculum (Starting from Pre-School)

- Syllabus to incorporate AI, Digital, and sustainability
- Curricula to be validated by industry representatives to reflect real-world needs

08 Extend Internship Programmes

- Possibly to extend between 6-12 months for interns to gain real practical experiences
- Project-based learnings



Training Providers

09 Develop Micro-Credentials Training Programmes

- Sector certifications with foundational and advanced courses

10 Onboard Certified Trainers

- Sector experts with specialised knowledge as trainers

3 Enablers

01. Establish an **Impact Study Implementation and Monitoring Unit (IMU)** to oversee execution of the initiatives **(potentially led by TalentCorp with MyMAHIR FSTC)**
02. Develop a **policy to mandate industry players to upskill/ reskill their workforces** impacted by AI, Digital, and Green Economy
03. Create a **Talent Data Repository (TDR)** to collate, assess, update and project the demand and supply of skilled workforce by each sector

Government

The government’s provision of funding and providing incentives to support the adoption of new technologies, upskill and reskill the workforce, and leverage existing infrastructure as training centres promises a more competitive and technologically advanced Malaysia.

Financial constraints are the primary challenge for companies adopting new technologies, limiting their ability to remain competitive. Additionally, the rapid pace of technological advancement requires a workforce equipped with specialised skills and a deep understanding of modern technical systems. Compounding this issue, Malaysia faces a talent drain, as many highly skilled professionals seek opportunities abroad, creating a gap in the local expertise critical for national development.

To address these challenges, three (3) financial-related initiatives are being proposed for the government’s consideration. Industry players believe that government intervention is essential to strategically support businesses navigating economic advancement challenges.

01 Financial Incentives for R&D Efforts

Provide financial incentives, including tax deductions and loans, for companies to invest in R&D efforts to adopt AI, Digital, and Green Economy technologies.

Offer **low-interest loans** or loan guarantees to support capital investments, such as the purchase of new equipment for facility upgrades

In addition to supporting R&D efforts, funds should also be allocated to companies to **secure intellectual property ownership** derived from their R&D results

Introduce a range of financial incentives such as **tax breaks, tax credits, and deductions for R&D expenditures**, investments in sustainable technology, or the adoption of Industry 4.0 technologies

Provide **subsidies to upgrade IT infrastructure**, ensuring it can effectively support future technological advancements and green practices

02 Financial Support to Upskill and Reskill Employees

Provide financial support and grants for companies to upskill and reskill their employees in AI, Digital, and Green Economy skills, as well as other sector-specific skills.

Establish a **co-funding model** to encourage greater public-private investment in upskilling and reskilling programmes, lowering the barriers for companies to invest in workforce development

Subsidise the cost of training and provide **financial aid options for individuals** who demonstrate potential or need

Offer **tax relief** to companies that invest in their employees’ training and development programmes on AI, Digital, and Green Economy

03

Consolidate Existing Infrastructure to Serve as Training Centres

Leverage the existing pool of training centres to address immediate skill shortages in AI, Digital, and Green Economy.

Leverage **universities’ experimental labs** for Green Economy initiatives

Develop a **centralised platform to connect trainers and employers** with workers needing upskilling and training programmes

Review the **TVET programme** as a place for impacted roles for upskilling

Industry Players

In today’s competitive landscape, industry leaders are tasked with spearheading talent development strategies and strengthening partnerships with key stakeholders. One significant hurdle they face is the shortage of necessary skills within the workforce. This leads to disparities in employees’ expertise that can hamper performance and overall productivity. Without adequate opportunities for employee development and career advancement, companies risk high staff turnover.

Furthermore, a noticeable gap exists between the skills the workforce possesses and those imparted by educational and training institutions. This discrepancy poses a significant challenge in effectively bridging skill gaps. Nevertheless, industry players are cognisant of their pivotal role in shaping the talent landscape and driving progress.

04

In-House Training and Development Programmes

Drive in-house training and development programmes to upskill and reskill employees in AI, Digital, Green Economy, and basic skills, ensuring holistic workforce growth.

