KHAZANAH
RESEARCH
INSTITUTE

MBOT
LEMBAGA TEKNOLOGIS MALAYSIA
MALAYSIA BOARD OF TECHNOLOGISTS

10 YEARS 2015-2025 A DECADE OF UPLIFTING TECH TALENTS

BADGES OF PROGRESS

A STUDY ON THE TECHNOLOGY AND TECHNICAL TALENT DEVELOPMENT IN MALAYSIA.

A research collaboration between Khazanah Research Institute and the Malaysia Board of Technologists

BADGES OF PROGRESS

A STUDY ON THE TECHNOLOGY AND TECHNICAL TALENT DEVELOPMENT IN MALAYSIA

KHAZANAH RESEARCH INSTITUTE

LEMBAGA TEKNOLOGIS MALAYSIA
MALAYSIA BOARD OF TECHNOLOGISTS
2015-2025 A DECADE OF UPLIFTING TECH TALENTS

Badges of Progress: A Study on the Technology and Technical Talent Development in Malaysia. – Kuala Lumpur, Malaysia: Khazanah Research Institute

Published September 2025. Published by Khazanah Research Institute at Level 17-1, Mercu UEM, Jalan Stesen Sentral 5, Kuala Lumpur Sentral 50470 Kuala Lumpur, Malaysia.
General Line: +603 2705 6100; email: enquiries@KRInstitute.org

Information on Khazanah Research Institute publications and digital products can be found at www.KRInstitute.org

Cover design by KRI Communications Unit.
The illustrations in the report have been designed using resources from licenced images from freepik and Shutterstock.

This report was a collaborative research initiative between the Khazanah Research Institute (KRI) and the Malaysia Board of Technologists (MBOT), undertaken in conjunction with the 10th anniversary of MBOT's establishment. The project benefited greatly from the active engagement of both institutions throughout its 10-month research cycle.

This report was authored by Dr Mohd Amirul Rafiq Abu Rahim, Hafiz Hafizi Suhaimi, Muhammad Nazhan Kamaruzuki and Wan Amirah Wan Usamah, with diligent contributions and research assistance from Dr Izma Syazana, Khairin Ilaina Mohamed Amin and Muhammad Iqbal Khairuddin. The report was jointly authored with Dr Diana Abdul Wahab from the Faculty of Business and Economics, Universiti Malaya and Dr Umawathy Techanamurthy, from the Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia – both of whom also served as Subject Matter Experts for this project.

This report was authorised for publication by the KRI Executive Committee, Dr Nungsari Ahmad Radhi and Nicholas Khaw. It also received endorsement through MBOT's internal publication process. We appreciate the constructive feedback provided by MBOT's Board of Directors during the presentation of the findings on 14 July 2025.

**Except the lead author, the remaining authors are listed alphabetically.*

ACKNOWLEDGEMENTS

We are grateful for the leadership and institutional support provided by the Chairman of KRI, Dr Nungsari Ahmad Radhi and the President of MBOT, YBhg. Professor Emeritus Datuk Ts. Ir. Dr Siti Hamisah Tapsir, *FASc.* We would also like to thank Dr Md Fauzi Md Ismail, Registrar of MBOT, for his continuous support and guidance throughout the project.

We would like to express our appreciation to the MBOT research team, whose support and collaboration were instrumental in facilitating the research process. In particular, we thank Dr Suaathi Kaliannan (Deputy Registrar), Ezra Zulia Udin (Assistant Registrar) and Muhammad Syafiq Abd Halim Pahmi (Assistant Registrar). Their commitment to logistical coordination, data access, field visits and continuous engagement throughout the research journey made this collaboration seamless and productive. Their open-door spirit and responsiveness enabled the research team to carry out its work effectively and with clarity.

We express our gratitude for the comments and feedback gathered from the Ministry of Science and Technology and Innovation (MOSTI) post cabinet meeting on the 1 August 2025, chaired by YB Tuan Chang Lih Kang. We also thank Dr Suraya Ismail, Director of Research at KRI, and Dr Yunus Yasin, KRI Research Fellow, for their internal reviews and critical feedback, which sharpened the analytical and policy focus of the report. We give our appreciation to KRI Knowledge Innovation and Data Team (KID) led by Gregory Ho Wai Son for their technical and computational support. We acknowledge the constructive comments gathered from KRI researchers during the KRI internal brainstorming session held on 14 July 2025.

We gratefully acknowledge the external reviewers for their valuable inputs and expert feedback:

- Ts. Dr Mohd Shamsul Farid Samsudin, Principal Scientist (Polymer), Petronas Research Sdn. Bhd.;
- Ts. Dr Khoo Boo Kean, Associate Manufacturing Director, K-One Technology Bhd.:
- Associate Professor Ts. Dr Tan Chin Ike, Head of School, School of Computing, Asia Pacific University of Technology:
- Associate Professor Ts. Dr Muhammad Fahmi Miskon, Head, Robotics and Automation Group, Smart Manufacturing Technology Centre, Universiti Teknikal Malaysia Melaka:
- Associate Professor Dr Hazrul Izuan Shahiri, Centre for Sustainable and Inclusive Development Studies (SID), Universiti Kebangsaan Malaysia; and
- Ts. Dr Nor Aznan Mohd Nor, Director, Technology and Technical Accreditation Secretariat (TTAS), MBOT.

We would also like to thank the following institutions and individuals for accommodating our field visits held on 23-25 June 2025. The visits were part of important process of this research to validate our understanding of regional dimensions of industrial clustering:

- Universiti Malaysia Pahang Al-Sultan Abdullah (UMPSA), chaired by Professor Ts. Dr Che Ku Mohamad Faizal Che Ku Yahya;
- University College of Yayasan Pahang (UCYP), chaired by Professor Dato' Dr Muhammad Fauzi Mohd Zain;
- BASF Petronas Chemicals, chaired by Ir. Shahruny Mohd Akil;
- Eastman Chemical, chaired by Ts. Keel Gunanda@Mohd Zaki Idral;
- Pahang Skills, chaired by Mahadir Abdul Raffar; and
- Camel Power (M) Sdn. Bhd, chaired by Jerry Xue Shihua.

Our deepest appreciation also goes to the 2,041 MBOT members who responded to our online survey conducted in March–April 2025. Their participation was key to enriching our analysis and deepening our understanding throughout the research process.

We are also grateful to the 45 individuals who took part in our five focus group discussions (FGDs), held between March and April 2025. These sessions brought together a diverse mix of stakeholders, including industry professionals, TVET and non-TVET academicians, MBOT-recognised graduates and MBOT officials. Their candid reflections helped shape the tone and depth of our analysis.

We also acknowledge the contributions of external agencies for their data provision and validation support: the Department of Statistics Malaysia (DOS), the Ministry of Higher Education (MOHE) and the Ministry of Education (MOE).

In completing this project, we have benefited tremendously from the contributions of the individuals and institutions mentioned above and many others who have not been named but offered valuable insight. Their perspectives have played a critical role in enriching the analysis and refining the direction of this research.

This report has undergone multiple rounds of review and editing to ensure clarity and accuracy. However, the authors are solely responsible for any remaining errors.

CONTENTS

ABBREVIATIONS

11th MP	:	The Eleventh Malaysia Plan
12th MP	:	The Twelfth Malaysia Plan
APEL	:	Accreditation of Prior Experiential Learning
BNM	:	Bank Negara Malaysia
CPD	:	Continuing Professional Development
DOS	:	Department of Statistics Malaysia
ECER	:	East Coast Economic Region
E&E	:	Electrical and Electronics
EPU	:	Economic Planning Unit
FGD	:	Focus Group Discussion
GDP	:	Gross Domestic Product
GLC	:	Government-Linked Companies
GNI	:	Gross National Income
GT	:	Graduate Technologist
GTS	:	Graduate Tracer Study
HEI	:	Higher Education Institution
HRD Corp	:	Human Resource Development Corporation
ICT	:	Information and Communication Technology
ILKA	:	*Institusi Latihan Kemahiran Awam* (Public Skills Training Institute)
ILO	:	International Labour Organization
IPTA	:	*Institusi Pendidikan Tinggi Awam* (Public Higher Education Institutions)
IPTS	:	*Institusi Pendidikan Tinggi Swasta* (Private Higher Education Institutions)
IR 4.0	:	Industrial Revolution 4.0
JPA	:	*Jabatan Perkhidmatan Awam* (Public Service Department)
KL	:	Wilayah Persekutuan Kuala Lumpur
KRI	:	Khazanah Research Institute
Labuan	:	Wilayah Persekutuan Labuan
LFPR	:	Labour Force Participation Rate
LFS	:	Labour Force Survey
LQ	:	Location Quotient
MARA	:	*Majlis Amanah Rakyat*
MASCO	:	Malaysia Standard Classification of Occupations
MBOT	:	Malaysia Board of Technologists
MITI	:	Ministry of Investment, Trade and Industry
MNC	:	Multinational Corporations
MOE	:	Ministry of Education (*Kementerian Pendidikan, KPM*)
MOHE	:	Ministry of Higher Education (*Kementerian Pendidikan Tinggi, KPT*)
MOHR	:	Ministry of Human Resources (*Kementerian Sumber Manusia – KESUMA*)
MOSTI	:	Ministry of Science, Technology and Innovation (*Kementerian Sains, Teknologi dan Inovasi*)
MP	:	Malaysia Plan (*Rancangan Malaysia - RMK*)
MQA	:	Malaysia Qualification Agency
MQF	:	Malaysian Qualifications Framework
MSIC	:	Malaysia Standard Industrial Classification
MTVET	:	Majlis TVET Negara
MyCOL	:	Malaysia Critical Occupations List
N. Sembilan	:	Negeri Sembilan

ABBREVIATIONS

NCER	:	Northern Corridor Economic Region
NDTS	:	National Dual Training System
NEC	:	National Education Code
NEP	:	National Economic Policy
NETR	:	National Energy Transition Roadmap
NIMP	:	New Industrial Master Plan
NOSS	:	National Occupational Skills Standards
OECD	:	Organisation for Economic Co-operation and Development
PEMANDU	:	Performance Management & Delivery Unit, Prime Minister's Department
P. Pinang	:	Pulau Pinang
PLMP	:	Passive Labour Market Policies
PLS-SEM	:	Partial Least Squares Structural Equation Modelling
Putrajaya	:	Wilayah Persekutuan Putrajaya
QT	:	Qualified Technician
R&D	:	Research and Development
REP	:	Returning Expert Program
ROI	:	Return on Investment
RPL	:	Recognition of Prior Learning
SCORE	:	Sarawak Corridor of Renewable Energy
SCT	:	Sustainable and Critical Technology
SEZ	:	Special Economic Zones
SKM	:	*Sijil Kemahiran Malaysia* (Malaysia Skills Certificate)
SME	:	Small and Medium Enterprises
SOCSO	:	Social Security Organisation (*Pertubuhan Keselamatan Sosial – PERKESO*)
SPM	:	*Sijil Pelajaran Malaysia* (Malaysian Certificate of Education)
SPV	:	Shared Prosperity Vision
SSA	:	Shift-Share Analysis
STEM	:	Science, Technology, Engineering and Mathematics
STPM	:	*Sijil Tinggi Persekolahan Malaysia* (Malaysian Higher School Certificate)
STP	:	Science and Technology Park
SWS	:	Salaries and Wages Survey
T&T	:	Technology and Technical
Tc.	:	Certified Technician
Ts.	:	Professional Technologist
TTAC	:	Technology and Technical Accreditation Council
TTAS	:	Technology and Technical Accreditation Secretariat
TTWG	:	Technology and Technical Working Group
TVET	:	Technical and Vocational Education and Training
UMPSA	:	Universiti Malaysia Pahang Al-Sultan Abdullah
UniMAP	:	Universiti Malaysia Perlis
UTeM	:	Universiti Teknikal Malaysia Melaka
UTHM	:	Universiti Tun Hussein Onn Malaysia

GLOSSARY

Academic Accreditation	:	The formal recognition that an educational institution or program meets defined standards of quality and relevance for education and training. *Source:* MQA (2021)
Brain Drain	:	The emigration of skilled and talented individuals at a rate higher than desired, leading to a net loss of human capital from a country. *Source:* Giannoccolo (2009)
Certification	:	A credential awarded by a recognised authority confirming that an individual has met certain standards of proficiency or competence. *Source:* MBOT (n.d.)
Colocation	:	In urban and regional development context, it refers to the occurrence of businesses, industries and institutions that are located close to each other and form a spatial agglomeration. *Source*: Inoue, Shiode, and Shiode (2023)
Continuing Professional Development (CPD)	:	A structured system used to quantify learning and professional development activities undertaken by individuals to maintain and enhance their professional competencies. In the context of MBOT, CPD points are awarded for activities such as attending training, conferences, workshops, publishing papers, or engaging in industry-based learning. Accumulation of a minimum number of CPD points is required for the renewal of professional titles such as Ts. (Professional Technologist) and Tc. (Certified Technician). *Source:* MBOT (n.d.)
Customer Service	:	Satisfaction captures the day-to-day service experience, including responsiveness, staff competency and ease of interaction with support channels.
Employability	:	The combination of skills, experience and personal attributes that make an individual more likely to gain employment and succeed in their chosen career. *Source:* Singh and Ehlers (2020)
Field of Study	:	A standardised classification system used to categorise academic programmes and fields of study for statistical and administrative purposes. The NEC is adapted from the ISCED-F 2013 classification and is used by MOHE and DOS in graduate tracer studies, labour market surveys and education data reporting. *Source:* MOHE (2021)
Field of Study Match	:	The degree to which a person's job aligns with the subject area/ field of their highest qualification.
Focus Group Discussions (FGD)	:	A focus on a particular area of discussion, with a predetermined group of people, who participate in an interactive discussion. *Source:* Gammie, Hamilton, and Gilchrist (2017)
Freelance	:	Employment in gig-sectors through services to multiple employers. *Source:* MOHE (2022)
Graduate Employability	:	Referring to the status of graduates, which includes those who are employed, continuing their studies, participating in any forms of re- and upskilling programmes and waiting for job placement. *Source:* MOHE (2022)

GLOSSARY		
Gross National Income (GNI)	:	GNI per capita is the gross national income, converted to U.S. dollars using the World Bank Atlas method, divided by the midyear population. GNI is the sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output plus net receipts of primary income (compensation of employees and property income) from abroad. To smooth fluctuations in prices and exchange rates, a special Atlas method of conversion is used by the World Bank. This applies a conversion factor that averages the exchange rate for a given year and the two preceding years, adjusted for differences in rates of inflation between the country and the Euro area, Japan, the United Kingdom, and the United States. *Source:* World Bank (n.d.)
Higher education institutions (HEI)	:	An educational institution, whether established under any written law, including private educational institutions providing higher education leading to the award of certificates, diplomas, degrees, or their equivalent. *Source:* MOHE (2022)
Industrial Corridors	:	Industrial Corridors in Malaysia are strategic regions developed to promote economic growth by enhancing infrastructure, connectivity and industrial activities. These corridors aim to attract investments, create employment opportunities and facilitate balanced regional development. Examples include the Northern Corridor Economic Region (NCER) and the East Coast Economic Region (ECER). *Source:* MIDA (2024)
Industrial Revolution 4.0 (IR 4.0)	:	Industrial Revolution 4.0 refers to the integration of digital technologies such as artificial intelligence, the Internet of Things (IoT), big data, robotics and automation into manufacturing and industry. It aims to create smart, connected systems that enhance productivity, efficiency and innovation.
Iskandar Malaysia	:	Iskandar Malaysia is a major economic development corridor in southern Johor, launched in 2006 to drive growth in sectors such as manufacturing, logistics, education, tourism and creative industries. It is strategically positioned near Singapore and aims to become a sustainable, international metropolis. *Source:* MIDA (2024)
Jobs	:	Total labour required by establishments to produce goods and services which comprised of filled jobs and vacancies. *Source:* DOS (2023)
Jobs Creation	:	Jobs that are created in an organisation which were not previously available, including newly created schemes, jobs created for the promotion of existing employees and increase in the number of jobs from existing structure. *Source:* DOS (2023)
Klang Valley	:	Klang Valley is Malaysia's primary urban and economic region, encompassing Kuala Lumpur and its surrounding cities and towns in the state of Selangor. It is a key hub for government, commerce, finance and industry, contributing significantly to the nation's GDP. *Source:* UNESCAP, n.d.
Kulim Hi-Tech Park (KHTP)	:	Kulim Hi-Tech Park is Malaysia's first high-technology industrial park, established in 1996 in Kedah. It is designed to attract high-tech industries such as semiconductors, electronics and advanced manufacturing, contributing significantly to Malaysia's E&E sector. *Source:* MIDA (2024)

GLOSSARY

Labour Market Signalling	:	The process by which qualifications, certifications, or professional titles convey information to employers about a candidate's potential productivity. *Source:* Spence (1973)
Labour Pooling	:	High density of employers that are able to attract labour who are in search of more productive works. *Source*: KRI (2022)
Malaysia Standard Classification of Occupations (MASCO)	:	A national benchmark for the classification of occupations in the employment structure of the country. *Source:* MOHR (2020)
Malaysian Technical University Network (MTUN)	:	MTUN refers to Malaysian Technical University Network, introduced in 2006. It offers a variety of technical courses to suffice industrial needs and consists of four public universities which are Universiti Tun Hussein Onn Malaysia, Universiti Teknikal Malaysia Melaka, Universiti Malaysia Perlis and Universiti Malaysia Pahang. *Source:* MOHE (2022)
MBOT Field of Technologies	:	To-date, there are 24 fields that are recognised by MBOT. These fields was defined by MBOT's Technology Expert Panel which consists of representative for the industry, relevant government agency and academia. These technology fields are not permanent and will dynamically change based on the rapid growth of technology. The study classifies the 24 fields into four broad fields, i.e. Applied Science, IT-based, Industrial-based and Sustainable & Critical Technologies (SCT). The list include: 1. Electrical & Electronics Technology (EE) 2. Information & Communication Technology (IT) 3. Chemical Technology (CM) 4. Telecommunication & Broadcasting Technology (TB) 5. Building and Construction Technology (BC) 6. Biotechnology (BT) 7. Green Technology (GT) 8. Manufacturing & Industrial Technology (ME) 9. Agro-based Technology (AF) 10. Transportation & Logistics Technology (TL) 11. Material Science Technology (MT) 12. Marine Technology (MR) 13. Maritime Technology (MI) 14. Resource Based, Survey & Geomatics Technology (RB) 15. Food Technology (FT) 16. Oil & Gas Technology (OG) 17. Automotive Technology (AT) 18. Aerospace & Aviation Technology (AV) 19. Nano Technology (NT) 20. Nuclear & Radiological Technology (NR) 21. Art Design & Creative Multimedia Technology (AM) 22. Cyber Security Technology (CS) 23. Atmospheric Science and Environment Technology (AC) 24. Health and Medical Technology (HM) *Source:* MBOT (2025)

GLOSSARY

Malaysia Critical Occupations List (MyCOL)	:	The Malaysia Critical Occupations List (MyCOL) identifies skilled, in-demand, and strategic occupations in Malaysia that are experiencing significant labour shortages. It serves as a tool for policymakers to address skills imbalances and guide human capital development. *Source:* MOHR and TalentCorp (2023)
National Education Code (NEC)	:	A standardized classification system used in Malaysia to categorize academic programmes and fields of study for statistical and administrative purposes. The NEC is adapted from the ISCED-F 2013 classification and is used by the Ministry of Higher Education (MOHE) and Department of Statistics Malaysia (DOS) in graduate tracer studies, labour market surveys and education data reporting. Reference: Ministry of Higher Education Malaysia (MOHE), 2020. Based on ISCED-F 2013 by UNESCO. *Source:* MOHE (2021)
Personal Benefits	:	Tangible and intangible gains received for growth such as certification credibility, career mobility and access to professional opportunities.
Professional Benefits	:	Reflect MBOT's role in shaping and uplifting the wider professional ecosystem through standard-setting, influence in policymaking and support for the education-to-career pipeline.
Professional Mobility	:	The ability of individuals to move between roles or sectors within the labour market, especially upward in their career path. *Source:* Le Grand and Tåhlin (2002)
Professional Recognition	:	The process by which an individual's skills, experience, or qualifications are formally acknowledged by a professional body. In MBOT's case, this includes titles such as Ts. and Tc. *Source:* MBOT (n.d.)
Qualification-job Mismatch	:	There are two types of qualification-job mismatch used in this report namely the vertical and horizontal qualification-job mismatch: i. Vertical qualification-job mismatch is defined as the phenomenon where a graduate's qualification level does not match the occupation they work in, in which one can either be underqualified or overqualified. The mentioned statuses are assigned based on MASCO 2020 occupations and how they line up with the appropriate qualification levels (primary/secondary, diploma, degree and postgraduate); where high-skilled jobs are for high qualifications, minimum at diploma level. The phrases "skills mismatch", "qualification-job mismatch" and "vertical mismatch" refer to the same phenomena and will be used interchangeably in the report. ii. Horizontal qualification-job mismatch (or field of study mismatch) refers to the phenomenon where a graduate's field of study for their qualification level does not match the field of work they engage in; for example, a graduate who has a degree in engineering but works in retail. The phrases "job-study field mismatch" and "horizontal mismatch" refer to the same phenomena and will be used interchangeably in the report. *Source:* KRI (2024)
Recognition of Prior Learning (RPL)	:	A process used to evaluate skills and knowledge gained outside formal education and award equivalent qualifications *Source:* MQA (2023)

GLOSSARY

Regional Development Authorities	:	Statutory bodes responsible for providing direction, devising policies and strategies that promote and accelerate the Malaysian regional development. *Source:* MIDA (2024)
Regional innovation system	:	The interaction of organisations and institutions that influence or restrict knowledge flow and innovation process in a region. *Source:* Pino and Ortega (2018)
Returning Expert Programme (REP)	:	A government initiative designed to attract Malaysian professionals working abroad to return home by offering incentives such as tax exemptions, housing and car import benefits and career facilitation. *Source:* TalentCorp (n.d.)
Skill Mismatch	:	A situation where a worker's skills do not align with the requirements of their job, either underqualification or overqualification. *Source:* Silva (2022)
Special Economic Zones (SEZ)	:	Special Economic Zones are designated areas within Malaysia where business and trade laws differ from the rest of the country. These zones offer incentives such as tax breaks and streamlined customs procedures to attract foreign investment and stimulate economic growth. Notable examples include Iskandar Malaysia and the Johor-Singapore Special Economic Zone. *Source:* MIDA (2025)
Study field	:	Referring to the guidelines of the National Education Code (NEC), i.e. Science, Mathematics & Computing; Engineering, Manufacturing & Construction; Health & Welfare; Agriculture & Veterinary; Social Science, Business & Law; Education; Arts & Humanities; and Services & others. *Source:* MOHE (2021)
Talent Pipeline	:	The supply chain of individuals progressing through education, training and employment systems to meet current and future workforce demands. *Source:* Levine (2010)
Technology and Technical (T&T) Graduates	:	Technology and Technical graduates is defined by four study fields in the National Education Code 2020 (NEC 2020), which include Natural Sciences, Mathematics and Statistics (NEC 05), Information and Communication Technologies (NEC 06), Engineering, Manufacturing, and Construction (NEC 07), and Agriculture, Forestry, Fisheries and Veterinary (NEC 08). *Source:* MOHE (2021)
Technology and Technical Talent	:	Refers to workers with qualifications or experience in applied science, engineering technology and other related technical fields include TVET.
Technology and Technical Working Group (TTWG)	:	The Technology and Technical Working Group (TTWG) is an initiative under the Malaysia Board of Technologists (MBOT) that brings together industry experts and technologists to align Malaysia's technology sectors with national development goals. TTWG focuses on elevating professional practices across recognized technological domains, establishing ethical guidelines and promoting best practices in areas such as engineering, IT and healthcare. They also ensure that MBOT's operations remain agile and responsive to technological advancements. *Source:* MBOT (2024)
Technologist/ Technician Pathway	:	Structured career progression pathways associated with MBOT-recognised titles such as Graduate Technologist to Professional Technologist. *Source:* MBOT (2019b)

GLOSSARY

Technical and Vocational Education and Training (TVET)	:	A type of education and training that equips individuals with practical and occupational skills.
Unemployment Rate	:	The proportion of unemployed population to the total population in labour force, measured in percentage. *Source:* DOS (2024b)
Urban Agglomeration	:	Urban agglomeration refers to an extended city or town area comprising a central urban core and its surrounding suburbs or linked urban areas, often forming a continuous and densely populated zone. It reflects the spatial concentration of people, infrastructure and economic activity. *Source:* Fang and Yu (2017)

EXECUTIVE SUMMARY

Malaysia stands at a crucial juncture in strengthening its technology and technical workforce. As the country pursues industrial transformation under national agendas such as the New Industrial Master Plan (NIMP) 2030 and the National TVET Policy 2030, the alignment between talent development and labour market needs is increasingly urgent.