Provide **on-the-job training** and mentoring programmes to help employees learn new technologies and processes directly in their work environment

Launch **AI / Digital / Sustainability academy** to provide specialised training for professionals in the industry

Provide **regular training sessions** for employees / **educate consumers on environmental issues** and how they can contribute to sustainability efforts

Provide **e-learning platforms and AI-driven learning through online courses and resources** (i.e., Using virtual reality (VR) and augmented reality (AR) technologies for immersive training experiences)

05

Talent Retention Strategies

Drive talent retention strategies, including creating individualised career development plans and talent mobility to broaden skill sets and equip them for future roles.

Implement a robust **personal development plan** that provides a pathway for career advancement and skill acquisition to equip employees for future roles

Work with employees to **regularly review and update individualised career development plans** that align with their aspirations and the company’s goals

Encourage **internal mobility** to expose employees to different aspects of the business, broadening their skill sets

06

Strengthen Industry-Driven Collaboration

Build stronger synergy with government, academia, and training providers to ensure effective solutions are implemented efficiently and timely.

Sector-specific conferences and/or workshops are regularly organised as healthy benchmarking platforms for sharing **best practices and guidelines**

Sector-driven councils (for example, TalentCorp MyMAHIR FSTC) to regularly discuss curriculum development and alignment with academic institutions on future skill requirements

Engage in **public-private partnerships** with technology providers, startups, and associations to conduct pilot projects with cutting-edge solutions that benefit the industry

Leverage **MyMAHIR as a one-stop platform** for different personas (including students, professionals, and organisations) to support career transition and explore in-demand roles and the required skills for effective workforce planning

Academia

The current education curriculum needs to be redesigned to better equip students with the skills and knowledge required for the real world, particularly by enhancing internship programmes. It is important to acknowledge the existing gap between the skills possessed by graduates and the demands of employers, leading to a significant disparity in the workforce.

The emergence of new job roles necessitates competencies that are not currently prioritised in education. Furthermore, the changing nature of industries means students need greater exposure to real workplace practices and culture, making the shift from academic to professional environments quite challenging. It is increasingly evident that educational programmes must adapt alongside industry advancements to ensure that graduates are adequately prepared for the workforce.

07 Refresh Education Curriculum (Starting from Pre-School)

Realign education curriculum according to sector demands and adapt to address evolving workforce needs.

Involve industry experts in the curriculum development process to ensure that the **content is practical, up-to-date, and relevant**, particularly courses related to automation, digital, and sustainability

Introduce **students to AI and digital-related subjects from a young age** and maintain a dynamic curriculum that can quickly adapt to technological advancements

Establishing advisory boards/ channels for **regular feedback on curriculum** relevance and teaching effectiveness can help educators fine-tune their approaches to meet industry standards

08 Extend Internship Programmes

Increase the frequency of internships to keep up with sector trends and provide students with valuable hands-on experience and practical problem-solving opportunities.

Internships with **longer tenure (6-12 months)** with industry players provide students with opportunities to gain invaluable industry experience, build professional networks, and understand day-to-day operations

Develop internship and apprenticeship programmes **that integrate industry-driven projects** into the syllabus to give students practical problem-solving opportunities

Make **practical attachments** a compulsory component of training programmes; involve on-the-job training, internships, or real-world projects for participants to apply their knowledge, reinforce continuous learning, and improve skill retention

Training Providers

In professional training, there is a pressing need to improve the quality of content delivered by training providers. This can be achieved by bringing more certified and reputable trainers on board to ensure that the training material meets the specific requirements of different sectors. The professional training landscape is riddled with challenges. Outdated and generic content often fails to meet the unique needs of various sectors. Additionally, there is a need for more credible training providers and regular assessments to ensure that training remains relevant.

Training programmes must be more effective, impart enduring skills, and align with the industry’s operational needs. Moreover, the emphasis on soft skills neglects the need for sector-specific expertise, which results in a gap in developing specialised skills for industry professionals. Industry stakeholders emphasise the pivotal role of training providers in addressing the talent landscape needs and bridging skill gaps.

09 Develop Micro-Credentials Training Programmes

Develop micro-credentials training programmes to focus on AI, Digital, and Green Economy topics that align with sector needs.

Develop training programmes that are strategically aligned with **recognised industry certifications**, ensuring trainees gain credentials to enhance their career progression opportunities

Create **short, focused modules** that can be stacked towards a more prominent credential and provide micro-credentials that recognise specific skills and competencies

Provide a range of upskilling training programmes that cater to various roles within the sector by **offering accredited certification courses** specifically designed for the sector, focusing on foundational and advanced concepts

10 Onboard Certified Trainers

Onboard certified trainers that tailor the delivery of training programmes to various learning styles and ensure content remains relevant to real-world applications.

Offer **various delivery methods**, including online, in-person, and hybrid models, to accommodate different learning preferences and schedules by utilising microlearning and modular approaches

Assess training providers’ **credibility and certification status** to ensure they meet the specific needs and sector standards

Invest in comprehensive **train-the-trainer programmes** to ensure trainers are well-equipped to teach new technologies and methodologies

Implement a **quality assurance programme** that regularly evaluates the effectiveness of training delivery and content



Enablers

The impact study also proposed three (3) Whole-of-Nation Enablers vital to speeding up the transformation of the Malaysian workforce. Implementing these enablers is crucial to turning this study into tangible actions and measurable outcomes. It also adopts an approach that involves both public and private sectors working collaboratively to transform the Malaysian workforce.

The Whole-of-Nation implementation approach has the following success factors:

- **Accountability and responsibilities:** Public-private stakeholders should be directly involved in implementing and governing the proposed initiatives. It is essential to define the respective accountability to ensure collective efforts are put in for the success of the implementation.
- **Transparency:** Periodic reporting of the progress will provide transparency in the implementation of initiatives and recommended actions.
- **Linkages with multiple stakeholders:** Consistent and effective communication for information sharing is vital to ensure stakeholders are always informed, made aware, and aligned. Engagement with relevant stakeholders is crucial to nurturing collaboration across sectors and helping leverage diverse expertise, perspectives, and resources.
- **Execution with discipline:** To meet the milestones set, it is imperative to implement the recommended actions for this impact study with strict discipline. This is to ensure the timeliness of the implementation to meet the overall objectives.

01 Implementation and Monitoring Unit (IMU)

Establish an Impact Study Implementation and Monitoring Unit (IMU) to oversee the execution of the initiatives. (Potentially, led by TalentCorp with MyMAHIR FSTC)

- Define the **scope and objectives** of the Impact Study Implementation and Monitoring Unit (IMU)
- Assemble a **skilled team** within the IMU with expertise in talent strategy and skill development
- Develop and implement a **comprehensive monitoring framework**
- Establish **robust data collection** and **analysis protocols** to measure implementation outcomes consistently

02 Policy to mandate upskill / reskill workforces

Develop a policy to mandate industry players to upskill/ reskill their workforces impacted by AI, Digital, and Green Economy.

- Engage with relevant stakeholders, policymakers, and experts** to gain support for a mandatory upskilling policy
- Draft a policy** that requires industry players to invest in workforce development, outlining clear standards and expectations for upskilling and reskilling programmes
- Set up a regulatory framework to ensure compliance** with the upskilling mandate and monitor industry players' effectiveness and adherence to the policy

03 Talent Data Repository (TDR)

Create a TDR to collate, assess, update, and project the demand and supply of skilled workforce by each sector.

- Define the **objectives and scope** of the TDR, ensuring it captures essential data on workforce skills across various sectors
- Build **secure data infrastructure** capable of efficiently managing the collation, storage, and analysis of talent data
- Establish **partnerships with industry, academia, and government** to facilitate comprehensive and ongoing data collection for the TDR

Global Case Study



The “Skill Up Ireland” initiative: Microsoft is on a mission to #SkillUpIreland by providing every person in Ireland with the opportunity to skill up for an AI future

Skilling Up Ireland for an AI future

In October 2023, the Ireland Ministry of State for Trade Promotion, Digital, and Company Regulation, in collaboration with Microsoft, launched a national AI skilling programme to provide people of all ages, experiences, and backgrounds with the opportunity to upskill for an AI future.