This project, a collaboration initiative between Khazanah Research Institute (KRI) and the Malaysia Board of Technologists (MBOT), was undertaken to explore how professional recognition and academic accreditation can strengthen the technology and technical pipeline in Malaysia. At its core, the study seeks to assess the extent to which recognition systems enhance the credibility, employability and labour market value of Technology and Technical (T&T) talents. It aims to offer insights into how professional recognition and academic accreditation frameworks can be further leveraged to address skills gaps, support career development and align talent development strategies with the broader aspirations of industrial transformation and economic resilience.

Drawing from both secondary and primary data sources, including a large-scale survey involving over 2,041 MBOT members and a series of focus group discussions, this report presents evidence-based recommendations to support the role of professional recognition and academic accreditation in Malaysia. Our analysis reveals several important insights into the challenges and opportunities shaping the technology and technical talent pipeline, professional recognition and academic accreditation and labour market alignment:

Labour market imbalances and gaps in the TVET education landscape highlight persistent challenges in the overall talent pipeline

Malaysia's TVET system is marked by institutional diversity, aiming to serve a wide socio-economic and industrial spectrum. However, this has unintendedly led to fragmented pathways and inconsistent quality across programmes. **TVET graduates are often constrained by the limited progression routes available to them, largely shaped by their field of study and past academic qualifications.** Most institutions focus on lower-level certifications, with only a minority offering tertiary-level qualifications, which restricts graduates' ability to develop advanced skills. As a result, many TVET graduates lack upward mobility, holding basic or intermediate credentials in an economy increasingly demanding higher-order technical competencies.

Despite a growing need for talent in new sectors, most T&T graduates continue to be trained in industry focused fields like manufacturing and engineering, limiting adaptability to emerging industries. Underemployment and field mismatches are common, with many graduates in semi-skilled jobs that do not utilise their training, particularly in manufacturing and agriculture. This misalignment is further complicated by structural issues in the labour market. Meanwhile, lifelong learning opportunities are fragmented and often restricted to specific sectors with strong institutional support, while broader formal upskilling pathways remain underdeveloped. Although initiatives like MBOT and Malaysian Technical University Network (MTUN) offer structured advancement in some fields, many areas still lack accessible pathways for career progression. This underscores a critical need for more integrated, flexible and future-oriented strategies in both education and labour policy to align talent development with national economic goals.

Despite the presence of concentrated job clusters and related TVET course distribution, its potential is underutilised, as local T&T talent is inefficiently matched.

Despite efforts to align TVET course distribution with regional industrial activity, the system's potential remains underutilised due to uneven access and weak talent matching. Industrial hubs like Kulim and Pekan have benefited from targeted TVET offerings that reflect local economic strengths in manufacturing. However, many other regions, particularly in Sabah and Sarawak, lack access to specialised, future-oriented courses in high-growth sectors like IT. In these underserved areas, generalised or poorly aligned TVET programmes reduce graduate employability and fail to support regional development goals. This disconnect highlights the need for more equitable and industry-relevant TVET provision nationwide.

Moreover**, the concentration of technical and technology-based economic activities in urban centres such as Kuala Lumpur, Selangor, Johor and Pulau Pinang has not translated into effective local talent utilisation or regional innovation**. While job clusters exist, many local T&T graduates remain mismatched or underutilised, with high-value functions like R&D often retained offshore by multinational corporations. Limited collaboration among firms, educational institutions and government bodies further weakens the innovation potential of these clusters.

Professional recognition must be understood not just as a formal credential but as an ecosystem that involve individual aspirations, academic pathways and institutional performance.

Professional recognition enhances technical confidence and facilitates career mobility, with over one-third of recognised members reporting increased motivation to pursue higher-skilled roles. Upward progression is especially evident among Qualified and Certified Technicians. However, recognition uptake tends to be reactive, with many only recognising its value post-graduation, particularly early-career professionals, women and those in low-wage sectors. **Despite widespread perceptions of employer preference for certified talent, actual career advancement remains limited, as only one-fifth of higher-certified members report tangible progression**. Employer misconceptions, especially in the private sector where MBOT titles are often seen as honorary, hinder the formal integration of recognition into HR systems.

Academic accreditation plays an important but underutilised role in enhancing graduate employability and early-career mobility, especially among diploma holders and younger graduates. Survey findings showed that those from MBOT-accredited programmes report stronger confidence in job readiness and better field-of-study alignment, affirming accreditation's role as both a quality assurance and labour market signalling tool. **However, low pre-graduation awareness undermines its value as a proactive career planning mechanism**. Outcomes also vary significantly by MBOT-accredited institutions—graduates from TVET-related institutions perform lower with minimal progress (in terms of job status and income level), while those from private higher education institutions (HEI), public HEIs and MTUN progress better.

Member satisfaction with MBOT's professional recognition framework reflects moderate trust, with higher satisfaction concentrated among mid-career professionals in structured sectors like academia and Government-Linked Companies (GLC). However, early-career members, particularly Graduate Technologists and Qualified Technicians consistently reported lower satisfaction across key dimensions such as perceived value, personal benefits and service delivery. This signals a need for MBOT to better support entry-level members through tailored onboarding and engagement. More broadly, the perceived return on recognition is weakened by limited wage gains, low private-sector recognition and fragmented communication. **Many members discover MBOT informally and remain uncertain about the tangible value of certification, highlighting the need for greater visibility, outreach and integration of recognition into HR and policy systems**.

Policy reforms are crucial to further enhance the potential of Malaysia's technical and technological talent

Our recommendations are grounded in the realities of Malaysia's technology and technical workforce. They are not meant to reinvent the wheel, rather to reinforce the critical links across the talent ecosystem, from education and training to recognition and employment. At the core of this report is a belief that meaningful recognition, equitable access and structured support are key to build a resilient and future-ready workforce.

The three policy pillars and their related recommendations are summarised as follows:

Pillar 1: Establish a Responsive and Industry-Aligned Talent Pipeline

Recommendations:

1. Strategically broaden the availability of higher-level TVET programmes
2. Strengthen MBOT's role in the broader TVET and lifelong learning landscape
3. Encourage job and talent creation in T&T-related service subsectors

Pillar 2: Strengthen Regional and Industry Talent Matching

Recommendations:

1. Enhancing regional integration through stronger industry-academia coordination
2. Promote the development of industrial cluster-specific training programmes
3. Incentivise the hiring and training of local and regional talent

Pillar 3: Elevate Social Recognition of Technical Professions

Recommendations:

1. Institutionalise professional recognition framework for real returns
2. Reposition MBOT accreditation as a strategic tool for graduate employability, institutional visibility and wage equity
3. Strengthen recognition value through career integration, early support and institutional visibility

CHAPTER

01

INTRODUCTION

CHAPTER 1

INTRODUCTION

Dr Mohd Amirul Rafiq Abu Rahim

To remain resilient, it is imperative for Malaysia to shift away from creating low-skilled, traditionally labour-intensive occupations towards knowledge-intensive jobs. Global megatrends such as the rising role of Industry 4.0 technologies, climate change and environmental sustainability, demographic shifts and globalisation of value chains are changing the nature of jobs. Skills transformation to develop future competencies remains at the forefront of the industrial strategy.

NIMP 2030

1.1 Background Context

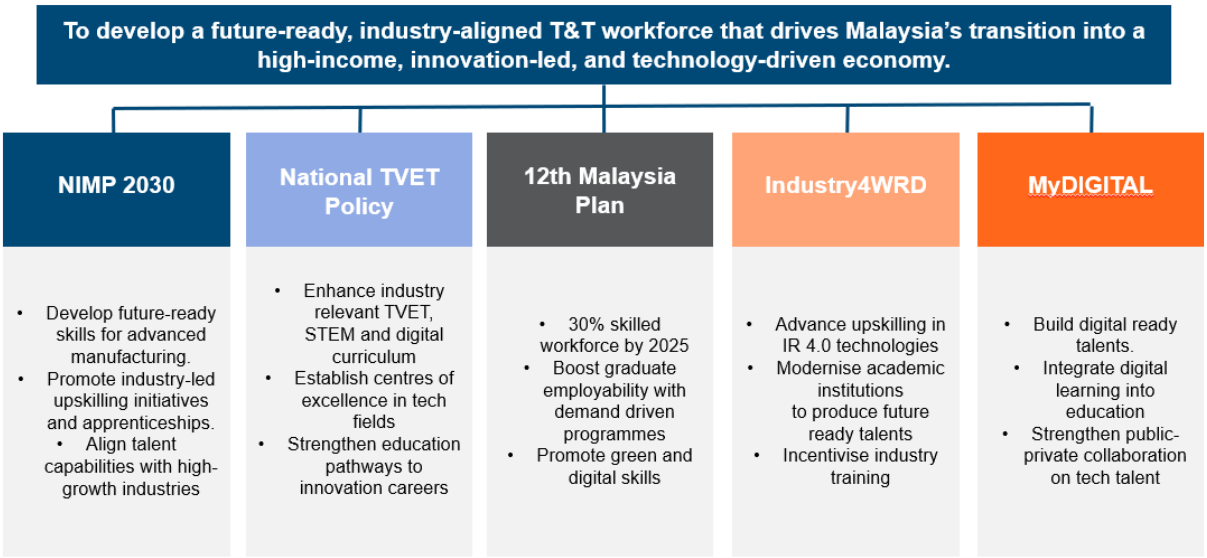
Malaysia's development journey offers a striking case of structural transformation. From a commodity-based economy in the 1960s, it has grown into an export-oriented manufacturing and services hub, powered by high-technology and capital-intensive sectors. Gross National Income (GNI) per capita grew from around RM7,000 (~USD2,000) in 1970 to RM47,000 (~USD11,000) in 2024[1], placing the country within the upper-middle-income category. This transformation was not just about output but about improving the quality of life. Life expectancy increased from 61 years in 1970[2] to 75 years today[3]. Poverty incidence dropped from nearly half the population in 1970 to just 6.2% in 2022[4]. These outcomes reflect not only economic growth but also broad social progress.

Malaysia's economic gains have been driven not only by industrial diversification, but also by deliberate investments in human capital. From universalising basic education to expanding access to tertiary education, talent development has long been a core pillar of the country's development agenda. As Malaysia transitions toward a high-income and innovation-led economy, the demand for a workforce equipped with both foundational and specialised skills has become more pronounced[5].

National policies over the past decade have drawn increasing attention to the strategic role of technology and technical (T&T) talents in sustaining economic momentum. Whether in advanced manufacturing, green energy, digital infrastructure, or precision industries, these sectors require a new generation of workers who are not only trained but also professionally recognised for their competencies and aligned with industry demands. The emphasis placed on technical talent development in the New Industrial Master Plan (NIMP) 2030[6], the National TVET Policy 2030[7], and the Twelfth Malaysia Plan (12th MP)[8] and the Higher Education Blueprint 2015-2025[9] reflects a wider shift from quantity-based education targets to outcomes tied to employability, relevance and economic value.

[1] DOS (n.d.)
[2] Ibid.
[3] DOS (2024a)
[4] DOS (2023)
[5] NEAC (2020)
[6] MITI (2023)
[7] Secretariat of the National TVET Council (2024)
[8] EPU (2021)
[9] MOE (2015)

Figure 1.1: Summary of recent policy documents for T&T talent pipeline



Source: ESPACT, n.d.; MITI (2023); 12th Malaysia Plan; Various Malaysia Plan documents.

It is within this evolving context that this report, aimed at tracking the impact of professional recognition and academic accreditation for the T&T talent pipeline in Malaysia. Beyond mapping the state of the T&T talents, it interrogates how talent development systems interact with market dynamics and whether current institutional mechanisms, especially those regarding professional recognition and academic accreditation are adequate in supporting career progression, credibility and job quality for the workforce.

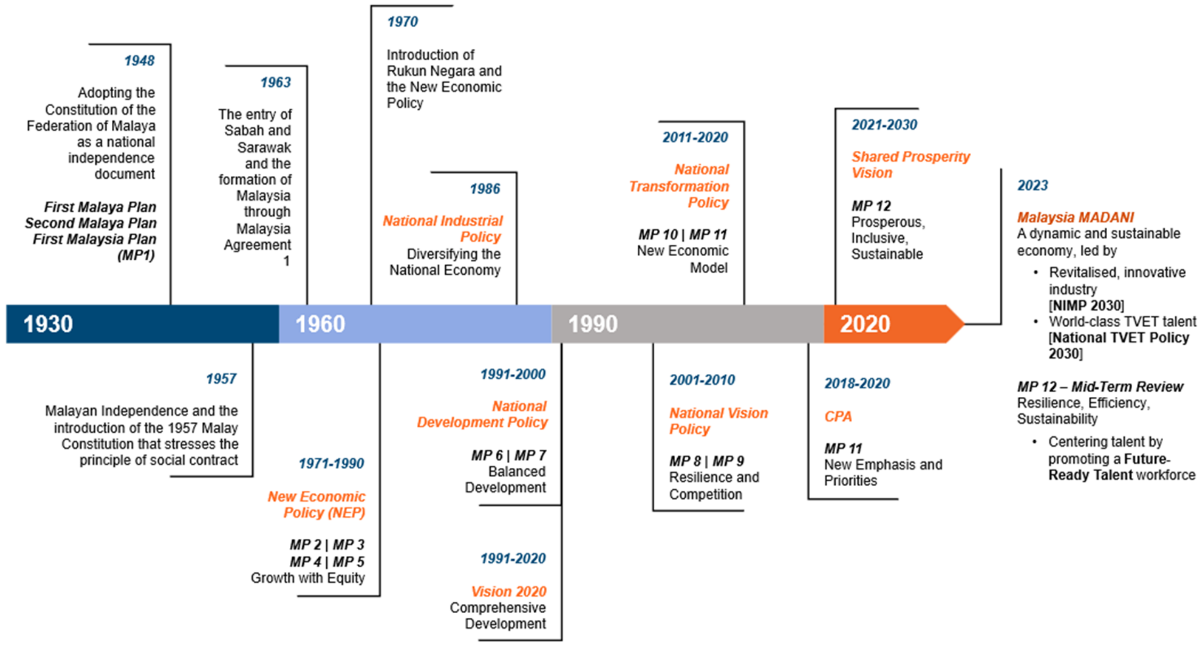
Malaysia's transformation was not accidental. It was shaped by long-term development strategies anchored in industrial policy and investment in talent

The timeline of Malaysia's economic transition from agriculture to industry and services reflects decades of deliberate investment in education, infrastructure and strategic industrial development. Today, talent development is no longer a supporting agenda because it stands at the core of the nation's industrial transformation[10].

The timeline from 1948 to 2030 (Figure 1.2) illustrates a clear policy progression, from early nation-building efforts to economic diversification, industrial upgrading and more recently, a stronger emphasis on talent-driven growth. The New Economic Policy (NEP) (1971–1990)[11] laid the groundwork for inclusive growth by broadening access to education and employment. This was followed by the various industrial policies to promote industrial development in 1986-1990 which marked a significant push toward manufacturing and export orientation[12]. The National Development Policy (1991–2000) and Vision 2020 envisioned a resilient, competitive and knowledge-based economy and emphasising human capital as a driver of productivity.

[10] MITI (2023)
[11] GOM (1970)
[12] A broad set of strategies and interventions by the government to promote industrialisation within the said period to transform the economy, and support specific sectors (e.g. manufacturing, E&E, digital tech), i.e. The Industrial Master Plan (IMP), 1986-1995, Promotion of Investments Act (PIA) (1986) and the amendments of Income Tax Act (1967). As stated in Chapter IV, Sixth Malaysia Plan, 1990-1995 (GOM, 1990), during this period, the Industrial Coordination Act (ICA) (1975) was established to provide exemption orders to manufacturing companies with shareholder's funds of less than $2.5 million or 75 workers from being licenced. These periods also marked the liberalisation of equity guidelines for foreign investment with a view to further enhancing the nation's investment initiatives.

Figure 1.2: Malaysia development history and milestone



Source: Nathan (1987); Sundaram, Teik, and Tan (1995)

From the 2000s onwards, policies became more focused on skills development, innovation and the digital economy. The New Economic Model (2010)[13] called for high-income status anchored on productivity and inclusivity. It builds through a future-ready economy, where Malaysia needs more than just workers, but also needs to be recognised, empowered and industry-aligned technology and technical workforce.

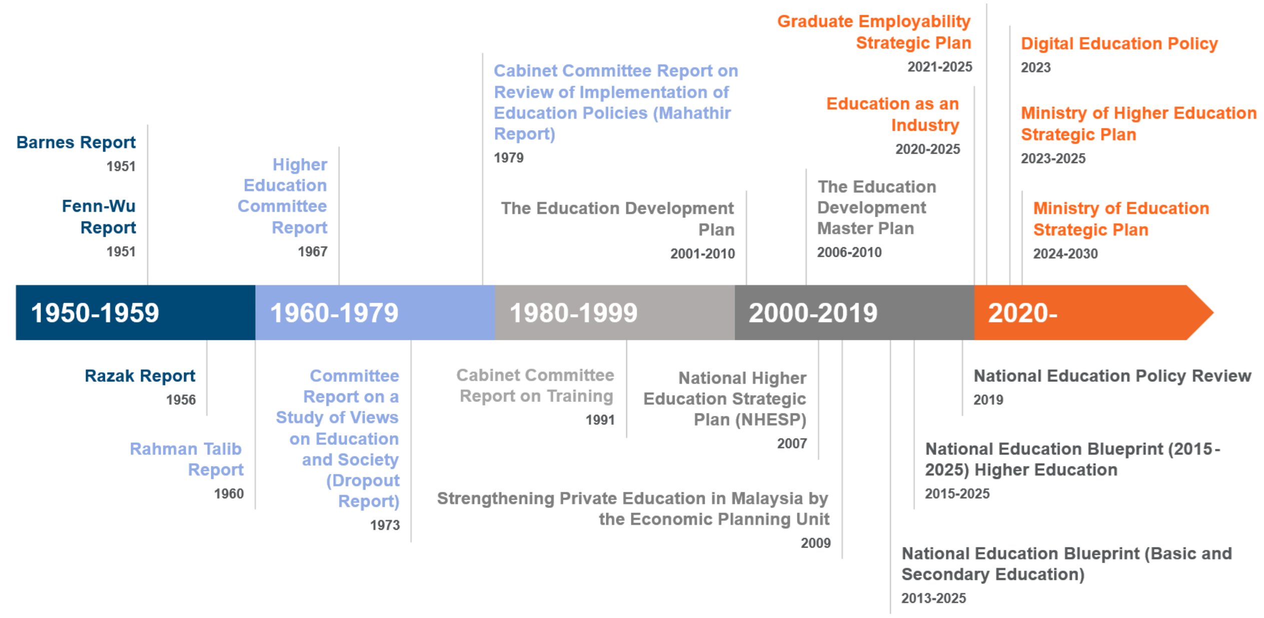
The Shared Prosperity Vision (SPV) 2030[14] and the 12th MP[15] strengthened the mandate for upskilling and improving labour market outcomes, particularly among the B40 and youth segments. The Mid-Term Review of the 12th MP[16] highlights that talent development is no longer an ancillary concern but key in Malaysia's industrial strategy. It also mentioned that under the Future-Ready Talent Big Bold, the Government has committed to reducing skills mismatch, scaling up TVET reform and improving graduate employability[17]. Initiatives such as the Academy in Industry (AiL)[18], enhanced Critical Occupations List and digital talent upskilling form the backbone of this transformation. Without a steady supply of recognised, industry-aligned technical talent, Malaysia's high-value economic aspirations risk being derailed.

"Local talent development programmes will be scaled up through collaboration between ministries, agencies and industries... especially for niche E&E skills."- Strategy A2, Elevating E&E Industry, Mid-Term Review of Twelfth Malaysia Plan.

[13] NEAC (2020)
[14] MEA (2019)
[15] EPU (2021)
[16] EPU (2023)
[17] Ibid.
[18] The Academy in Industry (AiI) programme managed by the Malaysia Productivity Corporation (MPC). Source: MPC (2024).

Alongside these industrial strategies, Malaysia developed a comprehensive education planning system[19]. The Education Development Plan (2001–2010) and the government set a high aspiration for Malaysia's education system under the Malaysia Education Blueprint 2013–2025 (Preschool to Post-Secondary Education) that sought to modernise the education system and equip graduates with 21st century skills. The Blueprint's twin goals—quality and equity—were aimed at raising student outcomes, addressing inequality and preparing young Malaysians for the future of work[20].

Figure 1.3: Policies for the development of the education system in Malaysia, 1951-2024



Source: ESPACT (n.d.); MOHE (n.d.)

At the higher education level, the Malaysia Education Blueprint (Higher Education) 2015–2025 focused on graduate employability, industry collaboration and lifelong learning[21]. Graduate Tracer Study (GTS) were institutionalised as a feedback tool to assess employment outcomes and inform policy[22].

Meanwhile, the NIMP 2030[23] explicitly identifies talent as a strategic enabler, committing to building a workforce that is "future-proofed" through reskilling, recognition and certification. Central to this vision is the strengthening of the TVET pathway as a key mechanism to elevate the quality of Malaysia's local talent pool. Despite a declining enrolment trend in recent years, the plan lays out a renewed public-private commitment to enhance the relevance and attractiveness of TVET through stronger industry collaboration, flexible learning options and targeted job placement support. Led by the National TVET Council with support from key ministries and agencies, the strategy aims to align training with critical sector demands, reduce skills mismatch and reposition TVET as a viable, high-value pathway into Malaysia's future industries.

"Expand TVET programmes for high-skilled jobs in critical sectors" – NIMP 2030 under Action Plan E.2.4.

[19] See ESPACT, n.d.
[20] MOE (2013)
[21] MOE (2015)
[22] The GTS is a year-round survey conducted by the MOHE on graduates from local public and private higher education institutions (HEIs) upon graduation. The objectives of the study are to gain graduates' employment status as well as their views on academic programmes, institutions, and the impact of the teaching and learning processes. Source: MOHE (2022) .
[23] MITI (2023)

One aspect of Malaysia's talent development strategy has been the formal recognition of technical expertise and the institutionalisation of professional pathways for non-traditional occupations. Strategy 9 of the 11th Malaysia Plan explicitly identified the need to recognise technologists as professionals and established Malaysia Board of Technologists (MBOT) as a statutory body to advance this agenda[24]:

"Transforming TVET is one of the game changers in the Eleventh Plan to meet the demand of industry and contribute... Focus will be given to transform the TVET delivery system and increase its attractiveness as a choice for another education pathway. A Malaysian Board of Technologist (MBOT) will be established to recognise the professionalism of TVET practitioners that will enable them to demand higher wages." – Strategy Paper 9, Eleventh Malaysia Plan.

The establishment of MBOT focused on standards, governing professional conduct and supporting continuous professional development. These were seen as critical steps in enhancing the career prospects and social recognition of TVET-trained professionals. The aim was clear: to elevate the status of technologists and ensure their skills are not only industry-relevant but also institutionally acknowledged within Malaysia's professional ecosystem.

Across these phases, there has been growing recognition of the importance of T&T talent in sustaining economic competitiveness. While the early stages focused on creating mass employment in basic manufacturing, later stages demanded more specialised skills such as engineers, technologists, technicians and digital workers. Investment in education widened access, but increasingly, the priority has shifted toward quality, relevance and alignment with market needs.