Initiatives:

- Microsoft Ireland’s education team has created a tailored 6-week ‘**Introduction to AI**’ course for individuals with minimal or no AI knowledge. Designed for anyone over 18, the course aims to provide foundational AI knowledge and skills through live virtual sessions.⁴⁵ Upon completion, participants will receive a digital badge and have the opportunity to take an exam to earn a Professional Certificate, all at no cost.
- The ‘**Skills for Jobs**’ initiative offers courses to help graduates and workers upgrade their Digital and AI skills, providing access to eight (8) Professional Certificates for in-demand tech jobs. It includes an AI pathway for a Professional Certificate in Gen-AI, delivered in partnership with Fastrack into Information Technology.

Testimonials from small business owners from Ireland on its proven benefits for SMEs:⁴⁶

- **Andrew Murray, General Manager of the Doonmore Hotel in Inishbofin**, sees AI as a tool to save him time on everything from scheduling staff to inventory and invoicing. After learning AI fundamentals and tools like Microsoft Copilot in a course, Murray shared his enthusiasm for AI’s time-saving capabilities, stating, “*What I am interested in the most is the power of AI to save time for people like me because time is the most precious thing we have.*” He plans to apply AI to streamline administrative tasks, noting that AI can accomplish in minutes what would take him a week.
- **Catherine O’Connor works on one of her heddle looms**. She is a weaver who draws on the colours and textures of Inishbofin in her work. She markets her artwork using Copilot. She said that in the AI training, she learned how to put in a detailed description of a particular work and the idea behind it to create a prompt for Copilot. Copilot then produced a few sentences that made a good starting point for a post or website description. “*Before I would be sitting there a long time, or I would ask my sister to come up with some words -she was always telling me I needed to fluff it up a bit because I’m trying to sell something,*” O’Connor said. “*It is only when I did the course that I saw how easy it was to do it.*”

The ‘Skill Up Ireland’; initiative presents a replicable model for Malaysia, offering the potential to significantly enhance the digital competencies of the local workforce and drive innovation, especially for SMEs.

Collaboration between the Government/TalentCorp and industry players (through a public-private partnership) aims to launch the ‘Skill Up Malaysia’ programme, which seeks to equip individuals across Malaysia with essential AI and Digital skills, thereby enhancing the nation’s workforce competencies in the rapidly evolving technological landscape:

This initiative could serve as a potential enhancement for the 42MY initiative:⁴⁷

Khazanah Nasional, Malaysia’s sovereign wealth fund, entered into a joint venture with Sunway Education Group (SEG) to establish 42 Malaysia (42MY), a peer-to-peer computer science school that aims to develop 10,000 skilled tech talent within the next 10 years. 42MY will further bolster the domestic startup and tech ecosystem by nurturing and developing Malaysian talents, complementing the nation’s digital economy development agenda, and strengthening its Industry 4.0 capability. The programme’s education model focuses on practical project-based learning approaches that resemble a real-work environment where learners can learn coding while working on real-life industry projects with corporate partners.

45. Microsoft, *Skills for AI*, <<https://pulse.microsoft.com/en-ie/skills-for-ai/>>

46. Chris Welsch, *New tools for innkeepers, weavers and florists: How AI is reaching the farthest edges of Ireland*, Microsoft, 17 June 2024, <<https://news.microsoft.com/source/emea/features/leaving-no-one-behind-ireland-ai-tools-innkeepers-weavers-florists/?OCID=lock2/>>

47. Sunway University, *Khazanah Partners Sunway Education Group To Launch 42 Malaysia*, 27 March 2023, <<https://sunwayuniversity.edu.my/news/2023/khazanah-partners-sunway-education-group-launch-42-malaysia>>

Conclusion

The advancements in AI, Digital, and Green Economy are making waves and will demand significant workforce changes over the next three (3) to five (5) years. This impact study has revealed the implications for the workforce across 10 sectors due to the continued and rapid progress in these areas. A total of **949 roles were validated**, comprising **889 existing roles crucial for maintaining industry standards** and operational efficiency, and **60 emerging roles** highlighted due to their increasing relevance with the rise of these trends.