The inclusion of TVET transformation in recent plans such as TVET 2030, NETR (National Energy Transition Roadmap), and the 12th MP Mid-Term Review signals a policy shift: Malaysia is not just preparing people for jobs, but for future industries. This includes roles in renewable energy, precision manufacturing, AI applications and green technology, all of which require structured pathways of training, certification and recognition.

A strategic priority for technology and technical talent pipeline

NIMP 2030 underscores the need for Malaysia to transition from low-skilled, labour-intensive roles to a more knowledge-intensive and innovation-driven workforce[25]. Global shifts such as the rise of Industry 4.0 (IR 4.0) technologies, decarbonisation and demographic change are reshaping the nature of work. Skills transformation is no longer optional. It plays a key role in ensuring Malaysia remains competitive and inclusive[26]. This development aligns with a broader national shift towards demand-led training models, industry-accredited programmes and standardised qualifications across public and private TVET providers[27]. The push for industry-recognised credentials and harmonised quality assurance systems, reflects the government's recognition that skills alone are not sufficient unless they are valued and understood by the market[28].

[24] EPU (2015)
[25] MITI (2023)
[26] Sharef, Yahaya, and Alli (2024); Turner, Suki, and Jiang, n.d.; Khalid (2023); Bianchi, De Propris, and Labory (2024); Thake (2025)
[27] Secretariat of the National TVET Council (2024)
[28] EPU (2021); Secretariat of the National TVET Council (2024)

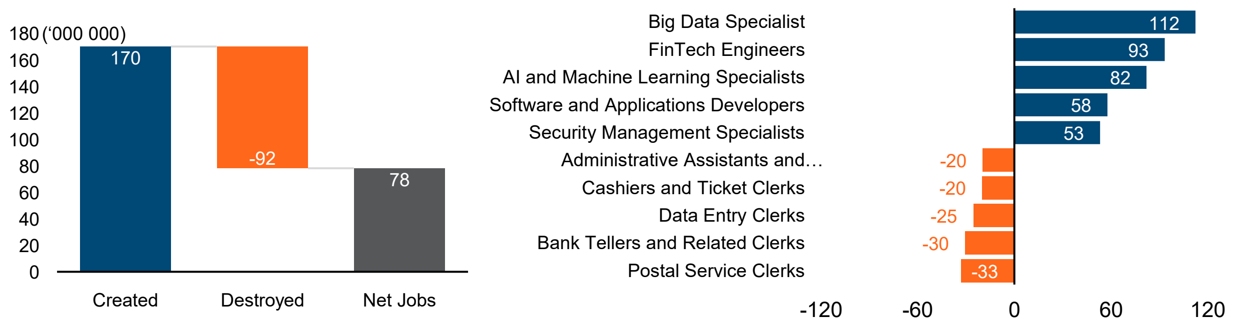
As such, the establishment of MBOT is both a policy response to recognition gaps and a strategic move to professionalise a critical segment on Malaysia's future-ready workforce. The demand for skilled workers in emerging fields is growing fast such as cybersecurity, renewable energy, industrial automation, AI and digital manufacturing are no longer fringe industries.

The future of work is being shaped by technological advancement, green transitions and demographic change. According to the Future of Jobs Report 2025[29], 86% of employers anticipate that artificial intelligence and information-processing technologies will significantly transform their industries by 2030. These shifts are expected to create 170 million new jobs globally, while displacing 92 million existing ones, resulting in a net gain of 78 million jobs (Figure 1.4). Roles such as AI specialists, renewable energy engineers and cybersecurity analysts are among the fastest growing, highlighting the rising global demand for digitally competent, technically skilled professionals. However, this transformation also brings risks of deeper skills mismatches and inequities in recognition, particularly for those in technical occupations without formalised certification or progression pathways[30].

Therefore, our response should go beyond expanding enrolment in TVET or technical programmes where the focus must be on building a resilient and recognised T&T talent. This requires strengthening systems of certification, that confer credibility and professional mobility to graduates in emerging fields.

Existing policies in Malaysia already outline frameworks to support this shift, but implementation will need to keep pace with rapidly changing global demands[31]. These global signals should be taken seriously and we need to assess how well Malaysia is preparing its technical and technological workforce—not just for today's labour market, but for the transformations ahead.

Figure 1.4: Global employment change by 2030 and Fastest-Growing and Fastest-Declining Jobs, 2025–2030



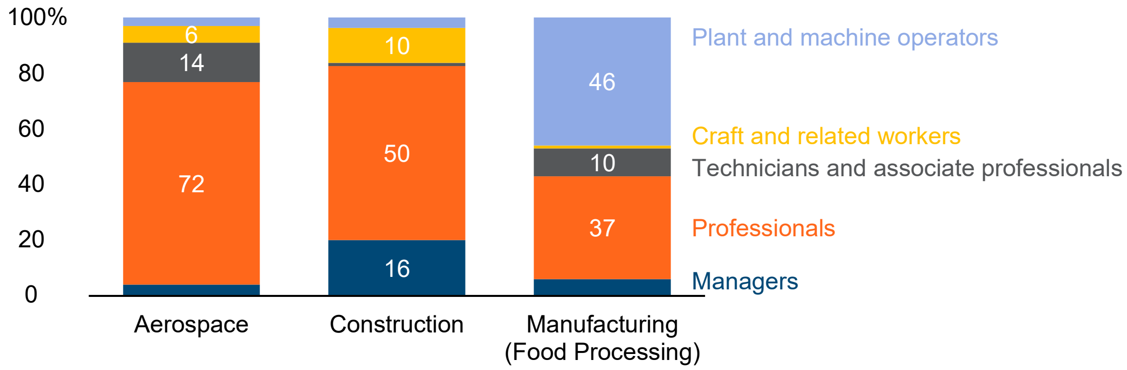
Source: Adapted from WEF (2025)

Malaysia is not insulated from these forces. The latest Malaysia Critical Occupations List (MyCOL 2022/2023)[32] confirms a structural demand for T&T talent, with nearly 40 occupations classified as critical within sectors such as aerospace, manufacturing and construction. These include roles such as mechanical engineers, industrial technicians, software developers and ICT systems administrators. The persistence of shortages in these roles suggests deeper systemic gaps in how Malaysia prepares and supports its technical workforce.

[29] WEF (2025)
[30] Ibid.
[31] Ahmad and Norzaidi (2024)
[32] MOHR and TalentCorp (2023)

Figure 1.5 highlights that critical occupations across the identified sectors are predominantly concentrated in mid-skilled roles (technicians and associate professionals, craft and related workers, and plant and machine operators). For example, in aerospace and construction, over 70% of the critical roles fall within these mid-skilled occupational groups. In manufacturing (food processing), the demand is concentrated among plant and machine operators and craft workers, while the proportion of professionals and managers remains relatively small.

Figure 1.5: Identified critical occupations by occupational group and sector, 2022/2023



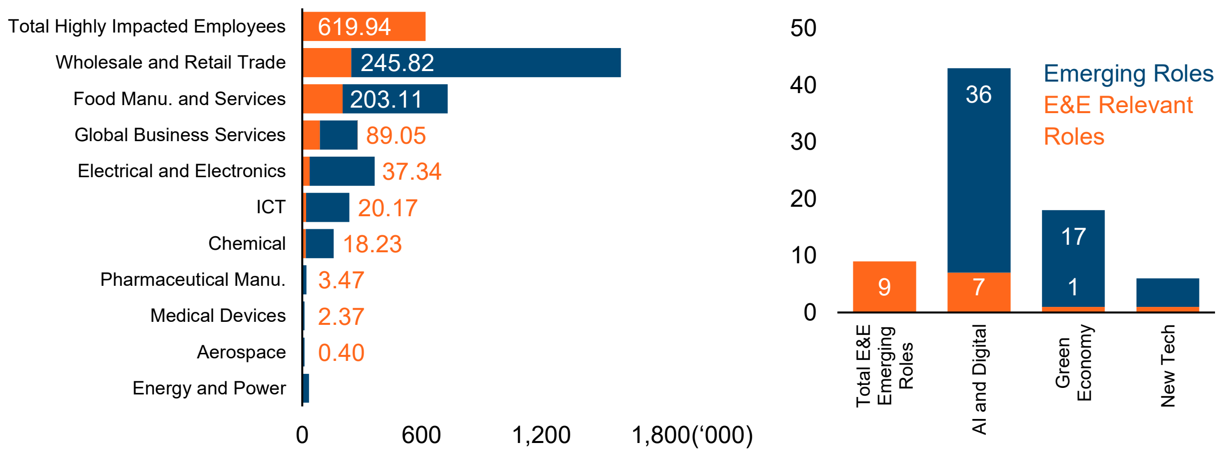
Source: MOHR and TalentCorp (2023)

Recent findings from TalentCorp's multi-sector impact study also reveal that nearly 620,000 jobs are at high risk of disruption over the next 3–5 years, while over 60 emerging roles that largely anchored in AI, data, digital infrastructure and sustainability are gaining prominence[33] (Figure 1.6). In the Electrical and Electronics (E&E) sector alone, a critical driver of the country's exports and industrial strength, nine new roles have emerged and demand upskilling in advanced design, data integration and Environmental, Social and Governance (ESG) led manufacturing. Yet, industry feedback consistently points to a gap between education output and job-ready technical skills[34].

This emphasises the need to consider the T&T talents as a national strategic asset, not just as a supply-side concern, but as a core component of Malaysia's competitiveness. If Malaysia is to lead in high-value sectors like semiconductors, clean energy tech and AI applications, then recognising and investing in the T&T talents must go beyond classroom instruction. It must involve industry-aligned curriculum design, micro-credential pathways and robust certification systems that can validate and elevate the contributions of Malaysia's technical professionals across sectors.

[33] TalentCorp (2024a)
[34] TalentCorp (2024b)

Figure 1.6: Number of highly impacted employees by sector and emerging roles in the E&E sector by category, 2024-recognised T&T talent pipeline.



Source: TalentCorp (2024a)

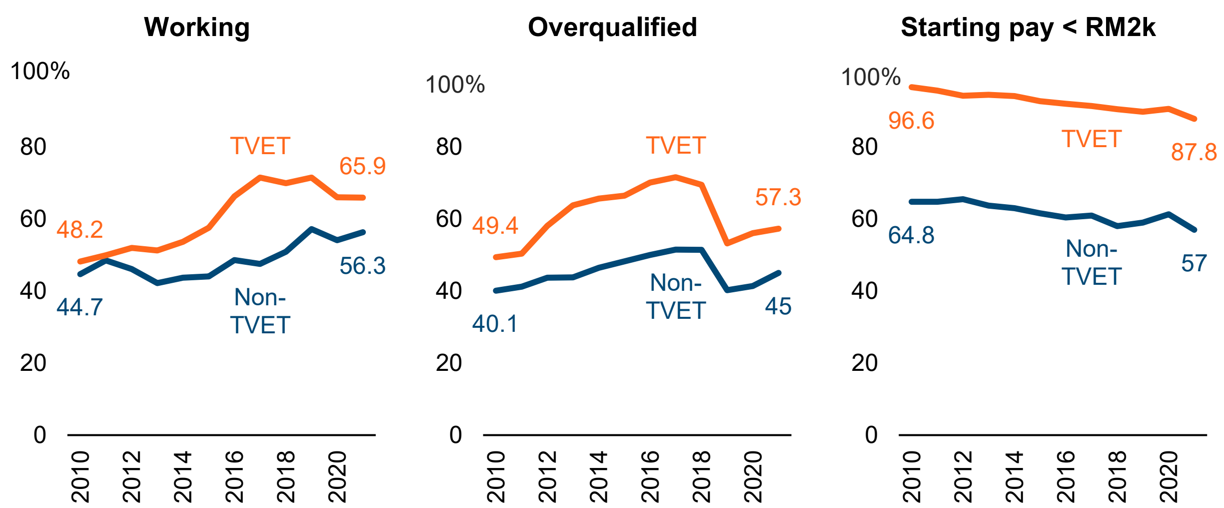
Source: TalentCorp (2024b)

The challenge: skills mismatch and recognition gaps

While Malaysia has expanded tertiary enrolment and TVET access, labour market data still points to persistent mismatches. Data from the KRI's Shifting Tides report utilising Ministry of Higher Education (MOHE) Graduate Tracer Study data show many graduates, particularly those in technical fields, struggle to find jobs that match their qualifications[35]. Underemployment among diploma and degree holders remains high, especially in T&T disciplines (Figure 1.7).

Findings from Shifting Tides underscored how weak labour market entry particularly when graduates are funnelled into unrelated, unstable, or low-paying jobs which can impose long-term costs on earnings, skill development and career mobility.

Figure 1.7: Prevalence of graduates who are working, overqualified and with starting pay less than RM2,000, by study stream, 2010–2021

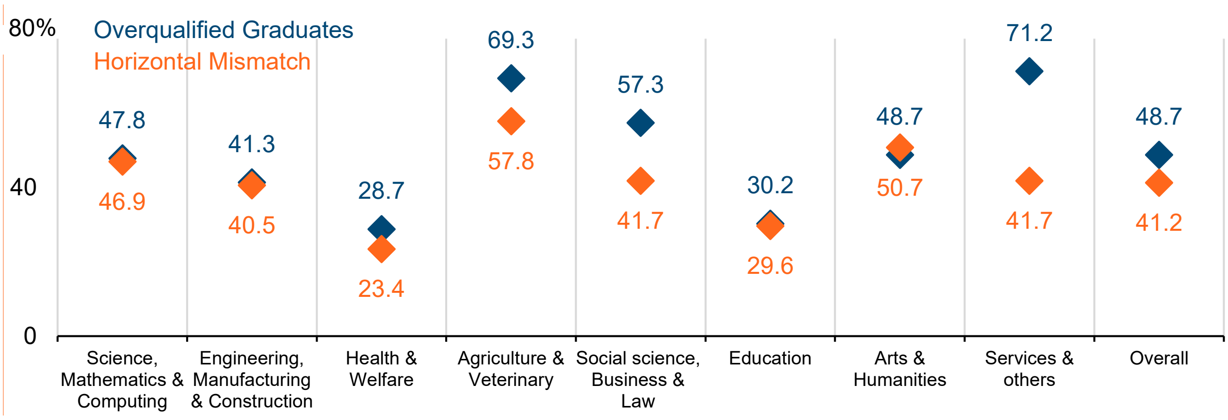


Source: KRI (2024)

[35] KRI (2024)

The same pattern is evident among T&T graduates. While they enter the market with specialised knowledge and considerable potential, they often find themselves in jobs that neither utilise their skills nor offer clear advancement pathways (Figure 1.8). Without strong demand-side conditions, such as supportive jobs, adequate starting roles and pathways for progression, the promise of technical training risks being eroded. Skills mismatch at the outset of a career is not just a short-term inefficiency; it represents a structural barrier to building a resilient and competitive workforce.

Figure 1.8: Average prevalence of mismatch by field of study, Percentage, 2010-2021



Source: KRI (2024)

This brings attention to an equally critical dimension: the role of professional recognition. In theory, certification and academic accreditation mechanisms should provide clear signalling value to employers, helping to differentiate qualified professionals and reduce information frictions in hiring[36]. But in practice, uptake and recognition remain uneven.

Despite the growing emphasis on recognition and certification as tools to improve employability among T&T talents, there remains limited empirical assessment of their actual economic value, particularly across different occupations and worker groups[37]. Existing evidence is fragmented, often confined to single-occupation case studies or lacking controls for factors that influence both income and certification attainment[38]. This gap highlights the need for a more systematic and policy-relevant evaluation in Malaysia's context.

Thus, the current study not only examines the structure of the T&T talents but also investigates how recognition and academic accreditation systems can be strengthened to support both economic outcomes and professional development.

[36] Valero-Gil et al. (2024)
[37] Weeden (2002); Gittleman, Klee, and Kleiner (2018)
[38] See for examples studies by Hussein et al. (2021); Ferns, Dawson, and Howitt (2021); Acevedo-De-los-Ríos and Rondinel-Oviedo (2022); Gaston (2023); Ngoc, Hieu, and Tien (2023)

Box 1.1: Professional Recognition and Academic Accreditation in Malaysia

MBOT: Background and Overview

The Malaysia Board of Technologists was established in 2015 under the Technologists and Technicians Act 2015 (Act 768)[39]. The establishment of MBOT was aligned with the 11th MP (2016-2020) which focuses on developing talent in Science, Technology and Innovation (STI) as part of Malaysia's transition to a high-income, knowledge-based economy[40].

Prior to MBOT's formation, technologists and technicians lacked formal recognition within Malaysia's professional ecosystem which limits career progression and industry standardisation. MBOT was introduced to bridge this gap by providing a structured accreditation and certification framework for technical professionals, ensuring alignment with national and global industry demands. MBOT operates under three primary functions: Registration, Accreditation, and Professional Development, as summarised in Table 1.1.

Table 1.1: MBOT core function

MBOT Core Function		
Registration	Accreditation	Professional Development
Formal recognition of: • Graduate Technologists (GT) • Qualified Technicians (QT) • Professional Technologists (Ts.) • Certified Technicians (Tc.)	Accrediting technology and technical programme in various level: • Bachelor's degree • Advanced Diploma, Diploma • *Sijil Kemahiran Malaysia* (SKM) • Certificate	Supports career growth through: • Accredited short courses & training programmes (recognised by Department of Skills Development, JPK) • Continuous upskilling initiatives

Source: MBOT (2025)

Beyond these core roles, MBOT emphasises:

- Stakeholders' engagement through collaborations with industry, academia and government.
- Strategic partnerships through enhancing mutual benefits through alliances.
- Internationalisation through alignment with global standards and partnerships with international bodies.

As of March 2025, MBOT have 64,313 registered individuals comprises of 12.5% QT, 36.3% Ts., 56.4% GT and 4.9% Tc. To date, it has 708 accredited academic programmes since 2017 across 24 Technology and Technical Fields.

Table 1.2: MBOT recognised technology and technical fields

Field Category	Detail fields
Applied Science	Agro-Based Technology (AF) Biotechnology (BT) Chemical Technology (CM) Food Technology (FT) Material Science Technology (MT) Nano Technology (NT)
IT-based	Art Design & Creative Multimedia Technology (AM) Cyber Security Technology (CS) Information & Communication Technology (IT)
Industrial-based	Aerospace & Aviation Technology (AV) Automotive Technology (AT) Building & Construction Technology (BC) Electrical & Electronic Technology (EE)

[39] MBOT (2019a)
[40] EPU (2015)

	Health & Medical Technology (HM) Manufacturing & Industrial Technology (ME) Maritime Technology (MI) Oil & Gas Technology (OG) Telecommunication & Broadcasting Technology (TB) Transportation & Logistic Technology (TL)
SCT	Atmospheric Science & Environment Technology (AC) Green Technology (GT) Marine Technology (MR) Nuclear & Radiological Technology (NR) Resource Based, Survey & Geomatics Technology (RB)

Source: MBOT (2025)

Professional recognition and academic accreditation framework

MBOT's framework ensures that technical professionals meet competency benchmarks, fostering employability and industry relevance. Below (Table 1.3) is MBOT's continuous pathway for technologists and technicians.

Table 1.3: Technology and technical qualification advancement

Recognition	Registration Level	Required Experience
Ts.	Applicants with a bachelor's degree or higher and must first register as a Graduate Technologist (GT).	Min. 3 years of relevant working experience
GT	Hold a bachelor's degree recognised by the board.	None (entry-level)
Tc.	Applicants with a technical certificate or diploma in a recognised field, either from an accredited institution or equivalent to SKM 3 or 4 (in some technology fields, e.g. Aviation, SKM Level 2 is acceptable). They must also have at least one year of relevant practical experience demonstrating technical competency in the applied field. Applicant must first register as a Qualified Technician (QT).	Min. 3 years of relevant working experience
QT	Hold a certified qualification recognised by the board.	None (entry-level)

Source: MBOT (2025)

As for Academic Accreditation, MBOT accredits technology and technical education and training programmes to ensure they align with industry needs and produce graduates equipped with the necessary skills and knowledge. This accreditation process, conducted through the Technology and Technical Accreditation Council (TTAC)[41], guarantees the quality and relevance of the education provided by these institutions.

In addition, MBOT supports continuous upskilling and professional development by accrediting short courses and training programmes recognised by the Department of Skills Development (DSD, also known as *Jabatan Pembangunan Kemahiran* or JPK)[42]. This focus on lifelong learning ensures that technical professionals can continuously update their skills and remain relevant in a rapidly evolving technological landscape.

[41] MBOT (n.d.)
[42] Ibid.

1.2 Objective and Scope of the Report

This report is part of the research pillar within KRI, which focuses on addressing structural challenges in skills development, workforce transitions and job quality. Within this broader objective, the current study centres on the T&T talent pipeline, an area gaining increasing policy attention as Malaysia advances toward higher-value industries and digitalisation.

The research is conducted in collaboration with the MBOT and takes an independent, evidence-based approach to examining the state of T&T professionals in Malaysia. While MBOT has played a significant role since its establishment in 2015 in advancing professional recognition and academic accreditation for T&T talents, this report is not an institutional review commissioned by MBOT. Instead, it includes MBOT as a case study within a broader labour market analysis. This allows the report to explore how institutional mechanisms, such as certification, accreditation and regulatory frameworks, shape labour market outcomes in T&T occupations and how they might be improved for greater impact.

At its core, the report aims to generate a grounded understanding of the structural and institutional factors shaping the development of T&T talent in Malaysia. The analysis combines both quantitative and qualitative evidence to map the supply and demand conditions, identify gaps and evaluate the mechanisms through which credentials translate into better labour market outcomes. It also assesses how national policy frameworks such as TVET 2030, the NIMP 2030 and MBOT's own initiatives interact with labour market realities

Through this analysis, the report seeks to address three key questions:

1. **What is the current landscape of Malaysia's T&T talent pool?**

   What do national datasets reveal about the supply and demand for T&T professionals? Where are the gaps in terms of qualifications, employment outcomes, or job quality, and what are the emerging opportunities for workforce growth?

2. **How do professional recognition and academic accreditation affect the credibility, employability and labour market outcomes of T&T talent?**

   What role do MBOT play in skills recognition, enhancing trust and raising industry acceptance? How do these recognition mechanisms influence salary progression, job matching and career mobility?

3. **What reforms or policy interventions are needed to improve the alignment between certification systems and market needs, particularly through professional recognition and academic accreditation?**

   What barriers currently limit the effectiveness of recognition systems? How can these systems be strengthened to better serve both workers and employers, especially in key industrial sectors?

1.2.1. Report Organisation

This report encompasses seven chapters, split into two parts as outlined below:

- **Chapter 1** briefly introduces Malaysia's development, particularly in technology and technical-related industries and education. This chapter also includes the research objectives and methodological framework used in this report.
- **Part One: Contextual Analysis** consists of four chapters, exploring the current TVET education landscape (Chapter 2), labour market outcomes of technology and technical talent (Chapter 3), and job concentration and agglomeration benefits of regional clustering for technology and industry-related fields (Chapters 4 and 5).
- **Part Two: Badges of Progress** (Chapter 6), the case study portion of this report, explores the role and impact of MBOT on technology and technical talent development in Malaysia.
- Lastly, **Chapter 7** bridges research to policy by summarising the key findings of the report and bringing forward a set of policy recommendations.

1.3 Research Framework and Methodology

Malaysia's aspiration to become a high-income, innovation-driven economy depends on the strength and relevance of its talent pipeline, particularly in T&T occupations. Despite continuous policy attention to TVET, STEM education and industrial talent development, persistent issues remain—graduate underemployment, skills mismatch, low employer recognition of technical credentials and fragmented accreditation systems. These challenges hinder Malaysia's transition toward knowledge-intensive sectors and risk undermining national goals for industrial upgrading, energy transition and digital economy growth.

1.3.1. Conceptual Foundations

This research is grounded in a multidisciplinary approach to understand the conditions shaping the development and recognition of T&T talents in Malaysia. From a labour market perspective, human capital theory posits that education and skill acquisition enhance worker productivity and earnings potential[43]. However, the signalling model[44] underscores that formal credentials serve as imperfect indicators of ability and are only effective if they are trusted and understood by employers[45]. In segmented labour markets, such as those often observed in technical and vocational occupations, returns to education and certification are mediated by industry practices, occupational structures and institutional[46]. This provides the foundation for examining whether the professional recognition framework for T&T talents meaningfully shapes employability, wage progression, or job mobility.

In parallel, the analysis of job clusters and spatial distribution is guided by the broader literature on agglomeration economies. These refer to the productivity and innovation advantages that emerge when firms and workers are concentrated within a specific geographic area. While classical work by Marshall (1890) identified mechanisms such as shared labour pools, supplier networks and localised knowledge exchange, recent empirical studies continue to confirm the relevance of these dynamics.

[43] Becker (2002)
[44] Spence (1973)
[45] See also Rodrigues and Guest (2024)
[46] Kang and Mok (2022)

For instance, Ahlfeldt et al. (2015) provide updated evidence on the productivity effects of spatial clustering using granular data from multiple urban contexts. Similarly, Farrokhi (2021) explores how local labour markets benefit from firm concentration, especially in knowledge-intensive industries, and how these effects vary across space and skill levels.

However, reliance on a narrow set of industries may also increase exposure to external shocks and structural shifts. Jacobs (1969), in contrast to Marshall, emphasised the role of economic diversity in promoting innovation and resilience. This perspective, known as urbanisation economies, highlights the benefits of cross-industry interaction in diverse urban settings. More recent research supports this view. Economically diverse regions tend to be more resilient during economic downturns[47]. Furthermore, cities with a blend of traditional and emerging sectors are better positioned to adapt to technological transitions and labour market disruptions[48].

Complementing this, Jacobs (1969) introduced the idea that economic diversity, rather than specialisation, fosters innovation through cross-industry interactions—what are known as urbanisation economies[49]. Research has shown that diverse, urban environments are more adaptable, resilient and conducive to the emergence of new ideas and occupations[50]. Thus, these theoretical foundations support the dual objectives of the research: to understand the structure and outcomes of T&T talent in Malaysia's labour market and to assess the spatial, institutional and recognition mechanisms that determine their economic value. The inclusion of MBOT as a case study allows for a closer look at how institutional recognition operates in practice—and where it can be strengthened to better serve both individuals and industries.

1.3.2. Methodology

This research applies a mixed methodological approach that combines quantitative and qualitative research methods, utilising both secondary and primary data sources. The methodology is designed to answer the research questions by combining national-level labour market insights with targeted investigations into MBOT's recognition and academic accreditation impact.

Mixed methods approach

The research integrates two levels of inquiry that enable both system-level diagnostics and institutional-level assessments, supporting evidence-based recommendations for strengthening T&T talent pipeline in Malaysia:

1. A macro-mapping of the T&T talents using secondary datasets and policy documents to understand labour market patterns, job concentration, skills gaps and emerging industry demands.
2. A focused case study on MBOT's recognition and academic accreditation system, with primary data from a survey and a series of focus group discussions to assess its impact on members' employability, wage outcomes and professional mobility.

---

[47] Brada, Gajewski, and Kutan (2021)
[48] Hartal, Kourtit, and Carmen Pascariu (2023)
[49] Ikeda (2024)
[50] See for example Kapucu et al. (2024); Yang et al. (2022)

Secondary sources: understanding labour market structures

Secondary data is used to establish the broader supply-demand landscape for T&T talents. This includes identifying structural mismatches, underemployment trends and spatial agglomeration patterns. Key sources involve several macro data by various organisations, include the MOHE (Graduate Tracer Study), Department of Statistics Malaysia (Labour Force Survey & Economic Census), TalentCorp (Critical Occupation List) and KRI (Shifting Tides Survey). Through descriptive and empirical inquiries, the data provides insight into three important aspects that focuses on T&T talents pipeline:

1. Labour market landscape, including flow of talents and sector-specific job trends and emerging industries;
2. Training and skills development landscape, including the assessment of curriculum relevance, lifelong learning pathways and delivery models aligned with industry demand; and
3. Regional job clustering and industrial agglomeration patterns include spatial mismatches for targeted training and labour market policy responses.

Primary sources: Assessing MBOT's institutional role

To evaluate the role of professional recognition and academic accreditation, particularly the MBOT's certification system, the study employs primary data collection. This dual-source approach ensures triangulation and a more grounded interpretation of results especially in capturing the lived experiences of T&T talents and institutional dynamics from both employee and employer perspectives. It is done through:

1. Online Survey: A structured questionnaire targeting MBOT members across its four registration categories (Graduate Technologists, Professional Technologists, Qualified Technicians, Certified Technicians). The survey covers employment status, career progression, perceptions of MBOT's credibility and satisfaction with recognition processes.
2. Focus Group Discussions (FGDs) and Stakeholder Interviews: Involving participants among key relevant stakeholders, including employers and MBOT-certified individuals. These sessions help interpret survey findings, explore gaps in recognition and capture employer expectations.

1.4 Concluding Remarks

In summary, the country's transition toward a high-value, knowledge-driven economy will depend not only on expanding its pool of T&T talent but also on how effectively that talent is recognised, supported and matched to emerging opportunities. While current policies signal strong ambition, structural gaps in certification, academic accreditation and labour market alignment and outcomes remain. This report builds on both quantitative and qualitative evidence to examine the state of the T&T talent and assess the role of professional recognition and academic accreditation in shaping future labour market outcomes.

REFERENCES

Acevedo-De-los-Ríos, Alejandra, and Daniel R Rondinel-Oviedo. 2022. "Impact, Added Value and Relevance of an Accreditation Process on Quality Assurance in Architectural Higher Education." *Quality in Higher Education* 28 (2). Taylor & Francis:186–204.

Ahlfeldt, Gabriel M, Stephen J Redding, Daniel M Sturm, and Nikolaus Wolf. 2015. "The Economics of Density: Evidence from the Berlin Wall." *Econometrica* 83 (6). Wiley Online Library:2127–89.

Ahmad, Azlin Alisa, and Nabil Harith Riffat Norzaidi. 2024. "Adapting to Technological Transformations: Jobs and Skills in Malaysia's Evolving Work Landscape." In *Islamic Finance: New Trends in Law and Regulation*, 527–38. Springer.

Becker, Gary. 2002. "Human Capital." *The Concise Encyclopedia of Economics* 2:1–12.

Bianchi, Patrizio, Lisa De Propris, and Sandrine Labory. 2024. "People-Centred Policies for a Just Transition (Digital, Green and Skills)." *Contemporary Social Science* 19 (1–3). Taylor & Francis:262–82.

Brada, Josef C, Paweł Gajewski, and Ali M Kutan. 2021. "Economic Resiliency and Recovery, Lessons from the Financial Crisis for the COVID-19 Pandemic: A Regional Perspective from Central and Eastern Europe." *International Review of Financial Analysis* 74. Elsevier:101658.

DOS. 2023. "Poverty In Malaysia 2022." Putrajaya: Department of Statistics Malaysia.

———. 2024a. "Abridged Life Tables, Malaysia, 2022-2024." Putrajaya: Department of Statistics Malaysia.

———. 2024b. "Labour Force Statistics Malaysia Report May 2024." Putrajaya: Department of Statistics Malaysia. https://storage.dosm.gov.my/labour/lfs_month_2024-05_en.pdf.

———. n.d. "Annual Real GDP & GNI: 1970 to Present." Data catalogue. OpenDOSM. Accessed April 12, 2025. https://open.dosm.gov.my.

EPU. 2015. "Eleventh Malaysia Plan (2016–2020)." Putrajaya: Economic Planning Unit. https://ekonomi.gov.my/.../pdf.

———. 2016. "Strategy Paper 09: Transforming Technical and Vocational Education and Training to Meet Industry Demand." Putrajaya: Economic Planning Unit. https://ekonomi.gov.my/.../pdf.

———. 2021. "Twelfth Malaysia Plan, 2021-2025." Putrajaya: Economic Planning Unit. https://rmke12.ekonomi.gov.my/en.

———. 2023. "Mid-Term Review: Twelfth Malaysia Plan 2010-2025." Putrajaya: Economic Planning Unit.

ESPACT. n.d. "History of The National Education System in Malaysia." ESPACT - Education Services Provider. https://www.espact.com.my/national-education-system/brief-history.

Fang, Chuanglin, and Danlin Yu. 2017. "Urban Agglomeration: An Evolving Concept of an Emerging Phenomenon." *Landscape and Urban Planning* 162 (June):126–36. https://doi.org/10.1016/j.landurbplan.2017.02.014.

Farrokhi, Farid. 2021. "Skill, Agglomeration, and Inequality in the Spatial Economy." *International Economic Review* 62 (2). Wiley Online Library:671–721.

Ferns, Sonia J, Vaille Dawson, and Christine Howitt. 2021. "Professional Accreditation: A Partnership Proposition." In *Advances in Research, Theory and Practice in Work-Integrated Learning*, 60–72. Routledge.

Gammie, Elizabeth, Susan Hamilton, and Valerie Gilchrist. 2017. "Focus Group Discussions." In *The Routledge Companion to Qualitative Accounting Research Methods*, 372–86. Routledge.

Gaston, Paul L. 2023. *Higher Education Accreditation: How It's Changing, Why It Must*. Taylor & Francis.

Giannoccolo, Pierpaolo. 2009. "The Brain Drain: A Survey of the Literature." *Università Degli Studi Di Milano-Bicocca, Department of Statistics, Working Paper*, no. 2006–03:02.

Gittleman, Maury, Mark A Klee, and Morris M Kleiner. 2018. "Analyzing the Labor Market Outcomes of Occupational Licensing." *Industrial Relations: A Journal of Economy and Society* 57 (1). Wiley Online Library:57–100.

GOM. 1970. "New Economic Policy." Malaysia: Government of Malaysia. https://ekonomi.gov.my/sites/..../Prospects_compressed.pdf.

———. 1990. "Sixth Malaysia Plan (1990-1995)." Malaysia: Government of Malaysia. https://ekonomi.gov.my/sites/default/files/2020-08/...compressed.pdf.

Hartal, Shaul, Karima Kourtit, and Gabriela Carmen Pascariu. 2023. "Spatial Labour Markets and Resilience of Cities and Regions: A Critical Review." *Regional Studies* 57 (12). Taylor & Francis:2359–72.

Hussein, Mohammed, Milena Pavlova, Mostafa Ghalwash, and Wim Groot. 2021. "The Impact of Hospital Accreditation on the Quality of Healthcare: A Systematic Literature Review." *BMC Health Services Research* 21. Springer:1–12.

Ikeda, Sanford. 2024. *A City Cannot Be a Work of Art: Learning Economics and Social Theory from Jane Jacobs*. Springer Nature.

Inoue, Ryo, Shino Shiode, and Narushige Shiode. 2023. "Colocations of Spatial Clusters among Different Industries." *Computational Urban Science* 3 (1):35. https://doi.org/10.1007/s43762-023-00107-9.

Jacobs, Jane. 1969. "Strategies for Helping Cities." *The American Economic Review* 59 (4,):652–56.

Kang, Yuyang, and Ka Ho Mok. 2022. "The Broken Promise of Human Capital Theory: Social Embeddedness, Graduate Entrepreneurs and Youth Employment in China." *Critical Sociology* 48 (7–8). SAGE Publications Sage UK: London, England:1205–19.

Kapucu, Naim, Yue Ge, Emilie Rott, and Hasan Isgandar. 2024. "Urban Resilience: Multidimensional Perspectives, Challenges and Prospects for Future Research." *Urban Governance*. Elsevier.

Khalid, Muhammed Abdul. 2023. "The Future of Employment in Malaysia, Singapore and Thailand: Demographic and Labour Market Trends of Ageing Societies in the Context of the Fourth Industrial Revolution." UN. ESCAP.

KRI. 2022. "Residential Settlements and Spatial Inequality: A Study of Greater Kuala Lumpur Neighbourhoods." Kuala Lumpur: Khazanah Research Institute.

———. 2024. “Shifting Tides: Charting Career Progression of Malaysia’s Skilled Talents.” Kuala Lumpur: Khazanah Research Institute.
Le Grand, Carl, and Michael Tåhlin. 2002. “Job Mobility and Earnings Growth.” *European Sociological Review* 18 (4). Oxford University Press:381–400.
Levine, Carole. 2010. “Building a Talent Pipeline.”
Marshall, A. 1890. *Principles of Economics.* London: Macmillan.
MBOT. 2019a. “Annual Report 2016/2017.” Putrajaya. https://www.mbot.org.my/media/annual-report.
———. 2019b. “TTAC Standard Second Edition-Academic Sector.” 2019. https://www.ttasmbot.org.my/download/....pdf.
———. 2024. “MBOT Strategic Plan.” MBOT STRIVE 2024-2029. Putrajaya: Malaysia Board of Technologists. https://www.mbot.org.my/media/mbot-strategic-plan.
———. 2025. “MBOT Membership Data.”
———. n.d. “MBOT Registration.” MBOT - Malaysia Board of Technologists. Accessed August 8, 2025a. http://mbot.org.my/registration/mbot-professional-member.
———. n.d. “Professional Technical Certification.” MBOT - Malaysia Board of Technologists. Accessed April 19, 2025b. http://mbot.org.my/certification/professional-technical-certification.
———. n.d. “TTAC.” MBOT - Malaysia Board of Technologists. Accessed April 18, 2025c. http://mbot.org.my/accreditation/ttas-ttac.
MEA. 2019. “Shared Prosperity Vision 2030.” Putrajaya: Ministry of Economic Affairs. https://www.epu.gov.my/sites/....202030.pdf.
MIDA. 2024. “Economic Corridors.” Malaysian Investment Development Authority. 2024. https://www.mida.gov.my/why-malaysia/economic-corridors/.
———. 2025. “Everything You Need to Know about the Johor-Singapore Special Economic Zone.” Malaysian Investment Development Authority. 2025. https://www.mida.gov.my/mida-news/.../.
MITI. 2023. “New Industrial Master Plan 2030.” Policy Document. Kuala Lumpur: Ministry of Investment, Trade and Industry Malaysia. https://www.nimp2030.gov.my/.
MOE. 2013. “Malaysia Education Blueprint 2013-2025 (Preschool to Post-Secondary Education).” Putrajaya: Ministry of Education Malaysia,.
———. 2015. “Malaysia Education Blueprint 2015-2025 (Higher Education).” Putrajaya: Ministry of Education Malaysia. https://www.mohe.gov.my/muat-turun/penerbitan-jurnal-dan-laporan/...
MOHE. 2021. “National Education Code 2020.” Ministry of Higher Education.
———. 2022. “Graduate Tracer Study Report 2021.” Putrajaya: Ministry of Higher Education Malaysia.
———. 2023. “Graduate Tracer Study.”
———. n.d. “Penerbitan, Jurnal Dan Laporan.” Ministry of Higher Education Malaysia. Accessed December 4, 2025. https://www.mohe.gov.my/.../publications-journals-and-reports.
MOHR. 2020. “MASCO.” Putrajaya: Ministry of Human Resources.
MOHR, and TalentCorp. 2023. “Critical Occupation List (MyCOL) 2022/2023.” Sector Deep Dive for the Malaysia National Skills Registry. Putrajaya: Ministry of Human Resources. https://talentcorp.com.my/images/uploads/publication/.....pdf.
MPC. 2024. “Malaysia Productivity Corp: Academy in Industry Programme Able to Produce More Skilled Workers to Boost Country’s Productivity.” Malaysia Productivity Corporation. 2024. https://www.mpc.gov.my/mpc-news/academy-in-industry-programme-able-to-produce-more-skilled-workers-to-boost-countrys-productivity.
MQA. 2021. “Accreditation.” 2021. https://www.mqa.gov.my/new/qa.cfm#gsc.tab=0.
———. 2023. “Guidelines to Good Practices: Accreditation of Prior Experiential Learning (APEL) for Access.” Guideline. Cyberjaya: Malaysian Qualifications Agency. https://www2.mqa.gov.my/qad/v2/document/2022/GGP/...(ndV3).pdf.
Nathan, K. 1987. “Malaysia and the Soviet Union: A Relationship with a Distance.” *Asian Survey* 27:1059–73. https://doi.org/10.2307/2644845.
NEAC. 2020. “New Economic Model (NEM) for Malaysia.” Putrajaya: National Economic Advisory Council. https://ekonomi.gov.my/en/economic-developments/development-plans/new-economic-model.
Ngoc, Nguyen Minh, Vu Minh Hieu, and Nguyen Hoang Tien. 2023. “Impact of Accreditation Policy on Quality Assurance Activities of Public and Private Universities in Vietnam.” *International Journal of Public Sector Performance Management* 10:1–15.
Pino, Ricardo M., and Ana María Ortega. 2018. “Regional Innovation Systems: Systematic Literature Review and Recommendations for Future Research.” *Cogent Business and Management* 5 (1). https://doi.org/10.1080/23311975.2018.1463606.
Rodrigues, Ricardo, and David Guest. 2024. “Signalling Theory.” In *A Guide to Key Theories for Human Resource Management Research*, 254–60. Edward Elgar Publishing.
Secretariat of the National TVET Council. 2024. “National TVET Policy 2030.” Putrajaya: Prime Minister Department.
Sharef, Nurfadhlina Mohd, Wan Aida Wan Yahaya, and Hassan Alli. 2024. “Future-Proofing Workforce: High-Skilled Talent Development Strategies.” *Journal of Emerging Technologies and Industrial Applications* 3 (2).
Silva, Vicente. 2022. “The ILO and the Future of Work: The Politics of Global Labour Policy.” *Global Social Policy* 22 (2). SAGE Publications Sage UK: London, England:341–58.
Singh, Shalini, and Søren Ehlers. 2020. “Employability as a Global Norm: Comparing Transnational Employability Policies of OECD, ILO, World Bank Group, and UNESCO.” *International and Comparative Studies in Adult and Continuing Education* 12. Firenze University Press:131.

Spence, Michael. 1973. “Job Market Signaling.” *The Quarterly Journal of Economics* 87 (3). Oxford University Press:355–74. https://doi.org/10.2307/1882010.

Sundaram, Jomo K, Khoo Boo Teik, and Chang Yii Tan. 1995. *Vision, Policy and Governance in Malaysia*. World Bank.

TalentCorp. 2024a. “Impact Study of Artificial Intelligence, Digital, and Green Economy on the Malaysian Workforce Volume 1.” Volume 1. Petaling Jaya: TalentCorp.

———. 2024b. “Impact Study of Artificial Intelligence, Digital, and Green Economy on the Malaysian Workforce Volume 2.” Volume 2. Petaling Jaya: TalentCorp.

———. n.d. “Returning Expert Programme.” Accessed April 16, 2025. https://www.talentcorp.com.my:443/our-initiatives/for-professionals/rep/.

Thake, Anne Marie. 2025. “Transitioning to a Green Economy-the Impact on the Labor Market and Workforce Skills.” In *Greening Our Economy for a Sustainable Future*, 163–75. Elsevier.

Turner, Jason J, Nadiah Suki, and Nan Jiang. n.d. “Digital Transformation and Its Impact on the Malaysian Labour Market: Skill Shortages and the Future of Work.” In *The Future of Work in the Asia Pacific*, 158–72. Routledge.

UNESCAP. n.d. “Closing the Loop - Kuala Lumpur City Profile.” United Nations Economic and Social Commission for Asia and the Pacific. https://www.unescap.org/sites/default/d8files/Closing%20the%20Loop%20-%20Kuala%20Lumpur%20City%20Profile.pdf.

Valero-Gil, Jesus, Tiberio Daddi, Sabina Scarpellini, and Luca Marrucci. 2024. “Determinants and Benefits of Over-certification: A Signaling Theory Perspective.” *Corporate Social Responsibility and Environmental Management* 31 (6). Wiley Online Library:5984–99.

Weeden, Kim A. 2002. “Why Do Some Occupations Pay More than Others? Social Closure and Earnings Inequality in the United States.” *American Journal of Sociology* 108 (1). The University of Chicago Press:55–101.

WEF. 2025. “Future of Jobs Report 2025.” Insight Report. Geneva: World Economic Forum. https://reports.weforum.org/docs/WEF_Future_of_Jobs_Report_2025.pdf.

World Bank. n.d. “Gross National Income.” Accessed July 5, 2025. https://databank.worldbank.org/.../6.0.GNIpc.

Yang, Liangjie, Hainan Yang, Xueyan Zhao, and Yongchun Yang. 2022. “Study on Urban Resilience from the Perspective of the Complex Adaptive System Theory: A Case Study of the Lanzhou-Xining Urban Agglomeration.” *International Journal of Environmental Research and Public Health* 19 (20). MDPI:13667.

[THIS PAGE INTENTIONALLY LEFT BLANK]

PART ONE

Contextual Analysis

CHAPTER

02

TRAINING TECHNICAL TALENT: A STUDY ON MALAYSIA'S TVET EDUCATION LANDSCAPE

CHAPTER 2

TRAINING TECHNICAL TALENT: A STUDY ON MALAYSIA'S TVET EDUCATION LANDSCAPE

Wan Amirah Wan Usamah

TVET is no longer on the side-lines - it now stands at the very centre of national economic strategies and in this global race for relevance, skills are the new currency.

YAB Dato' Seri Dr. Ahmad Zahid Hamidi (2025)

2.1 Introduction

Malaysia's Technical and Vocational Education and Training (TVET) landscape has evolved into a vital pillar of the nation's human capital development strategy[51]. While there is no universally accepted definition, TVET is often characterised by its combination of practical training and technical knowledge. Malaysia's Code of Practice for TVET Programme Accreditation (COPTPA) describes TVET as an education and training pathway focused on preparing individuals for specific occupations, with a strong emphasis on industry-based practices[52].

As the country aspires to become a high-income, innovation-driven economy, TVET serves as a crucial mechanism for equipping the workforce with industry-relevant skills, especially in the development of technical and technology talents needed to serve its high industrial aspirations. The government's focus on aligning education with the needs of the labour market has elevated the role of TVET in national development plans, including the Twelfth Malaysia Plan (12th MP) and the Shared Prosperity Vision (SPV) 2030.

Over the years, Malaysia's TVET ecosystem has expanded to include a diverse range of institutions, offering programmes from certificates to bachelor's degree qualifications. Despite its growing prominence, TVET in Malaysia continues to face challenges such as social stigma, fragmented governance and limited pathways for academic and professional progression. However, policy reforms and institutional innovations—such as the establishment of the MBOT and efforts to promote industry-based training models—reflect a strong commitment to reposition TVET as a first-choice option for students.

Given TVET's growing importance, it is crucial to explore the structure, policies and trends shaping Malaysia's dynamic TVET education and training landscape. This chapter utilises various government documents relating to TVET, as well as information on the certifications and education opportunities listed on the TVET Madani website and TVET institutions, to summarise and map the TVET education landscape in Malaysia.

[51] EPU (2016)
[52] MQA (2024)

This chapter opens with a discussion on the development of Malaysia's TVET education system over the years in Section 2.2, highlighting the evolution of policy directions on TVET. This is then followed by a snapshot of the current TVET education landscape in Section 2.3, before delving further into mapping the distribution of these TVET institutes and selected technical fields in Section 2.4. Opportunities for lifelong learning and continuous training are then explored in Section 2.5. Lastly, Section 2.6 summarises the key findings of this chapter and brings forward some related policy discussion.

2.2 Development of Malaysia's TVET Education

The groundwork for TVET in Malaysia was set long before 1970 and its history can be divided into three stages: the British colonial stage (1870-1952), the post-Independence stage (1952-1978) and the Industrialisation stage (1979-2010). Initially, the emphasis was on setting up trade schools to address the pressing demand for trained workers in industries such as construction, agriculture and railway maintenance[53]. Soon after, during the post-independence stage, TVET in Malaysia was designed to meet the nation's interests by producing skilled labour for government agencies and covering various industries[54]. This shift was supported by policies such as the Education Act 1961 and development plans, including the First and Second Malaysia Plans[55]. Evidently, this can also be seen through the establishment of different types of TVET, which include Vocational Schools and Technical Schools, the MARA Institute of Technology and the Ungku Omar Polytechnic[56].