These 949 roles have been categorised into highly impacted, medium impacted, low impacted, and emerging roles. **Highly impacted** roles are those at risk of convergence or displacement, requiring workers to pivot to adjacent roles and reskill. **Medium impacted** roles remain relevant but need to evolve and upskill to meet new expectations. **Low impacted** roles are not severely affected but require ongoing self-improvement to stay relevant. **Emerging roles** are set to drive future advancements and innovations across the 10 sectors, playing a vital role in navigating the changes brought about by AI, Digital, and Green Economy. The study provided valuable insights into the demand for these roles, guiding both employees and employers in planning their career and talent development strategies. Additionally, it highlights the need for holistic, cross-cutting, and targeted interventions to ensure that workers are adequately prepared to meet the industry’s evolving talent needs.

The stakeholders have recommended 10 common initiatives across 10 sectors to implement in the talent

ecosystem. Government, Industry Players, Academia, and Training Providers each have important roles to play in ensuring the necessary reforms, transitions, and interventions are in place to prepare the workforce for a future-ready sector and contribute to Malaysia’s long-term socioeconomic goals.

Furthermore, **the impact study also proposed three (3) Whole-of-Nation Enablers, which will be vital to expediting the transformation of the Malaysian workforce**. The success factors for the whole-of-nation implementation approach include; ensuring clear accountability and responsibilities for public-private stakeholders; maintaining transparency through periodic progress reporting; establishing effective linkages with multiple stakeholders through consistent and open communication; and executing with discipline to meet the defined milestones. These factors are essential for the success of the implementation and governance of proposed initiatives.

Embarking on this journey of continuous adaptation and innovation will be vital in preparing the workforce for ongoing advancements in AI, Digital, and Green Economy. To achieve this, the MyMAHIR Future Skills Talent Council (FSTC) will conduct regular needs assessments to identify immediate and future workforce skills gaps, analyse talent demands by sector and educational level, propose strategies, determine essential sector-specific skills, and periodically update these skills in response to technological advancements and evolving operating environments.

A total of **949** roles were validated, **889** existing roles crucial for maintaining industry standards and **60** emerging roles were highlighted due to their increasing relevance with the rise of these trends

These 949 roles have been categorised into **Highly Impacted**, **Medium Impacted**, **Low Impacted** and **Emerging Roles**

3 **Whole-of-Nation Enablers** which will be vital to expediting the transformation of the Malaysian workforce

MyMAHIR Future Skills Talent Council (FSTC) has been set up to prepare for these changes

Abbreviations

AI	Artificial Intelligence	IoT	Internet of Things
ASRS	Automated Storage and Retrieval System	IR4.0	The Fourth Industrial Revolution
AWS	Automated Warehouse System	LLM	Large Language Models
BESS	Battery Energy Storage System	MIDA	Malaysian Investment Development Authority
CAAM	Civil Aviation Authority of Malaysia	ML	Machine Learning
CHRO	Chief Human Resources Officer	MNC	Multinational Companies
CIR2030	Chemical Industry Roadmap 2030	MyDIGITAL	Malaysia Digital Economy Blueprint
CO2	Carbon Dioxide	MyNSR	Malaysia National Skills Registry
COO	Chief Operating Officer	NDC	Nationally Determined Contributions
COP28	The 2023 United Nations Climate Change Conference	NETR	National Energy Transition Roadmap
CRM	Customer Relationship Management	NGTP	National Green Technology Policy
CSR	Customer Service Representative	PACT	Partnerships for Capability Transformation - Singapore
E&E	Electrical and Electronics	PCG	PETRONAS Chemicals Group
E&P	Energy and Power	PLC	Public Listed Companies
ESG	Environment, Social, And Governance	RMKe-12	12th Malaysia Plan (2021–2025)
FMS	Food Manufacturing and Services	ROI	Return on Investment
FSTC	MyMAHIR Future Skills Talent Council	SME	Small and Medium-sized Enterprises
GBS	Global Business Services	TDR	Talent Data Repository
GDP	Gross Domestic Product	TNB	Tenaga Nasional Berhad
GEN-AI	Generative AI	UK	United Kingdom
GHG	Greenhouse Gas	UNEP	United Nations Environment Programme
GLC	Government-Linked Companies	UniMAP	Universiti Malaysia Perlis
GPU	Graphics Processing Units	US	United States
GSO	Grid System Operator	USD	US Dollar
HIR	Highly Impacted Roles	WMS	Warehouse Management System
HSE	Health, Safety, and Environment	WRT	Wholesale and Retail Trade
ICT	Information and Communications Technology		
IMU	Implementation and Monitoring Unit		