As Malaysia moves towards economic development and industrialisation, the government has intensified its efforts to ensure the sufficiency of skilled and semi-skilled labour to fill these demands. This was done through a series of efforts, which include coordinating the education and industry ecosystem through various initiatives such as the amendment of education legislation, increasing and upgrading TVET institutions and the National Dual Training System (NDTS)[57]. Furthermore, these initiatives also brought together four technical universities under one umbrella, which is known as the Malaysian Technical University Network (MTUN)[58]. These include:

1. Universiti Tun Hussein Onn Malaysia (UTHM)
2. Universiti Teknikal Malaysia (UTeM)
3. Universiti Malaysia Pahang (UMP)
4. Universiti Malaysia Perlis (UniMAP)

[53] Rasul et al. (2015); Hawati Abdul Hamid and Tan Mei Yi (2023)
[54] Fah (2018)
[55] Devan (2021)
[56] Mazlan et al. (2015); Fah (2018); Hawati Abdul Hamid and Tan Mei Yi (2023)
[57] Mazlan et al. (2015); EPU (2015)
[58] ESPACT, n.d.

Efforts to enhance TVET did not stop there. In 2012, the government began converting vocational schools into Vocational Colleges[59]. This new reformation saw the addition of diploma-level programmes, better learning facilities and fortifying industry linkages. The transformation was meant to give vocational education a more professional image and ensure it remained relevant to the changing demands of the job market, in line with Malaysia's ambition to become a developed nation. Currently, Malaysia has over a thousand different TVET institutions, reflecting its growing presence in Malaysia's education landscape.

2.2.1. Policy Directions for Malaysia's TVET Education

TVET has featured prominently across Malaysia's national development plans, reflecting its growing importance in driving economic growth and workforce readiness. The 9th Malaysia Plan (2006–2010) laid the groundwork by strengthening TVET programmes, upgrading infrastructure in training institutions and encouraging stronger alignment with industry demands through proposed improvements in the NDTS, which was launched in July 2025.

Table 2.1: Summary of TVET-related initiatives in past Malaysia Plans

Malaysia Plan	Key Policy Directions & Initiatives
9th MP (2006-2010)	**Strengthening TVET Education** - Increased in skill trainings and human capital development: Graduate output to meet industry demands - Improved NDTS
10th MP (2011-2015)	**Mainstreaming and Broadening Access to Quality Technical Education and Vocational Training** - Improving the perception of TVET - Developing highly effective TVET instructors - Upgrading and harmonising TVET curriculum in line with industry requirements - Streamlining the delivery of TVET **MBOT was established in 2015 under the Act 768**
11th MP (2016-2020)	**Elevating TVET as a preferred pathway** - Technical and Vocational Education and Training will shift towards industry-led programmes to produce the skilled talent to meet industry needs - Launched the TVET Empowerment Agenda to reposition TVET as a mainstream education option - Established TVET Malaysia, an umbrella branding for all TVET providers. - Promoted TVET through increased funding, scholarships and awareness campaigns. - Fostered stronger industry-led curriculum development and apprenticeship - Introduced TVET Transformation Programme to improve governance and quality assurance **MBOT became a strategic institution to recognise technologists and technicians**
12th MP (2021-2025)	**Improving TVET Ecosystem to Produce Future-Ready Talent** - Strengthening TVET governance through a centralised coordination body. - Enhancing pathways for TVET graduates to pursue higher education and career advancement - Emphasising digital skills, green technology and IR4.0 competencies - Expanding the Recognition of Prior Learning (RPL) system - Enhancing collaborations with industries through co-developed training programmes and shared facilities

Source: EPU, n.d., KRI compilation

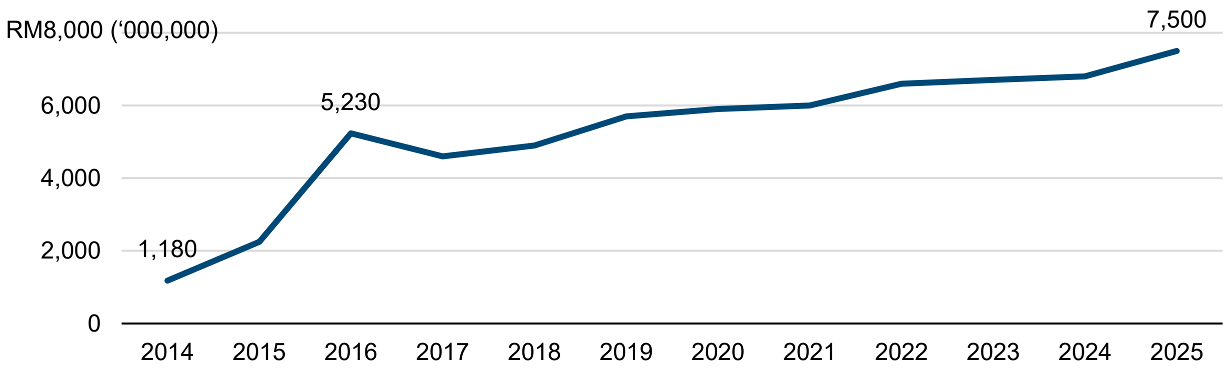
[59] EPU (2015)

The 10th Malaysia Plan (2011–2015) intensified the focus on quality and broadening access. Key reforms included the enhancement of industry-linked curricula and the implementation of the Malaysian Qualifications Framework (MQF) to ensure standardised accreditation across institutions. The government also encouraged more direct involvement of industries in training provision, curriculum development and certification processes, laying the foundation for stronger demand-driven training ecosystems. The tail end of the 10th MP also saw the establishment of MBOT to accelerate the recognition of TVET-related certifications.

In the 11th and 12th Malaysia Plans, the policy agenda shifted towards transforming TVET into a mainstream, future-ready education pathway. The 11th MP (2016-2020) introduced the TVET Empowerment Agenda, launched the TVET Malaysia branding and increased financial support and promotional efforts to attract students. This momentum continued in the 12th MP (2021-2025), which emphasises reforms in governance, enhanced articulation pathways for TVET graduates and the integration of digital, green and Industry 4.0-related skills. A centralised coordination mechanism and stronger industry partnerships are at the core of these reforms, signalling a holistic approach to making TVET a key driver of national development.

In line with Malaysia's growing aspirations for TVET education, the total national budget allocation for TVET and skills training institutions has risen greatly in the past decade (Figure 2.1: Total allocation for TVET and skills training institutions mentioned in the budget, 2014-2025). Notably, allocation for TVET increased from RM1.18 billion in Budget 2014 to RM5.23 billion in 2016. This was in parallel to the emphasis of TVET in the 11th MP, which highlighted TVET as a game-changer for Malaysia's technical talent. From 2016 onwards, the budget allocation for TVET has steadily increased, amounting to RM 7.5 billion in Budget 2025 – representative of the growth of Malaysia's TVET education landscape towards its contribution to the country's talent pool.

Figure 2.1: Total allocation for TVET and skills training institutions mentioned in the budget, 2014-2025



Source: MTVET, n.d., KRI compilation

2.2.2. TVET Current Governance and Key Agencies

Malaysia's TVET landscape is shaped by a decentralised, multi-agency governance structure that spans various ministries and statutory bodies. A summary of the various ministries involved, as well as their main responsibilities, is stated in the table below.

Table 2.2: Summary of ministries involved in TVET education

Ministry	Role
Ministry of Education (MOE)	Responsible for vocational education at the secondary school level, including Technical Schools (*Sekolah Menengah Teknik,* SMT) and Vocational Colleges (*Kolej Vokasional,* KV)
Ministry of Higher Education (MOHE)	Oversees the polytechnic and community college systems, which cater to diploma-level and technical training as well as provide general and continuing education opportunities
Ministry of Human Resources (MOHR)	Through the Department of Skills Development (DSD, also known as *Jabatan Pembangunan Kemahiran* or JPK), MOHR sets National Skills Standards (NOSS), certifies training centres and accredits training providers
Ministry of Youth and Sports (KBS)	Provides skills training and youth development programmes through institutions like National Youth Skills Institutes (*Institut Kemahiran Belia Negara,* IKBN) and Youth Higher Skills Institutes (*Institut Kemahiran Tinggi Belia Negara,* IKTBN)
Ministry of Rural and Regional Development (KKDW)	Responsible for rural development, regional development, community development, *Bumiputera*, *Orang Asli*, rubber industry smallholders, land consolidation, land rehabilitation

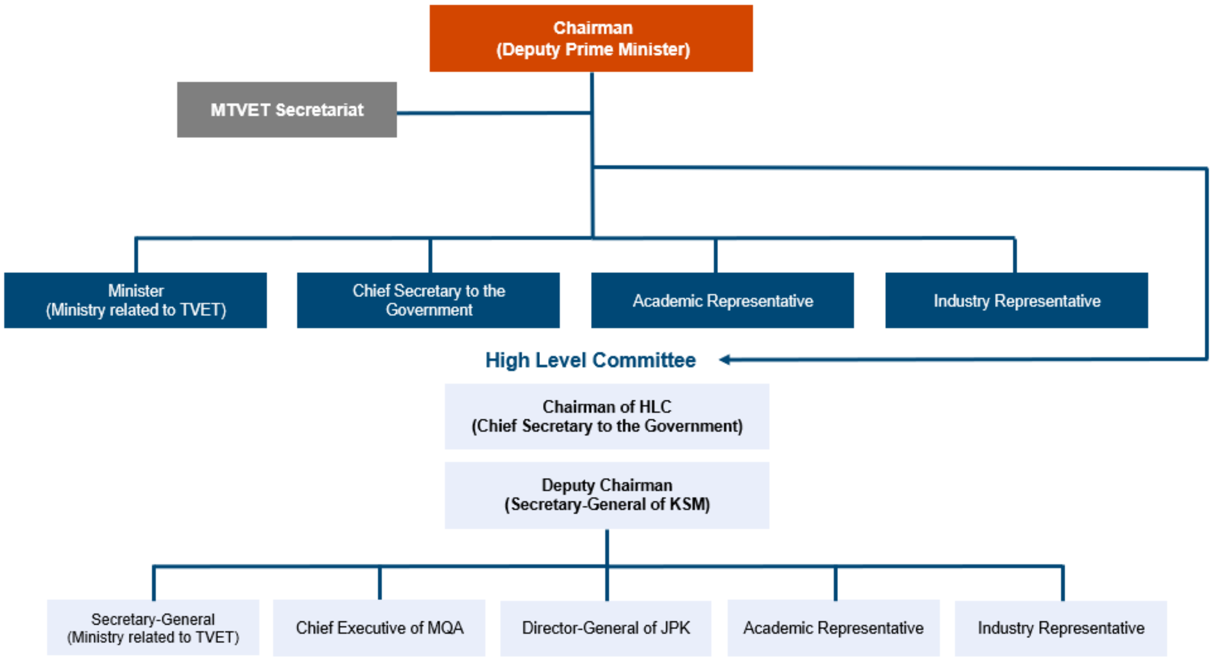
Source: MTVET, n.d., KRI compilation

This arrangement, while allowing tailored interventions by sector, has historically led to a lack of cohesion, inefficiencies in resource utilisation and difficulty in standardising quality across institutions[60]. To address this, the National TVET Council (MTVET) was established at the end of 2020, aiming to centralise policy direction, unify standards and increase inter-ministerial cooperation[61].

Structurally, MTVET includes representatives from key ministries such as the Ministry of Higher Education (MOHE), the Ministry of Human Resources (MOHR), the Ministry of Education (MOE) and the Ministry of Finance (MOF), along with industry leaders, regulatory bodies and TVET institutions. This multi-stakeholder composition allows for a whole-of-government and whole-of-industry approach to policy formulation and programme delivery. The council is supported by technical committees and working groups, which focus on specific areas such as curriculum standardisation, industry collaboration, funding mechanisms and graduate employability. Through this coordinated structure, MTVET plays a pivotal role in streamlining TVET governance, ensuring coherence across initiatives and elevating TVET as a key pillar of Malaysia's human capital development strategy.

[60] MTVET (2024)
[61] Ibid.

Figure 2.2: Structure of the National TVET Council (MTVET)



Source: MTVET (2024)

2.3 Malaysia's Current TVET Education Landscape

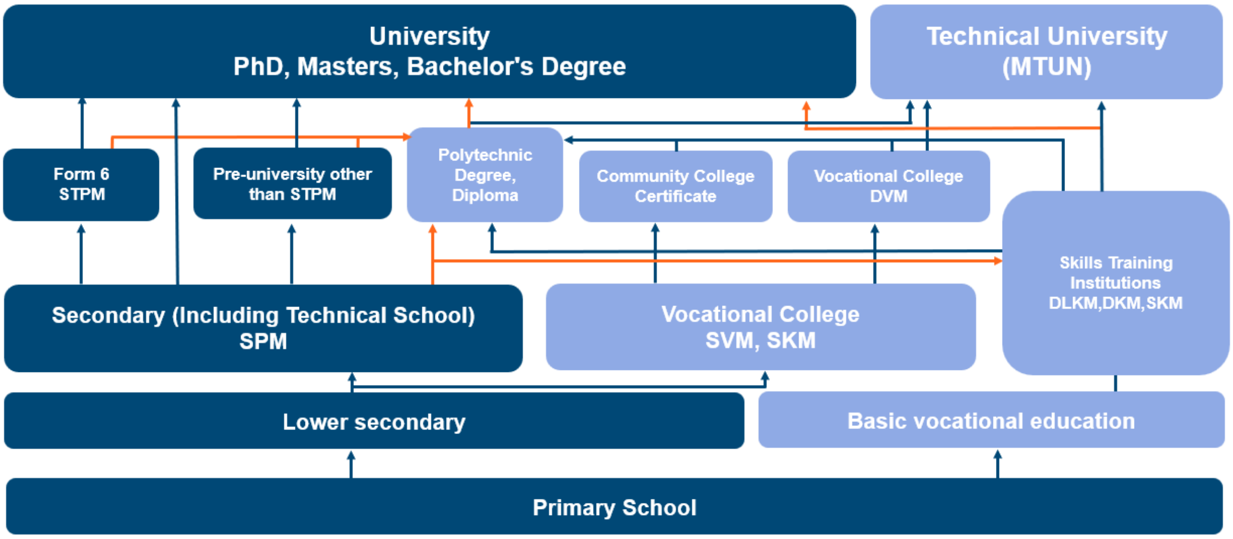
2.3.1. Education Pathways in Malaysia's TVET System

Malaysia's TVET pathway offers an alternative and practical route for students who are more inclined toward hands-on and skill-based education. TVET education typically begins after Form 3, when students can choose to enrol in vocational colleges, technical schools, or specialised institutions under the Ministry of Education or other government agencies. Students may enter the *Sijil Vokasional Malaysia* (SVM) programme, which runs for two years (Form 4 and Form 5) and combines academic and vocational subjects. Upon completion, they receive the SVM, which is equivalent to the *Sijil Pelajaran Malaysia* (SPM), allowing for further study or immediate employment.

After obtaining the SVM, students can advance to the *Diploma Vokasional Malaysia* (DVM), which adds another two years of specialised training. Alternatively, SVM graduates may enrol in community colleges and other private institutions to pursue various programmes. Students who are interested in pursuing TVET can also do so after obtaining their SPM, either by enrolling in polytechnics or skills training institutions to pursue a TVET-related diploma.

TVET students can also progress to advanced diplomas and bachelor's degrees, in technical or applied fields, particularly through universities of technical and vocational education (MTUN). These institutions bridge the gap between vocational training and academic advancement, offering research opportunities and professional pathways. However, TVET learners can often face challenges such as limited recognition of prior learning across institutions and a lack of integrated credit transfer systems. This is further discussed later in the chapter, in Section 2.5.

Figure 2.3: Malaysia's TVET education pathways



Source: MTVET (2024)

Note: Light blue boxes represent TVET institutes, whereas dark blue boxes are academic institutes. Blue arrows show transition pathways between institutes within the same sector. Meanwhile, orange arrows show institute transition pathways between academic and TVET sectors.

Industry-based training within TVET

Practical technical training is an important component of the TVET curriculum. To provide opportunities for TVET students to gain industry experience, companies are encouraged to partner with training institutions through work-based learning, apprenticeships and dual training systems, which are aligned with both national frameworks and firm-level human resource (HR) strategies. These programmes allow students to gain hands-on work experience while continuing to pursue studies.

National Dual Training System

Malaysia's NDTS is a key initiative within its TVET framework, modelled after Germany's dual-system approach. This system integrates 70–80% of practical, hands-on training in real workplace environments with 20–30% theoretical instruction delivered at accredited training centres[62]. Two main training methods are employed: day release, where apprentices spend part of the week in class and the rest at their workplace and block release, which involves extended periods of classroom learning followed by longer workplace attachments[63]. This structure ensures that trainees are not only industry-ready but also able to adapt quickly to workplace demands.

The NDTS aims to produce holistic knowledge workers equipped with technical expertise, social competence and strong methodological skills, supporting Malaysia's goal of becoming a high-income nation. The curriculum is collaboratively developed by industry players and public training institutions, guided by the National Occupational Skills Standards, ensuring its relevance and alignment with labour market needs. Upon completion, trainees receive nationally recognised certifications—Malaysian Skills Certificates (SKM Levels 1–3), Diplomas (DKM), or Advanced Diplomas (DLKM)[64]. The table below summarises a few examples of the NDTS programmes offered in public TVET institutions such as polytechnics, community colleges, and MTUN.

[62] MOHR (2023); "Sglobaltvet" (n.d.)
[63] "TVET Master Website" (n.d.); Bach, Sern, and Setiawan (2025)
[64] MOHR (n.d.)

Table 2.3: Summary of NDTS programmes

Institution Type	Example Programmes	Qualification Level
Polytechnics	Automotive Technology, Electrical Installation, Welding Technology	SKM Levels 1–3
Community Colleges	Mechanical Design Technology, Electronics Instrumentation Technology, 3D Animation Technology	SKM, DKM
MTUN	Industrial Electronics, Advanced Manufacturing, Automotive Systems	DKM, DLKM, professional certifications aligned to NOSS

Source: KRI compilation[65]

2.3.2. Malaysia's TVET Qualification and Accreditation Framework

The credibility of TVET in Malaysia hinges on robust quality assurance frameworks, which serve to standardise provision, protect learners and meet employer expectations. The primary agencies that have been managing the accreditation of TVET education are the Malaysian Qualifications Agency (MQA) and the Department of Skills Development. In 2011, the Malaysian Qualifications Framework was implemented to harmonise the TVET accreditation system alongside the academic sector. The MQF categorises qualifications into academic, vocational and skills-based sectors, creating a structured progression pathway.

Figure 2.4: Accreditation framework for Malaysia TVET Education

DEPARTMENT OF SKILLS DEVELOPMENT (JPK) MINISTRY OF HUMAN RESOURCES		MALAYSIAN QUALIFICATIONS AGENCY (MQA) MINISTRY OF HIGHER EDUCATION
National Skills Development Act 2006 [Act 652]	**Related Acts**	Malaysian Qualifications Agency Act 2007 [Act 679]
Malaysian Skills Certification System (SPKM) based on NOSS	**Training System**	Training based on the TVET provider's own system and curriculum
Department of Skills Development	**Certification Agency**	TVET Provider
SKM, DKM & DLKM (MQF TVET1-5)	**Type of Certification**	Certificate, Diploma & Degree (MQF TVET 1-6)
JPK Accredited Public & Private Centres	**TVET Provider**	Public & Private TVET Providers accredited by MQA
Skills Development Fund Corporation (PTPK)	**Fund Provider**	National Higher Education Fund Corporation (PTPTN)
	Coordination Platform	
	National TVET Council (MTVET) National Skills Development Council (MPKK) Joint Technical Committee (JTC) COPTPA	

Source: MTVET (2024)

In 2017, the MQF was revised and updated to align with changing trends in both national and international higher education systems. The main goals of the revision were to enhance the MQF learning outcomes and bridge the gap between academic and technical qualifications. To achieve this, the Skills, Vocational and Technical sectors were consolidated into a single category known as the "TVET" sector, while the Higher Education sector was rebranded as the "Academic sector". The revised framework introduced eight levels of learning; each was assigned a unique qualification title (Table 2.4). Additionally, the TVET Quality Assurance Council has been proposed under MTVET and is expected to streamline accreditation processes, enable mutual recognition of credits and develop an integrated quality management system.

[65] Voctech (2019); JPPK (n.d.); HRD Corp (n.d.)

Table 2.4: MQF academic framework

MQF Level	Education Sector	
	Academic	TVET*
8	PhD by Research	
	Doctoral Degree by Coursework & Mixed Mode	
7	Master's Degree by Research	
	Master's Degree by Coursework & Mixed Mode	
	Postgraduate Diploma	
	Postgraduate Certificate	
6	Bachelor's Degree	Bachelor's Degree
	Graduate Diploma	Graduate Diploma
	Graduate Certificate	Graduate Certificate
5	Advanced Diploma	Advanced Diploma
4	Diploma	Diploma
3	Certificate	Certificate
2	Certificate	Certificate
1	Certificate	Certificate

*Technical and Vocational Education Training **Inclusive of 4 credits for U1 courses from general studies

Source: MQA (2024)

Box 2.1: Role of MBOT in TVET Education Accreditation

The Malaysia Board of Technologists (MBOT) works closely with educational institutions, industries and other regulatory bodies to evaluate and accredit academic programmes from universities, polytechnics and training institutions. The Technology and Technical Accreditation Council (TTAC) was established in 2016, and its key role is to assess and ensure the quality of academic programmes developed by Education Providers (EPs). It also functions as the Joint Technical Committee (JTC) between MBOT and the MQA to ensure compliance with professional programme requirements outlined in Sections 50–55 of the MQA Act 2007 (Act 679). Through its evaluations, TTAC ensures that academic programmes meet the minimum standards for technology-based education and that graduates possess the competencies needed to qualify as professionals in their respective fields. Currently, the TTAC oversees the accreditation of programmes in over 24 technology fields that are governed under MBOT.

MBOT's accreditation process includes two stages: Provisional Accreditation and Full Accreditation. Provisional Accreditation confirms that a programme meets the essential requirements to be offered, particularly in relation to seven core assessment criteria, with a focus on curriculum structure. Full Accreditation involves site visits to validate the presence of adequate academic and support facilities, ensuring the programme meets stakeholder expectations. Once accredited by MBOT through TTAC, programmes are listed in the Malaysian Qualifications Register (MQR) and officially recognised as professional qualifications under both the MQF and MBOT standards. Additionally, accreditation enhances graduate recognition by the Public Service Department (PSD) and enables students to access financial aid from bodies like *Perbadanan Tabung Pendidikan Tinggi Nasional* (PTPTN) and *Majlis Amanah Rakyat* (MARA).

Source: MBOT (2019)

TVET Industry Advisory Council

Industry involvement in TVET education plays a pivotal role in ensuring Malaysia's TVET programmes stay relevant and employer-driven. Under the Single Quality Assurance System for TVET, the Joint Technical Committee—comprising 17 members from MQA, JPK, related ministries and three industry experts—reviews curricula and Occupational/Industry Standards & Practices (OISP), ensuring accreditation processes reflect current industry standards[66]. These panels help define national occupational frameworks, update the NOSS and maintain a living database of industry-endorsed practices via the OISP repository, thereby embedding industry-informed skills requirements directly into TVET accreditation criteria.

Meanwhile, the Ministry of Higher Education has convened the polytechnic and community colleges' Industry Advisory Council, which involves 21 industry leaders across nine areas. This body advises on structured initiatives such as Work-based learning in polytechnics and community colleges (WBL@PolyCC), internships and other on-campus industry collaborations, all supported by the 12th Malaysia Plan[67]. At the institutional level, sector-specific industry-academia panels are integrated into governance and curriculum changes to ensure the skills and technology taught remain relevant to industry demand.

Besides national programmes, sector-specific industry councils, like the German-Malaysian Chamber of Commerce's Advisory Council at German-Malaysian Institute (GMI), hold summits to align TVET with dual-system models. Moreover, in 2022 the government launched the Government-Industry TVET Coordination Body (GITC), backed by 12 industry associations and 12 collaboration hubs (in sectors such as aerospace, rail, semiconductor and hospitality), to foster coordination of expertise, equipment and technology between TVET centres and industries[68]. These multi-layered advisory mechanisms ensure that Malaysian TVET remains agile, industry-aligned and responsive to evolving workforce demands.

2.4 Mapping Malaysia's TVET Education Ecosystem

Malaysia's TVET landscape is diverse, comprising various institutions tailored to different sectors and skill levels. The majority of TVET institutions are public institutions, though the number of private TVET institutions has also been increasing in recent years – playing a growing role in expanding access to TVET education. Among the public TVET institutions, the providers are spread across various ministries depending on the type of institution, such as vocational colleges under the Ministry of Education, polytechnics and community colleges under the Ministry of Higher Education and technical training institutes under the Ministry of Human Resources, such as *Institut Latihan Perindustrian* (ILP).

Additionally, specialised training centres under other ministries—such as the Ministry of Human Resources (e.g. ILP, ADTEC, JMTI), Ministry of Youth and Sports (IKBN, IKTBN), and Ministry of Rural and Regional Development (GIATMARA)—also provide industry-focused training, often in partnership with employers. The table below summarises the various types of institutions available in Malaysia.

[66] "TVET 2020" (n.d.)
[67] Ashman (2021)
[68] "Malaysia Establishes a Government-Industry Body, and 12 Collaboration Hubs to Boost TVET" (2022)

Table 2.5: Summary of the types of TVET institutions

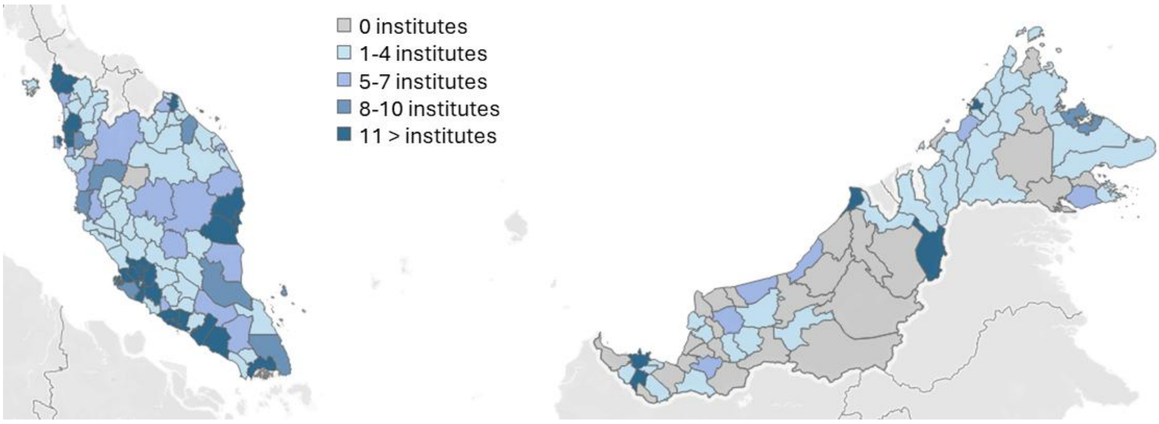
Type of Institution	Provider	Brief description	Minimum Qualification MQF Level	Highest Qualification MQF Level
Advanced Technology Training Centre (ADTEC)	MOHR	High-level industrial training for advanced sectors.	Level 4	Level 5
ILP	MOHR	Practical skills training for technical careers.	Level 1	Level 4
IKBN	Ministry of Youth and Sports	Youth-focused skills training in technical and sports fields.	Level 1	Level 4
IKTBN	Ministry of Youth and Sports	Advanced youth training in engineering and ICT.	Level 2	Level 5
GIATMARA	MARA	Community-focused technical training and entrepreneurship.	Level 1	Level 3
Community College	MOHE	Accessible TVET and lifelong learning for local communities.	Level 3	Level 5
Polytechnic	MOHE	Technical education in engineering and applied sciences.	Level 4	Level 5
Vocational College	MOE	Offers hands-on technical and vocational training, preparing students for specific trades and industries	Level 3	Level 4
IKM	MARA	Technical education for Bumiputera with skills focus.	Level 1	Level 4
KKTM	MARA	Advanced technical training in niche technology fields.	Level 3	Level 6
UniKL	MOHE	Offers industry-driven diploma and degree programmes.	Level 4	Level 8
MTUN	MOHE	Technical universities focused on engineering and TVET.	Level 5	Level 8
Akademi Binaan Malaysia (ABM)	Ministry of Works (via CIDB)	Specialises in construction skills and certification.	Level 1	Level 3
Private Training Providers	Private	Offers flexible programmes for industry needs and certification.	Level 1	Level 5
State Skills Development Centre	State Government	Regional training centres for industry upskilling.	Level 1	Level 5
State Foundation Skills Training Centre	State Government	Entry-level training for under-skilled or unemployed.	Level 1	Level 2

Source: MTVET, n.d., KRI compilation

2.4.1. TVET Institutions by District

Malaysia currently has over a thousand different TVET institutions spread across the country. All states have TVET institutions established, with most districts having at least one (Figure 2.6). The wide distribution of TVET institutions can be linked to rural development initiatives, particularly those under the purview of the Ministry of Rural and Regional Development.

Figure 2.5: Number of TVET institutions, by district



Source: MTVET, n.d., KRI compilation

However, most TVET institutions are concentrated in Malaysia's central region – with a total of 300 institutions in Selangor and Kuala Lumpur (KL). Within this region, the highest number of institutes are Petaling with 103 different TVET institutions, and KL with 86 institutions. Other districts with a high number of TVET institutions are Johor Bahru (39 institutes), Kuching (33 institutes), Kota Kinabalu (22 institutes), Alor Gajah (22 institutes) and Kuantan (20 institutes).

When comparing by institution type, Selangor and KL have a more diverse set of TVET providers, with over half (164 institutions) of their TVET institutions being private. In comparison, TVET education in other states is mainly driven by public institutions. Notably, among the various types of public institutions, GIATMARA has a large presence across the states.

Table 2.6: TVET private and public institutions distribution, by state

State	Private	Public	Total
Johor	27	77	104
Kedah	5	53	58
Kelantan	1	36	37
Melaka	11	33	44
N.Sembilan	6	29	35
Pahang	9	51	60
Perak	18	70	88
Perlis	0	12	12
Pulau Pinang (P. Pinang)	11	47	58
Sabah	12	67	79
Sarawak	22	70	92
Selangor	106	104	210
Terengganu	1	44	45
Kuala Lumpur	58	31	89

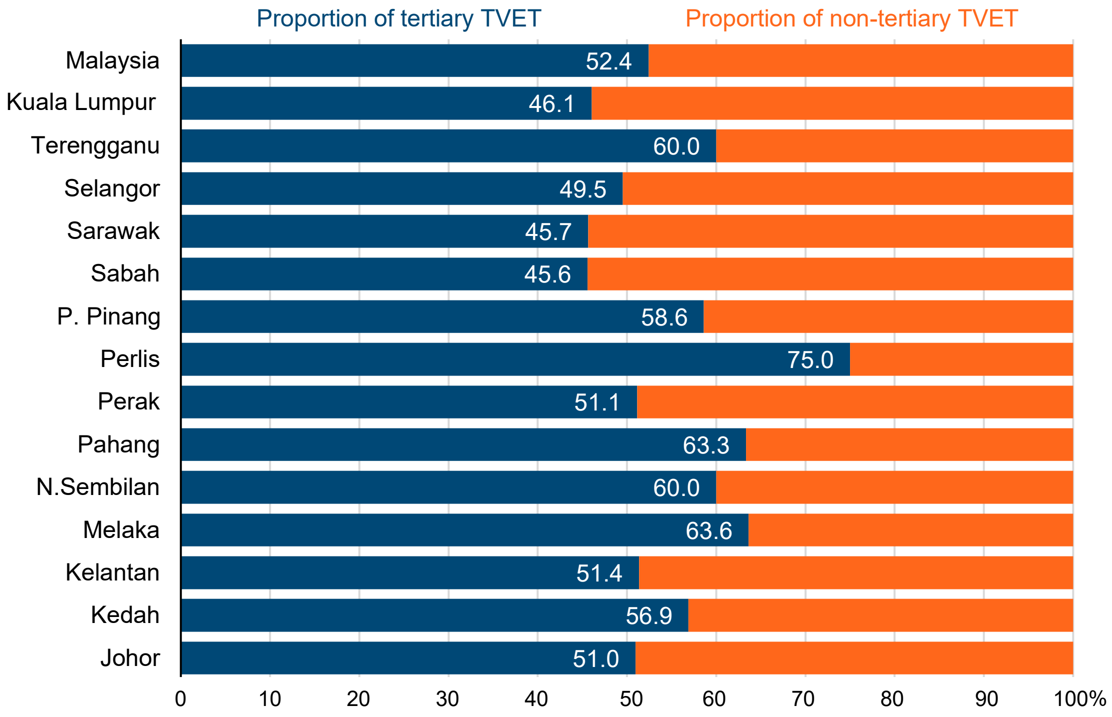
Source: MTVET, n.d., KRI compilation

Distribution of tertiary-level TVET institutions

However, not all TVET institutions offer tertiary education pathways, which are defined as a level of qualification equivalent to a diploma and above. In accordance with this definition, TVET institutions must provide courses and certification equivalent to an MQF Level 4 and above to be considered a tertiary TVET institute.

Out of the thousands of TVET institutions, only half (530 institutions) are considered to be tertiary TVET. When looking by state, the distribution is similar, whereby tertiary TVET generally makes up slightly over half of the total TVET institutions. Notably, in the case of Perlis, Melaka and Pahang, the proportion of tertiary TVET is higher at 75%, 63.6%, and 63.3%, respectively. Conversely, the presence of non-tertiary TVET is higher among Sabah, Sarawak and KL, where the share of tertiary TVET is at 45.6%, 45.7%, and 46.1%, respectively.

Figure 2.6: Proportion of tertiary TVET institutions, by state



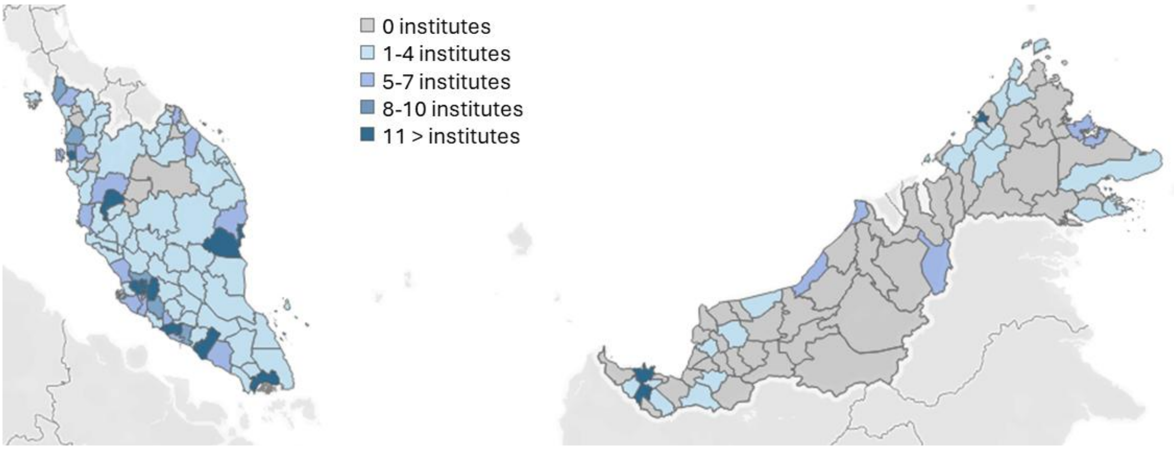
Source: MTVET, n.d., KRI compilation

There is a significantly lower number of districts that have a tertiary TVET institution (Figure 2.7). This is quite noticeable in Sabah and Sarawak, where tertiary TVET is concentrated around their respective state capitals, Kota Kinabalu (13 tertiary TVET) and Kuching (18 tertiary TVET). Additionally, Bintulu and Miri in Sarawak, as well as Sandakan in Sabah, each have five tertiary TVET institutions, which may be driven by the high industrial activity in the district.

Meanwhile, the distribution of tertiary TVET is more widespread in Peninsular Malaysia, with the majority of districts having at least one tertiary TVET institution. Similarly, most of the tertiary TVET institutions are concentrated in the central region districts, with the highest amount of tertiary TVET institutes being in Petaling (48 tertiary TVET) and KL (41 tertiary TVET).

Other districts with a high number of tertiary TVET institutions also include Johor Bahru, Johor (19 tertiary TVET), Kuantan, Pahang (15 tertiary TVET), Alor Gajah, Melaka (14 tertiary TVET), Kinta, Perak (13 tertiary TVET) and Seberang Perai Tengah, Pulau Pinang (12 tertiary TVET). These are also districts with a high number of economic and manufacturing activity, which may have contributed to the establishment of both public and private tertiary TVET in these areas.

Figure 2.7: Number of tertiary TVET institutions, by district



Source: MTVET, n.d., KRI compilation

Among the tertiary level TVET institutions, even fewer offer courses with a bachelor's degree (MQF Level 6) and above. Of the public tertiary TVET institutions, the MTUN is most known for higher levels of qualification – allowing education pathways up to the PhD level for interested TVET graduates. There are also private tertiary TVET providers that provide higher tertiary qualification pathways such as University Kuala Lumpur (UniKL) and UNITAR[69] which both have several branches across various states.

A significant majority of the tertiary TVET institutes that offer degree-level qualifications are located in Peninsular Malaysia, with most of them in Selangor and KL. In the case of Sabah and Sarawak, only private providers offer degree-level qualifications and above within the state. However, it should be noted that given the integration between TVET and academic curricula, those with a TVET-related diploma should, in principle, be able to further their studies in any university, subject to the specific course requirements.

[69] UNITAR International University (UNITAR) is a private university in Selangor, Malaysia that was established in 1997. Source: UNITAR (n.d.)

Table 2.7: Degree-level TVET Institutes

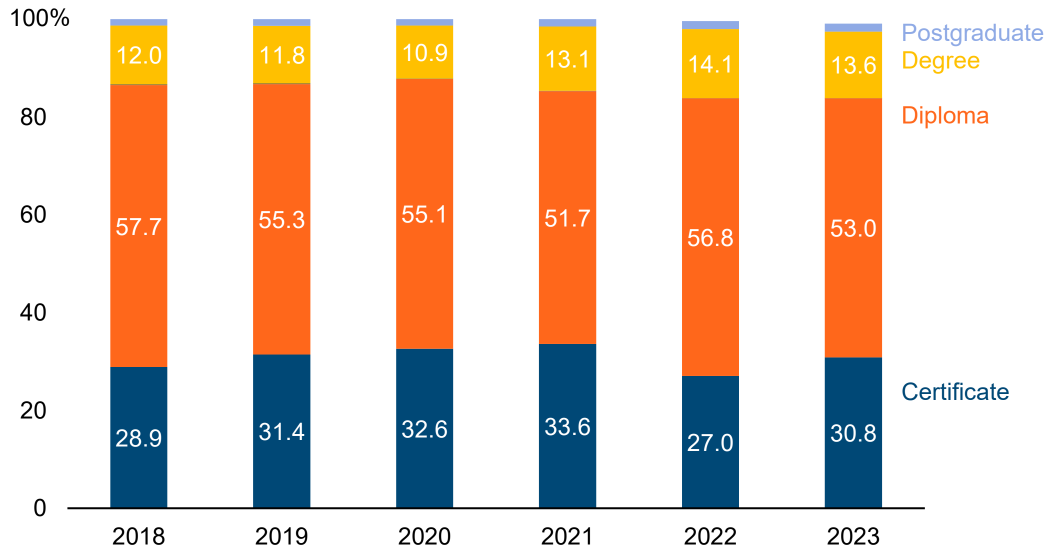
Institution Name	State	Public/Private Status
Universiti Tun Hussein Onn Malaysia (UTHM)	Johor	Public
Universiti Teknikal Malaysia Melaka (UTeM)	Melaka	Public
Universiti Malaysia Pahang Al-Sultan Abdullah (UMPSA)	Pahang	Public
Universiti Malaysia Perlis (UniMAP)	Perlis	Public
University Kuala Lumpur (UniKL)	Multiple Locations	Private (but GLC-owned, under MARA)
German-Malaysian Institute (GMI)	Selangor	Private (joint venture between the Malaysian and German governments)
DRB-HICOM University of Automotive Malaysia	Pahang	Private
i-CATS University College	Sarawak	Private
Knowskills Tvet College	KL	Private
Poly-Tech Mara College (KPTM)	Multiple Locations	Private (under MARA)
Open University Malaysia (OUM)	Selangor	Private
MAHSA University	Selangor	Private
Sunway University	Selangor	Private
Taylor's University	Selangor	Private

Source: MTVET, n.d., KRI compilation

Overview of Malaysia's TVET graduate output

In 2023, Malaysia produced over 83,000 TVET graduates, most of whom are at diploma qualification level. On average, slightly over half of those in TVET graduate with a diploma-level certification (Figure 2.8). Meanwhile, those who pursue degree-level certification are even fewer, ranging from 10% to 14% of the total TVET graduates. Though not considered a tertiary-level qualification, about a third of TVET graduates completed a certificate (MQF Level 3).

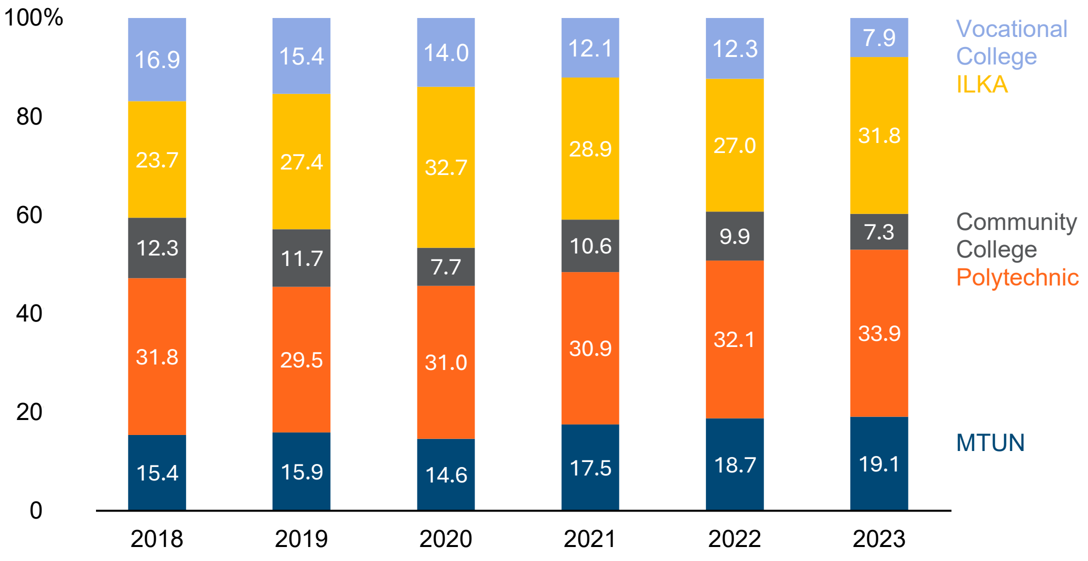
Figure 2.8: Proportion of TVET graduates, by certification level, 2018-2023



Source: MTVET, n.d., KRI calculations

Among the different types of public TVET institutions, the majority of Malaysia's TVET graduates are from polytechnics and ILKAs, reporting 28,407 and 26,685 graduates in 2023, respectively (Figure 2.9). When combined, those graduating from ILKAs and community colleges make up more than half of the total TVET graduates (Figure 2.9). As ILKAs and community colleges offer Diploma (MQF Level 4) and Advanced Diploma (MQF Level 5) qualifications, this explains why the majority of TVET graduates have diploma-level certification.

Figure 2.9: Proportion of TVET graduates, by institution type, 2018-2023



Source: MTVET, n.d., KRI calculations

For those graduating from MTUN, the number and share of TVET graduates have been increasing over the past six years, from 15.4% (12,399 graduates) in 2018 to 19.1% (15,987 graduates) in 2023. This reflects a growing number of students pursuing higher levels of TVET qualifications. This can also be seen with the trend of postgraduate TVET holders, which has been slightly increasing from 1.3% in 2018 to 1.7% in 2023.

2.4.2. Distribution of Technical Tertiary TVET Courses and Industries

While TVET has been touted as a game changer in the development of talent for Malaysia's industrial aspirations, it should also be noted that not all the courses offered in tertiary TVET institutes are technical or technology related. Some non-technical tertiary TVET courses currently offered are in tourism, business management and early childhood education, among others. While not technical, these courses serve to provide practical training and certification for other important sectors and services in Malaysia.

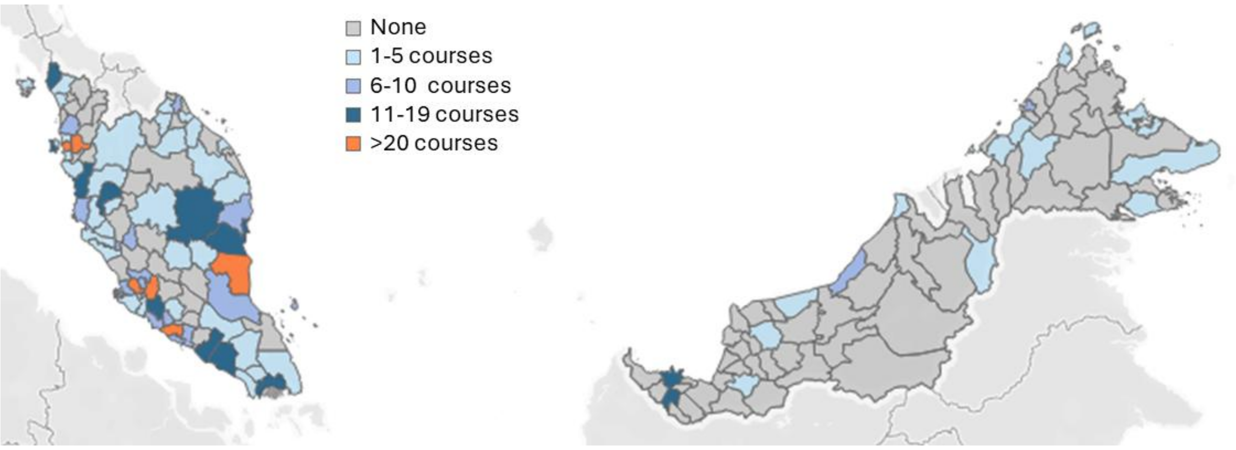
Among the tertiary TVET courses listed on the TVET Madani website are in technical and technology-related fields, which makes up the majority of the TVET tertiary certifications offered. As we aim to delve deeper into technical and technology talent development in Malaysia, this subsection further explores the distribution of four key sectors that are mentioned in our country's development goals. Namely, we examine which districts offer courses in:

1. Manufacturing and Industrial Technology;
2. Electrical and Electronic Technology;
3. Chemical and Petrochemical Technology; and
4. Computer Science and Information Communication Technology

Key technical and technology tertiary TVET courses by district

Manufacturing and Industrial Technology

Figure 2.10: Number of tertiary TVET courses, in Manufacturing and Industrial technology sector, by district



Source: MTVET, n.d., KRI compilation

Tertiary TVET courses under the Manufacturing and Industrial sector make up a significant portion of the current technical courses offered. Among the districts, Alor Gajah, Melaka, offers the highest number of manufacturing and industry tertiary TVET courses, with 40 courses across its various institutes (Figure 2.10). The concentration of Manufacturing and Industrial sector among the TVET institutions is also in line with Melaka's plans to establish a new industrial area in Alor Gajah[70].