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- AstraZeneca Sdn Bhd
- Biocon Sdn Bhd
- DUOPHARMA Marketing Sdn Bhd
- GoodScience Sdn Bhd
- IQVIA
- KCK Pharmaceutical Industries Sdn Bhd
- Kotra Industrial Berhad
- Malaysian Organisation of Pharmaceutical Industries (MOPI)
- Merck Sdn Bhd
- MSD Malaysia
- National Pharmaceutical Regulatory Agency (NPRA)
- Novartis Malaysia
- Novugen Pharma Sdn Bhd
- Pharmaceutical Association of Malaysia (PhAMA)
- Pharmaniaga Sdn Bhd
- SM Pharmaceutical Sdn Bhd
- Zerorange Healthcare Sdn Bhd
- Zuellig Pharma Malaysia

Medical Devices

- Association of Malaysia Medical Industry (AMMI)
- Bactiguard (South East Asia) Sdn Bhd
- Becton Dickinson Sdn Bhd
- Dexcom
- Epsilon Medical Devices Sdn Bhd
- Euremed Sdn Bhd
- Molnlycke Health Care Sdn Bhd
- Paramit Malaysia Sdn Bhd
- Plexus Manufacturing Sdn Bhd
- Sanmina-SCI Systems (M) Sdn Bhd
- Smith & Nephew
- Symmetry Medical Malaysia
- Teleflex

Global Business Services

- Agmo Holdings Berhad
- AGOS Asia Sdn Bhd
- AICPA & CIMA
- Ambition Group Malaysia
- amlIT Global Solutions Sdn Bhd
- BP Business Service Centre Asia Sdn Bhd
- Contact Centre Association Malaysia (CCAM)
- Credit Guarantee Corporation Malaysia Berhad
- Digirity
- Digital Global Business Services Council Malaysia (GBS Malaysia) - PIKOM
- Eli Lilly Asia Pacific SSC Sdn Bhd
- Experian Malaysia
- FUJIFILM Business Innovation (M) Sdn Bhd
- IBM Malaysia Sdn Bhd
- Malaysia Digital Economy Corporation Sdn Bhd (MDEC)
- Manpower Business Solutions (M) Sdn Bhd
- Novartis Corporation (Malaysia) Sdn Bhd
- PwC AC KL
- RHB Bank
- Roche Services (APAC) Sdn Bhd
- S&P Global
- Shell Malaysia
- SLB
- STT GDC Malaysia 2 Sdn Bhd
- Telecontinent Sdn Bhd

Information and Communications Technology

- Alibaba Cloud
- Cyber Security
- Dell Technologies
- Experian Malaysia

- Firmus Security Sdn Bhd
- Heitech Padu
- IBM
- Malaysia Digital Economy Corporation (MDEC)
- Malaysia Productivity Corporation (MPC)
- Maxis
- Microsoft Malaysia
- MPC Digital Productivity Nexus (DPN)
- MyDIGITAL Corporatoion
- Nexagate
- PETRONAS Digital
- Telekom Malaysia
- The National Tech Association of Malaysia (PIKOM)
- TimeDotCom

Food Manufacturing and Services

- Arnott’s Group
- Coca-Cola Bottlers (Malaysia) Sdn Bhd
- EQ Kuala Lumpur
- Farm Fresh Berhad
- Felda Global Ventures (FGV) Holdings Berhad
- Fraser & Neave Holdings Berhad
- Halal Development Corporation
- Lam Soon Edible Oils Sdn Bhd
- Malaysian Associations of Hotels
- Malaysia F&B Executive Association (MFBEA)
- Malayan Flour Mills Berhad
- Malaysia Food Manufacturing Group (MAFMAG)
- Malaysia Retail & Chains Association
- Nestlé Malaysia
- PJ Hilton
- QL Kitchen Sdn Bhd
- QSR Brands (M) Holdings Sdn Bhd
- SD Guthrie International (formerly known as Sime Darby Oils)
- Secret Recipe Cakes and Cafe Sdn Bhd
- Serai Group
- The Datai Langkawi
- Tyson Foods Manufacturing Sdn Bhd
- Zuspresso (M) Sdn Bhd (ZUS Coffee)

Electrical and Electronics

- Bosch Rexroth
- Collaborative Research in Engineering, Science and Technology (CREST)
- Federation of Malaysian Manufacturers (FMM)
- Flextronics
- Fuji Electric
- Inari Amertron
- Infinecs
- Infineon Technologies
- Intel
- Invest Penang
- Jabil Circuits
- Micron Memory
- Motorola Solutions
- National Instruments (NI)
- NXP Semiconductors
- Malaysia Semiconductor Industry Association (MSIA)
- On Semiconductor
- Oppstar
- TF-AMD
- Small and Medium Enterprises Malaysia (SAMENTA)

Aerospace

- Aerospace Malaysia Innovation Centre (AMIC)
- Asia Aero Technics
- Batik Air
- Boustead Heavy Industries Corporation Aeroservices (BHICAS)

- Civil Aviation Authority of Malaysia (CAAM)
- Composite Technology Research Malaysia (CTRM)
- D’viation Group
- Innopeak
- Invest Selangor Berhad (SDAICO)
- Malaysia Aerospace Industry Association (MAIA)
- Malaysia Airlines Berhad Engineering Services
- Malaysian Space Agency (MYSA)
- National Aerospace & Defence Industries (NADI)
- National Aerospace Industry Corporation Malaysia (NAICO Malaysia)
- Selangor Aviation & Technology Innovation Sdn Bhd (SELATI)
- Singularity Aerotech Asia Sdn. Bhd.
- SME Aerospace
- Spirit Aerosystems Malaysia Sdn. Bhd.

Wholesale and Retail Trade

- AEON Co. (M) Bhd.
- Coca-Cola Bottlers (Malaysia) Sdn. Bhd.
- Costa Coffee Malaysia
- DR Group Holdings
- Giordano Malaysia
- Habib Jewels
- Home Product Center (M) Sdn. Bhd.
- Lotus’s Malaysia
- Lulu Group Retail Sdn.Bhd.
- Malaysia Retail Chain Association (MRCA)
- Ms Read (M) Sdn. Bhd.
- Mydin/ Pak Runcit Sdn. Bhd.
- Poh Kong
- Parkson Co. Sdn. Bhd.
- SenHeng Electric Sdn. Bhd.
- SOGO Malaysia
- Transmarco Concepts Sdn. Bhd.
- Uniqlo Malaysia

Energy and Power

- Cenergi
- Energy Commission (EC)
- Energy Commission of Sabah (ECoS)
- Gentari
- Malakoff Corporation Berhad
- Malaysia Programme Office for Power Electricity Reform (MyPower)
- Sabah Energy
- Sarawak Economic Development Corporation
- Sarawak Energy
- SIRIM
- Tenaga Nasional Berhad
- TNB Renewables Sdn. Bhd.

Chemical

- Ancom Crop Care Sdn Bhd
- Ancom Nylex Berhad
- BASF Malaysia Sdn Bhd
- BASF PETRONAS Chemicals Sdn Bhd
- Chemical Industries Council of Malaysia (CICM)
- IOI Oleochemical Group
- Kaneka (Malaysia) Sdn Bhd
- Lynas Malaysia Sdn Bhd
- Malaysia Petrochemical Association (MPA)
- Optimistic Organic Sdn Bhd
- PETRONAS Chemical Group (PCG) Berhad
- Polyplastics Asia Pacific Sdn Bhd
- Sea Hawk Global Lines Sdn Bhd
- Sinergi Perdana Sdn Bhd
- Stolthaven Westport Sdn Bhd
- Toray Plastics Sdn Bhd
- UPC Chemicals (Malaysia) Sdn Bhd

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