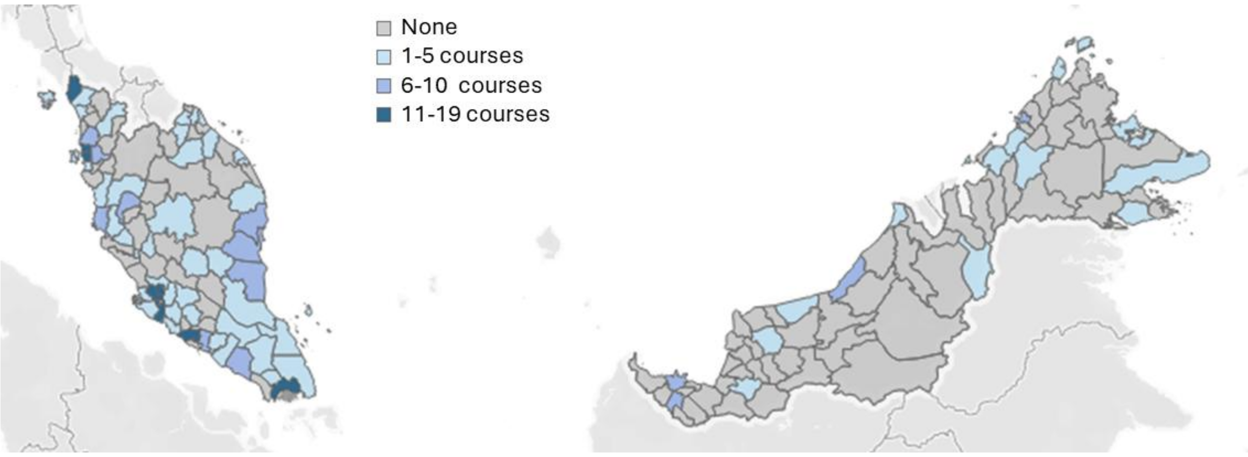
The overlap between talent supply and demand can also be seen in the case of Kulim, Kedah, which offers 30 listed tertiary TVET courses in the Manufacturing and Industrial sector. This can be an important source of talent for the Kulim Hi-Tech Park, which has been operating in the district since 1996[71]. Similarly, Shah Alam's industrial park's proximity to the Petaling district is complemented by the high number of tertiary TVET courses in the Manufacturing and Industrial sector. Additionally, Pekan, Pahang, which is known for its Pekan Automotive Park, offers 20 different tertiary courses in the Manufacturing and Industrial sector.

In the case of East Malaysia, Kuching, Sarawak, was the district with the highest number of tertiary TVET courses in Manufacturing and industry, with a total of 14 different courses. However, the availability of tertiary TVET courses in the Manufacturing and Industrial sector is found in more districts in Peninsular Malaysia, with most of the courses concentrated around high industry areas.

[70] "Melaka Plans New World-Class Industrial Area in Alor Gajah" (2022)
[71] "Kulim Hi-Tech Park - Leading Global Science City" (n.d.)

Electrical and Electronic Technology

Figure 2.11: Number of tertiary TVET courses, in Electrical and Electronic technology sector, by district



Source: MTVET, n.d., KRI compilation

The Electrical and Electronic sector has received growing attention in Malaysia's development aspirations and was also highlighted in the New Industrial Master Plan. Seberang Perai Utara and Seberang Perai Tengah in P. Pinang are among the districts with a high number of tertiary TVET courses in electrical and electronic technology, with 16 and 12 courses, respectively (Figure 2.11). The availability of the courses in this sector also complements P. Pinang's talent needs, as it has a strong, established Electronics and Semiconductor industry.

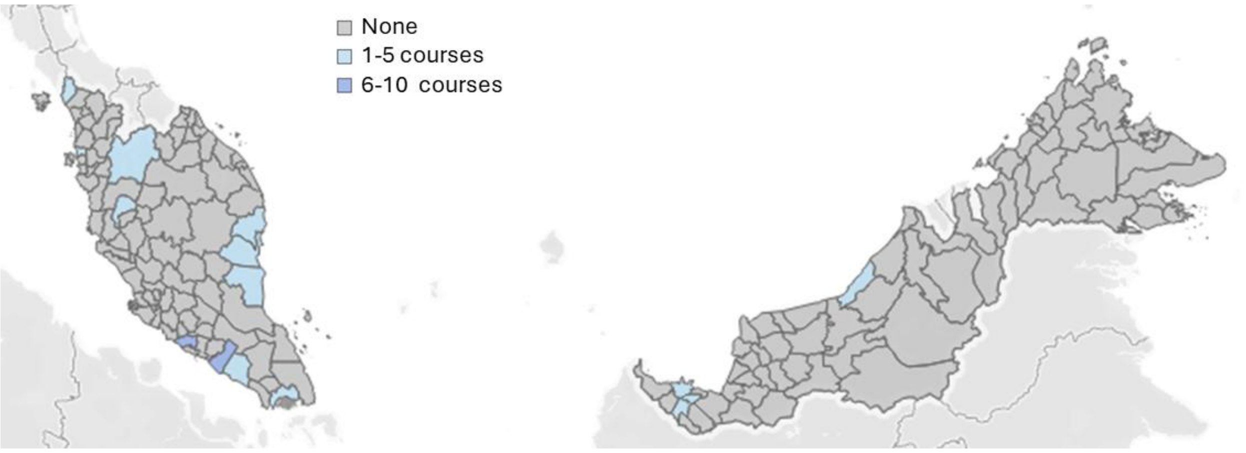
Among the states, however, Johor has the highest number of Electrical and Electronics tertiary TVET courses, totalling 39 courses across the state. Around a quarter of those courses were concentrated in the Johor Bahru district, which offers 11 tertiary-level TVET courses in Electrical and Electronic technology. While not as high as the number of E&E firms in the Northern and Central Region, Johor has a sizable number of firms in the E&E sector – with most of those firms concentrated in Johor Bahru and Muar[72]. There are also plans for a Johor-Singapore Special Economic Zone, which is planned to include the Electric and Electronics sector as priority sectors for this region[73].

[72] MITI (2023)
[73] MIDA (2025)

Chemical and petrochemical technology

The number of tertiary TVET institutions offering courses in Chemical and Petrochemical technology is significantly lower compared to other high-interest sectors. Out of two thousand tertiary-level qualifications on the TVET Madani database, only 37 courses are in the Chemical and Petrochemical Technology sector. However, it should be noted that those with Manufacturing and Industrial Technology qualifications and other related sectors can also be involved with the Chemical and Petrochemical industry.

Figure 2.12: Number of tertiary TVET courses, in Chemical and Petrochemical technology sector, by district



Source: MTVET, n.d., KRI compilation

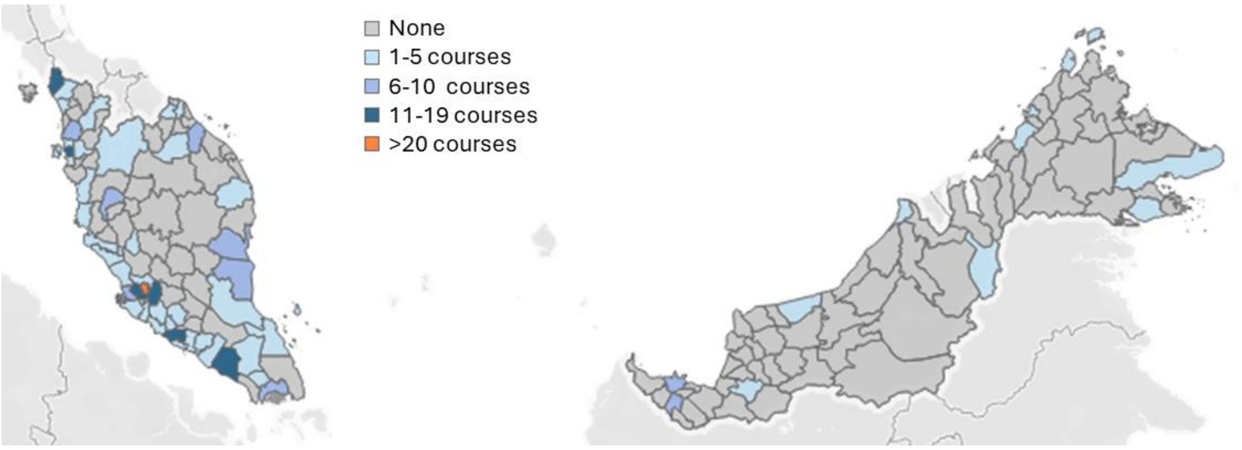
As the availability of the course is limited, most districts and states do not offer tertiary-level TVET courses in Chemical and Petrochemical technology (Figure 2.12). Among the districts that do, Muar, Johor has the highest amount at a total of 7 courses, spread between Politeknik Tun Syed Nasir Syed Ismail and Universiti Tun Hussein Onn Malaysia, Cawangan Pagoh. Meanwhile, other districts with a few chemical and petrochemical technology courses include Alor Gajah, Melaka (7 courses); Pekan, Pahang (5 courses); Kemaman, Terengganu (3 courses); Bintulu, Sarawak (3 courses); Perlis (3 courses); and Kuantan, Pahang (2 courses).

The distribution of the Chemical and Petrochemical tertiary TVET courses also overlaps with several of Malaysia's Petrochemical regional hubs. For example, Pekan, Kuantan and Kemaman are in close proximity to the Gebeng Petrochemical Cluster in Kuantan and the Petrochemical hub in Kerteh, which has several large-scale industries involved in the production of oil and gas products. Meanwhile, Bintulu, Sarawak is known for its Liquified Natural Gas (LNG) sector, which can be supported by the Chemical and Petrochemical course availability in the region.

However, in the case of Johor, its largest Petrochemical industry sector, the Pengerang Integrated Petroleum Complex is in the Kota Tinggi district. While Kota Tinggi itself has a few tertiary TVET institutes, it does not offer Chemical and Petrochemical tertiary courses. Rather, the closest is in Muar, where the MTUN and Polytechnic in that district specialise in Petrochemical courses. However, it is important to consider the capabilities of the institute in other nearby districts and thus utilise their technical capacity to meet the skill demands elsewhere.

Computer science and information technology

Figure 2.13: Number of tertiary TVET courses, in Computer Science and Information Technology sector, by district



Source: MTVET, n.d., KRI compilation

The distribution of tertiary TVET courses in the Computer Science and Information Technology sector across Malaysia is heavily skewed toward more urbanised and industrialised districts, especially clustered in the Klang Valley region. Figure 2.13 shows that KL has the highest concentration of such courses, with more than 20 available tertiary courses in this sector. Meanwhile, the Petaling and Ulu Langat district in Selangor shows a high (shown in dark blue) amount of course availability with 14 and 11 courses, respectively. This is consistent with the region's status as Malaysia's economic and technological hub, home to the Multimedia Super Corridor (MSC) and a large number of tech firms, including global multinationals and local startups[74].

In addition to the Klang Valley region, Seberang Perai Tengah, P. Pinang, also showed a significant presence of the Computer Science and Information Technology sector with 17 tertiary courses. P. Pinang's high availability of Computer Science and Information Technology courses is consistent with its position as a long-standing hub for Electronics and ICT Manufacturing. These concentrations in Klang Valley and P. Pinang suggest a clear link between local demand for ICT talent and the educational infrastructure designed to support it.

Meanwhile, other districts with relatively high concentrations of Computer Science and Information Technology courses include Alor Gajah, Melaka (15 courses); Batu Pahat, Johor (11 courses); and Perlis (11 courses). Interestingly, these districts have a lower presence of a strong IT and computer science industry, which may point to lower integration between local industry demand and talent supply. However, it should be noted that talent mobility does occur nationally and some states may leverage existing institutions in other districts to cater to the skills demand of another. For example, Johor has seen significant investment in industrial parks and data centres[75] that are mostly located in the Johor Bahru district. In contrast, large parts of rural Malaysia, particularly in the central and eastern regions of Peninsular Malaysia as well as much of Sabah and Sarawak, show little to no presence of these courses. Only a few districts in East Malaysia show minimal course availability, with Kuching, Sarawak, having the most at 9 courses. This reflects broader patterns of unequal development and the limitations of tertiary TVET availability in that region.

[74] MOC (2021)
[75] IRDA (2022)

Colocation between TVET courses and main industry drivers

In Malaysia, co-locating TVET institutes offering key Technical and Technology tertiary courses near strong industry drivers such as Manufacturing, Electronics and Petrochemical hubs can foster stronger alignment between education and workforce needs. Proximity to industries can allow for smoother integration of TVET's practical components, which is most effective when conducted on-site or in collaboration with nearby firms. Local partnership may also enable immediate curriculum updates, equipment donations, internship placements and stronger employer input in industry-academia boards.

Although mobility between states does occur among TVET graduates seeking job opportunities, the inherently practical nature of this education stream means being close to industries can offer tangible advantages. While national mobility offers some flexibility, the benefits of local engagement and contextualised training underline the strategic importance of colocation in shaping a responsive and robust TVET ecosystem in Malaysia. This relationship is further explored in Chapter 5.

2.5 Lifelong Development and Progression Pathways for T&T Talents

Lifelong learning and professional development in Malaysia, particularly within the TVET sector, have become strategic priorities in national education and workforce development policies. Recognising the evolving needs of industries and the importance of continuous skill enhancement, these pathways can encompass formal higher education routes, various microcredentials and short-term training programmes, as well as structured professional development opportunities. Thus, this section further explores the lifelong learning opportunities and professional progression pathways currently available for Malaysia's T&T talents.

2.5.1. Lifelong Learning Opportunities within TVET Education

Recognising the dynamic demands of industry and rapid technological changes, Malaysia promotes lifelong learning to ensure that individuals continuously upskill and reskill throughout their careers. There are several modes to further enhance TVET graduates' capabilities, either through formal learning pathways or shorter, flexible arrangements such as micro-credentials and training programmes. These upskilling opportunities can vary for TVET graduates, and their relevance is dependent on the field or industry they pursue.

Formal further learning pathways in TVET

Earlier, Section 2.2 described the various education pathways available to those pursuing TVET, ranging from secondary education channels all the way to postgraduate qualifications. After the introduction of the Implementation of the Single Quality Assurance System for TVET (*Pelaksanaan Sistem Jaminan Kualiti Tunggal TVET*) in 2019, these TVET education pathways are structured to accommodate vertical and lateral mobility. This, in principle, allows TVET graduates to further their studies at higher levels of qualification, which can be important components in increasing technical capabilities and career mobility. Findings from previous KRI research on TVET found that TVET graduates with a higher level of qualification (degree vs. diploma) are more likely to be in high-skilled jobs that match their skill set and receive higher pay[76]. Hence, the availability of formal learning channels is crucial for the development of these T&T and TVET talents.

[76] KRI (2024)

While the framework for TVET graduates to pursue higher qualifications exists, its practical implementation can depend on the specific course requirements of the higher education institution itself. Section 2.3 highlighted that there is a range of TVET institutes with different education objectives and levels of qualification that are available within their institution. Thus, TVET graduates can have a variety of educational backgrounds and certifications by the time they've reached the diploma level. For example, students who pursued TVET via vocational colleges would have had an SVM certification compared to TVET students in polytechnics, which requires an SPM certificate. While in both cases, they are able to graduate with diploma-level certifications from their respective institutions, their potential to further their study at the bachelor's degree level can vary.

In 2019, the development of a Bachelor's in Technology (B.Tech) available in MTUNs was established as a means to close this gap. This new programme thus allowed students with SVM certification to pursue a bachelor's degree in MTUN institutions. Prior to that, admission to MTUN TVET degree-level programmes, such as in Engineering Technology, required an SPM certificate. This limited the learning opportunities for TVET students from institutions that offered SVM or SKM certifications. A summary of available B.Tech in MTUN is listed in the Table 2.8 below. Additionally, TVET students are able to pursue a Bachelor's in Vocational Education at UTHM. These degree programmes are often specialised in specific areas, such as welding or general machining, with the aim of producing skilled TVET educators in those sectors.

Table 2.8: Summary of B.Tech in MTUN

MTUN	Programmes
UTHM	Building Construction with Honours Electrical System Maintenance with Honours Furniture Design and Manufacturing with Honours Industrial Electronic Automation with Honours Industrial Machining with Honours Occupational Safety and Health with Honours Oil and Gas Plant Operation with Honours Refrigeration and Air Conditioning with Honours Welding with Honours Technology Management (Construction) with Honours Technology Management (Production and Operation) with Honours Technology Management with Honours
UMPSA	Building Construction with Honours Automotive with Honours Industrial Electronic Automation with Honours Electrical System Maintenance with Honours Oil & Gas Facilities Maintenance with Honours Industrial Machining with Honours Welding with Honours
UTEM	Technopreneurship With Honours Technology Management with Honours (Technology Innovation) Technology Management with Honours (High Technology Marketing) Technology Management (Supply Chain Management and Logistics) With Honours
UniMAP	Industrial Machining with Honours Electrical Maintenance System with Honours Industrial Electronic Automation with Honours Automotive with Honours Building Construction with Honours

Source: MTVET, n.d., KRI compilation

Though there have been efforts to expand the opportunities for TVET diploma-level graduates to attain degree-level qualifications, access to postgraduate education in the TVET education sector remains largely limited. This is also seen through the MQF framework (Table 2.4), which shows MQF Level 6 (Degree-level) as the highest available qualification under the TVET sector.

However, that is not to say there are no postgraduate programmes available to TVET degree holders. Currently, these programmes in MTUN are limited to Master of Science, Master of Engineering Technology, and Master of Technical and Vocational Education. As entry to these programmes requires a minimum of a bachelor's degree in the relevant field, B.Tech graduates (and thus TVET graduates without SPM) may not be eligible for these programmes. This can constrain those who intend to pursue postgraduate education and thus limit their potential in technical development.

Accreditation of Prior Experiential Learning

In addition to the above education pathways, Malaysia's Accreditation of Prior Experiential Learning (APEL) system, overseen by the MQA, offers a structured mechanism for recognising knowledge and skills acquired outside formal education[77]. APEL is segmented into three key pathways: APEL A for access to higher education, APEL C for credit transfers within academic programmes and APEL Q for awarding full qualifications via experiential evidence. In TVET contexts, learners with industry experience from roles such as machine operators, technicians, or supervisors can document their skills through portfolios, challenge tests, or interviews. This enables them to gain direct admission or exemption credits toward vocational certificates up to postgraduate certification.

Despite its transformative potential, APEL implementation in TVET faces significant challenges. Studies reveal that inconsistent assessment quality, limited awareness among potential candidates and the complexity of evaluation processes hinder broader uptake[78]. Moreover, ensuring robust quality assurance, particularly through transparent, competency-based assessments, remains a core concern for maintaining legitimacy and public confidence[79].

Nevertheless, if effectively executed, APEL can empower TVET professionals by offering accelerated educational progression, enhanced employability and recognition for lifelong learning—all crucial for a resilient and skilled Malaysian workforce.

Micro-credentials and flexible learning channels in TVET

Micro-credentials and short courses with certification have emerged as a flexible and modular form of learning that supports Malaysia's lifelong learning agenda. These types of programmes are especially beneficial for working adults, allowing them to upskill without the need to commit to full-time education. Microcredentials serve a broad range of purposes in the TVET sector, ranging from required certifications needed in order to work in the field to short courses intended to broaden T&T talents' technical knowledge and remain relevant in the industry. A summary of the different types of microcredential programmes are summarised in Box 2.2.

Despite the promising growth of microcredentials in Malaysia's TVET landscape, challenges remain. The main issues include fragmentation of offerings, unclear recognition across industries, high fees for specialised certifications and limited microcredential coverage in niche or emerging fields.

[77] MQA (n.d.)
[78] Ooi and Din Eak (2019)
[79] Kaprawi, Razzaly, and Ali (2015)

Box 2.2: Summary of TVET microcredential and certifications offered

Industry required certification

One critical area is compliance with mandatory industry certifications such as those issued by the Department of Occupational Safety and Health (DOSH). In fields like Construction, Manufacturing, and Oil and Gas, certifications like the Occupational Safety and Health Competency Certificate (OSHCC) or Gas Competency Certificate are often legal prerequisites for employment. Through microcredentials, TVET providers offer short, targeted training aligned with these regulations, enabling learners to obtain or renew required qualifications more flexibly. This has proven to be especially valuable for working adults who cannot commit to full-time programmes. However, access remains uneven due to the limited number of institutions accredited to deliver DOSH-recognized microcredentials and the significant costs associated with certification and renewal.

Professional competency certificates

In addition to regulatory certifications, TVET learners increasingly pursue professional competency certifications tied to specialised equipment and software. For instance, sectors like automotive, precision engineering and mechatronics may require proficiency in tools like SolidWorks, AutoCAD, or programmable logic controllers (PLCs). Microcredential courses enable learners to gain hands-on experience and assessment-based certification without enrolling in lengthy diploma programmes. These certifications often have strong employer recognition and are critical in hiring decisions. Nonetheless, the reliance on proprietary software licenses and the need for certified trainers mean that course delivery can be expensive and geographically limited, particularly outside urban centres.

Knowledge-based short courses

TVET institutions also offer a wide array of knowledge-based short courses under the microcredential umbrella. These range from digital literacy, entrepreneurship and green technology to communication and project management skills. Unlike compliance-based or equipment-specific certifications, these courses are more generalist but serve to broaden a learner's competencies and enhance employability.

2.5.2. Professional Development Pathways for Technology and Technical Talent

To support professional development, numerous professional bodies in Malaysia offer professional recognition that enhances employability and career progression within various TVET-related industries. In professional and technical industries, external validation through recognition is often seen as objective proof of expertise. Recognition often correlates with career advancement, allowing them further professional opportunities and upward mobility.

For example, MBOT recognises Professional Technologists and Certified Technicians, while the Construction Industry Development Board (CIDB) certifies construction personnel under the Construction Personnel Registration. Other bodies include the Energy Commission for electrical certifications and the National Institute of Occupational Safety and Health (NIOSH), which provides safety-related credentials. These credentials are recognised nationally and internationally, helping professionals validate their expertise in specialised fields. Several examples of professional bodies that provide recognition for technical talent are stated in the table below.

Table 2.9: Examples of professional bodies recognition for technical talent

Professional Body	Recognition	Sector
Malaysia Board of Technologists (MBOT)	Professional Technologist (Ts.) Certified Technician (Tc.)	Technologist and Technician
Engineering Council	Chartered Engineer (CEng)*	Engineering
Board of Engineers Malaysia (BEM)	Professional Engineer (Ir.)	Engineering
Board of Quantity Surveyors Malaysia (BQSM)	Professional Quantity Surveyor (Sr.)	Construction / Built Environment
Board of Engineers Malaysia (BEM)	Certified Engineering Technician (Eng. Tech)	Engineering Support / Technical
Construction Industry Development Board (CIDB)	Certified Construction Project Manager (CCPM)	Construction Project Management

Source: KRI compilation
Note: The list of professional bodies above are non-exhaustive

Compared to some other technical professions, professional recognition for technicians and technologists is fairly new. Where previously they had no structured professional pathways, the establishment of MBOT pioneered the framework of professional development among technicians and technologists in Malaysia (Box 2.3). The impact of these MBOT professional recognitions on their career mobility and technical capabilities is further explored in Chapter 6.

Box 2.3: Role of MBOT in Professional Recognition

MBOT plays a central role in providing professional recognition for technical and technology practitioners in Malaysia, especially those emerging from the TVET education streams. Under the Technologists and Technicians Act 2015 (Act 768), MBOT serves as the national body that registers and certifies technologists and technicians in various technology fields, including Information Technology, Manufacturing Technology and Biotechnology. This formal recognition helps elevate the status of technical professionals, positioning them alongside traditional professionals like engineers and architects.

By offering titles such as Professional Technologist (Ts.) and Certified Technician (Tc.), MBOT enhances the credibility and mobility of TVET graduates, aligning their qualifications with national competency standards. MBOT also promotes continuous professional development (CPD), mandating registered professionals to update their skills in response to technological advancements. By creating this ecosystem of recognition, regulation and upskilling, MBOT provides a structured career pathway for Malaysia's technical workforce.

2.6 Discussion and Policy Implications

The output of TVET graduates' skills and qualifications is constrained by available education pathways

Malaysia's diverse TVET landscape includes various institution types, each serving different purposes based on their mandates. For instance, public skills training centres focus primarily on equipping students with industry-relevant skills for immediate employment in technical trades. Polytechnics and community colleges, on the other hand, tend to blend vocational and academic content, preparing students for either employment or further study. Meanwhile, university-level institutions that offer TVET-related degrees focus more on producing technologists and applied researchers. This fragmentation reflects the need to serve different socio-economic groups, sectors and job market requirements, but it also means that institutional objectives and therefore programme quality, depth and outcomes, vary widely across the system.

Given this, the output of Malaysia's TVET graduates is constrained by the education pathways available, limited by their field and past certifications. This affects the depth and breadth of their skills and qualifications. Most TVET enrolments occur at post-secondary certificate and diploma levels, with fewer students advancing to degree or postgraduate levels within the TVET ecosystem. This is partly due to the scarcity of institutions offering advanced TVET education and the lack of seamless articulation between lower and higher levels of training. While the distribution of TVET institutions is widespread across the country, only half of those available offer tertiary TVET pathways, which are the diploma-level qualifications and above.

Despite efforts to strengthen TVET in recent years, programmes remain heavily concentrated at the certificate and diploma levels, with relatively few clear and accessible routes into tertiary-level TVET. The constraints and availability of TVET qualifications become more limited as the level of qualifications increases, with most post-graduate opportunities existing in the academic sector.

This bottleneck restricts upward mobility for TVET graduates. As a result, most TVET graduates enter the workforce with only basic or intermediate qualifications, which may limit their opportunities for career advancement, particularly in an evolving economy that increasingly values higher-order technical skills and innovation. **Hence, there is a need to establish more tertiary TVET institutions by offering higher-level qualifications in existing non-tertiary TVET, particularly in states with limited availability.**

Distribution of TVET courses echoes regional industrial activity, but there is room for improvement

The distribution of TVET courses in Malaysia largely mirrors the country's regional industrial activity, with many technical and vocational institutions offering programmes aligned with the dominant industries in their respective areas. For instance, districts like Kulim, Kedah and Pekan, Pahang, known for their robust manufacturing and automotive sectors respectively, also had a higher concentration of TVET institutions offering relevant courses in manufacturing, automotive and industrial technology. This strategic alignment can help meet local labour demands and facilitate job placement for graduates.

Moreover, proximity to related industries allows students to engage in real-world training through apprenticeships, internships and industrial collaborations. This integration strengthens the practical components of TVET and enhances the overall quality and responsiveness of skills training to current industry needs. **To maximise these benefits, there should be a more deliberate and data-informed approach to planning the geographic distribution and specialisation of TVET programmes across Malaysia**. Especially as not all districts with technical TVET course offerings enjoy the same degree of industrial integration. In several districts, the range of available courses does not always reflect local economic priorities or offer pathways into high-demand, high-skill sectors. Some districts may offer generic technical courses without clear progression pathways or industry alignment, which can limit their relevance and effectiveness.

Specialisation within TVET institutions can also play a vital role in ensuring training relevance and quality. Institutions that focus on a specific field—such as automotive technology or petrochemical—can concentrate resources, infrastructure, and expertise to deliver high-calibre education and practical training. These specialised institutions are better positioned to invest in the costly specialised equipment, teaching staff, and facilities as required for hands-on learning. Practical training that can mirror real-world conditions is a cornerstone of effective TVET, which can produce highly competent TVET graduates.

While the clustering of specialised TVET courses in industrial regions can enhance local responsiveness, it also reveals gaps in access for students from less-developed areas. There are regions across Malaysia that have limited access to technical tertiary TVET institutes. This is particularly noticeable in Sabah and Sarawak, where key technical tertiary-level courses are only clustered around very few districts. This geographical imbalance can lead to underutilised potential in regions where latent industrial growth is possible but unsupported by a skilled local workforce. **Expanding and strategically distributing tertiary-level TVET programmes alongside regional economic development plans can help close this gap and facilitate more equitable growth.** Additionally, tertiary TVET courses that are not capital-intensive or less reliant on proximity to industries, such as computer science or ICT-related courses, could also be expanded in regions with limited access to tertiary TVET courses.

TVET-specific lifelong learning channels are fragmented, with opportunities tied to specific fields or industries

TVET-specific lifelong learning opportunities in Malaysia remain fragmented, with pathways often confined to limited, narrow industry segments. While specialisation and competency within a field require niche programmes and certifications specific to the industry pursued, this pathway is not available to all technology or technical sectors in Malaysia. Despite lifelong learning being increasingly recognised as essential for career adaptability and progression, the structure and availability of upskilling options within TVET remain inconsistent, posing a challenge to the broader accessibility and flexibility needed for professional and technical development for our country's T&T talent.

Despite the growth in post-graduate qualifications within the TVET sector through the expansion of MTUN, these opportunities are still largely concentrated in select areas such as engineering technology and technical education. Fields like advanced manufacturing and digital technologies have made progress, but many other disciplines within the TVET landscape lack structured pathways for professional or academic advancement beyond the undergraduate level.

As a result, professionals from other technical sectors may struggle to find relevant, accredited postgraduate pathways that align with their work experience and career aspirations. This points to a need to strategically **broaden the availability of higher-level TVET programmes across more fields, such as establishing a Master of Technology in MTUNs, to position TVET as a viable and respected lifelong learning track parallel to traditional academic education.**

Microcredential programmes, which have the potential to offer flexible and modular learning for working adults, are similarly constrained. These short courses are often available only in selected fields, typically those with strong industry engagement or where there is a high demand for updated competencies. These include sectors such as ICT, logistics and manufacturing, where there are more established routes for short-term, skills-based learning—often tied to employer demand or specific technologies.

However, many other technology and technical areas lack sufficient microcredential options due to weak collaboration with industry bodies or limited institutional capacity. Professional competency certifications, which are vital for verifying skills and ensuring quality in the workforce, are also largely dependent on the strength of these industry linkages, leaving some fields without credible or accessible lifelong learning channels. Without strong links to employers and industry bodies, many of these programmes may struggle to gain recognition as legitimate markers of professional competence, reducing their utility for TVET graduates seeking continued growth or career advancement.

Nonetheless, professional development structures driven by relevant professional bodies are emerging to provide clearer and more formalised competency markers. One promising development in the professionalisation of TVET talent is the formation of MBOT, which provides a structured recognition system for technical and technological practitioners. MBOT serves not only as a professional development pathway that legitimises technical competencies but also creates a clear career progression framework through its tiered registration system (e.g. Graduate Technologist to Professional Technologist, Qualified Technician to Certified Technician).

This form of recognition is vital in a sector where practical experience and applied knowledge are core competencies. It can also be crucial in bridging the gap between technical qualifications and industry expectations, which can help TVET graduates advance in their careers and gain parity with traditionally qualified professionals. **Thus, strengthening institutions like MBOT and increasingly integrating their standards into the broader TVET and lifelong learning landscape can be essential to the development of a skilled and respected technical workforce in Malaysia.**

2.7 Concluding Remarks

In conclusion, this chapter has provided a comprehensive overview of the evolution and current state of Malaysia's TVET education system, tracing its development through various policy shifts and institutional reforms. By contextualising the growth of TVET alongside national development goals, we have seen how the system has expanded to meet growing industrial demands while still grappling with structural and strategic challenges. The mapping of TVET institutes and technical fields further reveals a system that is responsive to regional economic priorities but also marked by uneven distribution and access.

Our analysis identified three key findings. First, despite the government's efforts to strengthen the sector, the output of skilled TVET graduates is limited by the structure and availability of educational pathways, particularly in terms of limited tertiary TVET institution availability. Second, while the alignment between TVET offerings and regional industrial activity is evident, greater coordination is needed to ensure that training opportunities are not only concentrated in high-demand regions but also serve broader national development goals. Lastly, the potential of lifelong learning is underutilised due to fragmented programme offerings and narrow field-specific opportunities, pointing to a need for more strategic expansion of both formal learning pathways and microcredential programmes for TVET graduates.

These findings underscore the importance of developing a more cohesive and inclusive TVET ecosystem in Malaysia—one that not only matches skills supply with current market demands but also anticipates future shifts in the labour landscape. As the country advances toward a knowledge-driven economy, a strengthened TVET framework is essential for developing a resilient and future-ready workforce in Malaysia.

REFERENCES

Ashman, Adam. 2021. "Higher Education Ministry Ropes in 21 Industry Leaders to Elevate Vocational Training, Education." 2021. https://www.malaymail.com/news/malaysia/2021/.../2016981?utm#google_vignette.

Bach, Alexandra, Lai Chee Sern, and Agus Setiawan. 2025. "Construction Technology, Wood Technology and Color Technology and Interior Design." TVET@Asia. March 4, 2025. https://tvet-online.asia/startseite/.../.

Devan, Ananda. 2021. "History of Malaysian Education System: Year 1824 to 2025." *ResearchGate*. https://doi.org/10.2139/ssrn.373572.

EPU. 2015. "Eleventh Malaysia Plan (2016–2020)." Putrajaya: Economic Planning Unit. https://ekonomi.gov.my/.../pdf.

———. n.d. "Malaysia Plans." Economic Planning Unit.

ESPACT. n.d. "History of The National Education System in Malaysia." ESPACT - Education Services Provider. https://www.espact.com.my/national-education-system/brief-history.

Fah, Chang Yun. 2018. "The Development of TVET System in Malaysia and Its Challenges Ahead." *Tatlor's Education Group*, no. 1. 馬來西亞華社研究中心:1–42.

Hawati Abdul Hamid and Tan Mei Yi. 2023. "Unlocking the Earning Potential of TVET Graduates." Khazanah Research Institute. Creative Commons Attribution CC BY.

HRD Corp. n.d. "Skim Latihan Dual Nasional (SLDN)." HRD Corp Support Centre. Accessed June 29, 2025. https://supportcentre.hrdcorp.gov.my/.../skim-latihan-dual-nasional-sldn.

IRDA. 2022. "Invest Iskandar Report Card 2022." Iskandar Regional Development Authority.

JPPK. n.d. "Sistem Kemasukan Pelajar Ke Politeknik & Kolej Komuniti." Accessed June 29, 2025. https://ambilan.mypolycc.edu.my/portalbpp2/index.asp?pg=program&kat=D.

Kaprawi, Noraini, Wahid Razzaly, and Wan Nor Syahira Wan Ali. 2015. "Implementation Framework System for Accreditation of Prior Experiential Learning (APEL) In Higher Institutions in Malaysia." *Jurnal Teknologi (Sciences & Engineering)* 77 (33). https://doi.org/10.11113/jt.v77.7019.

KRI. 2024. "Shifting Tides: Charting Career Progression of Malaysia's Skilled Talents." Kuala Lumpur: Khazanah Research Institute.

"Kulim Hi-Tech Park - Leading Global Science City." n.d. KHTP. Accessed July 4, 2025. https://www.khtp.com.my/.

"Malaysia Establishes a Government-Industry Body, and 12 Collaboration Hubs to Boost TVET." 2022. Human Resources Online. February 4, 2022. https://www.humanresourcesonline.net/malaysia-establishes-a-government-industry-body-and-12-collaboration-hubs-to-boost-tvet?utm.

Mazlan, Alice Suriati, Zuraidah Abd Manaf, Zainal Abidin Talib, Ab Rahim Bakar, and Nik Zainun Nik Mood. 2015. "Technical Vocational Education & Training (TVET) in Malaysia: Selected Works." *Journal of Technical Education and Training* 7 (1):23–34.

MBOT. 2019. "Annual Report 2016/2017." Putrajaya. https://www.mbot.org.my/media/annual-report.

"Melaka Plans New World-Class Industrial Area in Alor Gajah." 2022. The Vibes. December 13, 2022. https://www.thevibes.com/articles/business/79981/melaka-plans-new-world-class-industrial-area-in-alor-gajah.

MIDA. 2025. "Everything You Need to Know about the Johor-Singapore Special Economic Zone." Malaysian Investment Development Authority. 2025. https://www.mida.gov.my/mida-news/.../.

MITI. 2023. "New Industrial Master Plan 2030." Policy Document. Kuala Lumpur: Ministry of Investment, Trade and Industry Malaysia. https://www.nimp2030.gov.my/.

MOC. 2021. "Malaysia Digital Economy Blueprint." Putrajaya: Ministry of Communications and Multimedia. https://ekonomi.gov.my/sites/default/files/2021-02/malaysia-digital-economy-blueprint.pdf.

MOFA. 2025. "Speech by: YAB Dato' Seri Dr Ahmad Zahid Hamidi at the ASEAN TVET Council 4th Regional Policy Dialogue." Official Portal Ministry of Foreign Affairs Malaysia. 2025. https://shorturl.at/iftxo.

MOHR. 2023. "Skills Malaysia." Skills Malaysia. June 25, 2023. https://skillsmalaysia.gov.my/ms/.

———. n.d. "Malaysian Skills Certificate (SKM) - Department of Skills Development." Accessed July 4, 2025. https://www.dsd.gov.my/en/service/malaysian-skills-certificate-skm.

MQA. 2024. "Malaysian Qualifications Framework (MQF)." https://cqa.upm.edu.my/upload/dokumen/menul320240924114553MQF_(2024).pdf.

———. n.d. "Accreditation of Prior Experiential Learning." Accessed July 4, 2025. https://www2.mqa.gov.my/apel/.

MTVET. 2024. "Dasar TVET Negara." https://mohon.tvet.gov.my/manual/MTVET_DASAR_TVET_NEGARA_2030.pdf.

———. n.d. "TVET Institutions in Malaysia."

Ooi, Li Hsien, and Arathai Din Eak. 2019. "Implementation and Challenges of Accreditation of Prior Experiential Learning: Admissions (APEL-A) The Assessors' Perspective." *Asian Association of Open Universities Journal* 14 (1). Emerald Publishing Limited:1–11.

Rasul, Mohamad Sattar, ZH Ashari, Norzaini Azman, and RA Rauf. 2015. "Transforming TVET in Malaysia: Harmonizing the Governance Structure in a Multiple Stakeholder Setting." *The Online Journal for Technical and Vocational Education and Training in Asia* 4 (2):1–12.

"Sglobaltvet." n.d. S Global TVET. Accessed July 4, 2025. https://sglobaltvet.edu.my/.

"TVET 2020." n.d. Accessed July 4, 2025. https://www2.mqa.gov.my/tvet/2020/index.cfm.

"TVET Master Website." n.d. TVET Master. Accessed July 4, 2025. https://tvetmaster.com/.

UNITAR. n.d. "UNITAR International University Malaysia." Https://Www.Unitar.My/. Accessed August 5, 2025. https://www.unitar.my/about-unitar/.

Voctech, Seameo. 2019. "TVET Country Profile Malaysia." UNESCO-UNEVOC World TVET.

[THIS PAGE INTENTIONALLY LEFT BLANK]

CHAPTER

03

OUTPUT AND OUTCOMES OF MALAYSIA'S TECHNOLOGY & TECHNICAL TALENT

CHAPTER 3

OUTPUT AND OUTCOMES OF MALAYSIA'S TECHNOLOGY & TECHNICAL TALENT

Hafiz Hafizi Suhaimi

We need to accelerate our digitalisation efforts to stay ahead in the post-pandemic era, as well as step up efforts to develop high-skilled talent and enhance TVET programmes. These initiatives will empower the Malaysian workforce to enhance efficiency and accelerate innovative capability, thereby creating a larger pool of skilled human capital for the nation.

YAB Dato' Seri Anwar Ibrahim (2023)

3.1 Introduction

While Chapter 2 discusses Malaysia's TVET education landscape, this chapter delves specifically into the profiles and labour market outcomes of our technology and technical (T&T) talent pool. It is important to distinguish here that while TVET does make a significant portion of the T&T talent, it also includes all graduates with qualifications in Natural Sciences, Mathematics and Statistics, Information and Communication Technologies, and Engineering, Manufacturing, and Construction courses.

This chapter first discusses the graduate output and labour market transition of the country's T&T talent in Section 3.2. It then further delves into their labour market outcomes, analysing the type of employment as well as the salaries and wages distribution among the T&T talent (Section 3.3). Section 3.4 then turns towards the demand side of T&T talent along with Malaysia's job creation policies in T&T related industries. Section 3.5 discusses several policy considerations and recommendations, followed by Section 3.6, which concludes the chapter with a summary of the key findings.

3.2 Talent Supply and Transition

This section seeks to understand the characteristics of supply and the readiness of graduates before they enter the labour market, particularly for those in technological or technical-related fields. Utilising data from the Ministry of Higher Education (MOHE) Graduate Tracer Survey (GTS), it examines the talent supply from both local public and private higher education institutions (HEIs) as well as their readiness in transitioning into the labour market.

3.2.1. Graduate Output

Malaysia produced approximately 287,000 graduates from both public and private HEIs in 2023. Among those graduates, 61.7% were from public HEIs (which consist of universities, polytechnics and community colleges), while the remaining 38.3% graduated from private HEIs. By qualification level, 60.7% of these graduates hold a bachelor's degree qualification or above[80], while 39.3% of the graduates were diploma and certificate holders.

[80] This includes postgraduate diplomas, master's degrees, PhDs and professional certifications

The field of study with the highest proportion of graduate output was in Business, Administration and Law (NEC 04) subjects, with 28.6% of graduates in 2023 (Figure 3.1). This was followed by Engineering, Manufacturing and Construction (NEC 07), at 19.5% of graduates. Meanwhile, other fields of study recorded much lower shares, the lowest being Agriculture-related courses at 1.4% of graduates. This distribution reflects a talent pool and student preference that is geared towards sectors perceived to offer better employment returns and industry demand. The strong presence in business and engineering-related fields aligns with long-standing industry demand, while moderate shares in Information and Communication Technologies and Health may indicate ongoing shifts towards higher-value, service-based and digitally enabled sectors.

The high concentration of graduates in Business, Administration and Law may also reflect institutional supply-side incentives, as these programmes are typically more scalable, require lower capital investment and are perceived to offer transferable career pathways[81]. However, this trend may risk labour market saturation and graduate underemployment in business-related fields, especially if economic growth is not matched by sufficient demand for these qualifications[82].

Lack of interest and motivation among students to pursue Science, Technology, Engineering and Mathematics (STEM) fields, challenges in STEM teaching and shifts in the medium of instruction in STEM fields at the school and tertiary levels limit the potential pool for both technical and professional pathways[83].

Figure 3.2 further delves into the distribution of the field of study among graduates by institution type. While public universities are a larger driver of graduate output, private HEIs also play a significant role in producing Malaysia's tertiary talent. Private HEIs tend to prioritise market-driven programmes such as Business, Administration and Law (NEC 04), Information and Communication Technologies (NEC 06), Health and Welfare (NEC 09) as well as Other Services (NEC 10), which collectively accounted for 58,518 graduates in 2023.

The emphasis on these fields reflects the commercial orientation of private HEIs, which are often more responsive to industry demand. While public HEIs also align their programmes with industry needs, their broader mandate includes public interest objectives such as promoting equitable access, supporting national development priorities and supplying talent for strategic sectors.

On the other hand, polytechnics and community colleges drove high graduate output in Engineering, Manufacturing, and Construction courses, other than public universities, at about 21.2% and 6.3%, respectively. Additionally, community colleges produce a higher amount of graduate output in Service courses. The distribution of the institution type within each field of study provides a snapshot of the focus areas of these institution types, reflecting the diverse roles each of these institution types plays in Malaysia's higher education landscape.

[81] Azizan, Pangil, and Zin (2021)
[82] Mohd Amirul Rafiq Abu Rahim and Shazrul Ariff Suhaimi (2022); KRI (2018)
[83] Nur Sofea Hasmira Azahar (2024)

Figure 3.1: Proportion of graduate output, by study fields, 2023

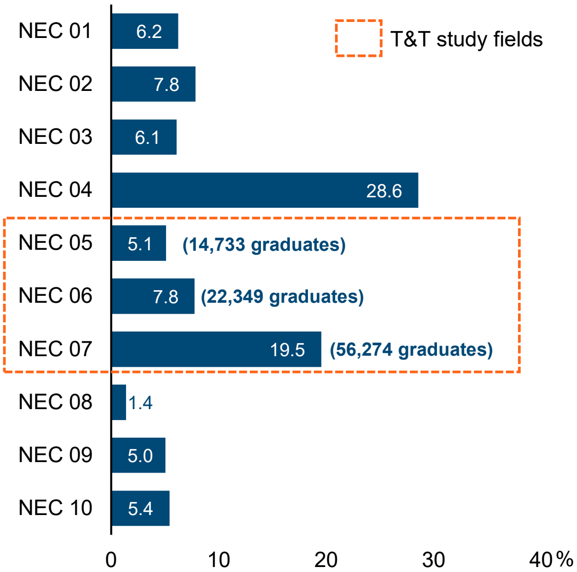
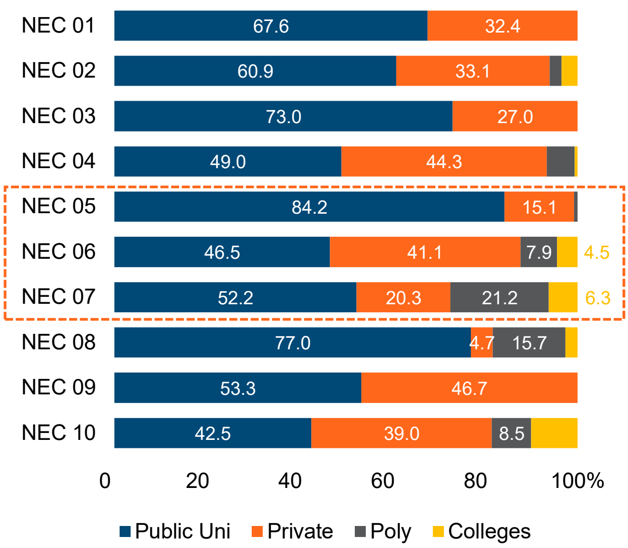


Figure 3.2: Breakdown of graduate output, by study fields and institution type, 2023



Source: MOHE (2023), KRI calculations

Note: NEC Code 01 – Education; NEC Code 02 – Arts & Humanities; NEC Code 03 – Social Sciences, Journalism & Information; NEC Code 04 – Business, Administration & Law; NEC Code 05 – Natural Sciences, Mathematics & Statistics; NEC Code 06 – Information & Communication Technologies; NEC Code 07 – Engineering, Manufacturing & Construction; NEC Code 08 – Agriculture, Forestry, Fisheries & Veterinary; NEC Code 09 – Health & Welfare; and NEC Code 10 – Services

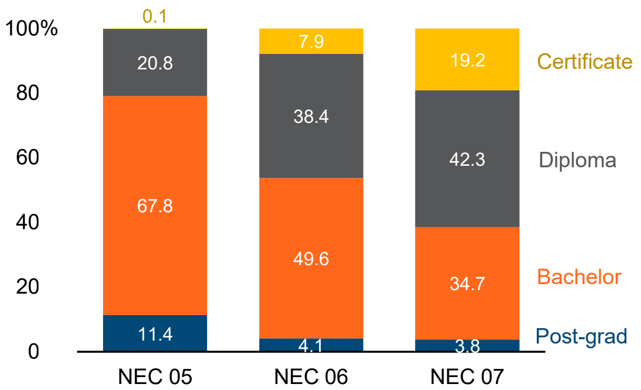
Technology and Technical (T&T) Graduates

In 2023, about 93,000 graduates (32.4% of total graduates) were from technology and technical (T&T) study fields, which is defined in this report as graduates from Natural Sciences, Mathematics and Statistics (NEC 05), Information and Communication Technologies (NEC 06), and Engineering, Manufacturing, and Construction (NEC 07). Among them, graduates from Engineering, Manufacturing and Construction courses make up the majority of the T&T talent, with over 56,200 graduates. This is followed by Information and Communication Technologies, with about 22,300 graduates, and Natural Sciences, Mathematics, and Statistics, with about 14,700 graduates.

Public HEIs, inclusive of public universities, polytechnics and community colleges, strongly drive the output of graduates from Natural Sciences, Mathematics, and Statistics, as well as Engineering, Manufacturing, and Construction, at 84.9% and 79% of the total graduates in respective fields, respectively (Figure 3.2). Meanwhile, graduate output for Information and Communication Technologies is a bit more fairly split between public HEIs (58.9%) and private HEIs (41.1%).

In addition to the public-private split, the distribution of the type of HEIs by study field offers a few interesting insights into the drivers of T&T graduate output. For example, for Natural Sciences, Mathematics, and Statistics, graduate output is driven mainly by public universities (84.2%) with limited shares of private HEIs (15.1%) and less than 1% among polytechnics. Meanwhile, though the majority of the graduate output from Engineering, Manufacturing and Construction courses is from public universities (52.2%), polytechnics (21.2%) and private HEIs (20.3%) also have a significant portion of graduates in that field.

Figure 3.3: Breakdown of graduate output, by study field and study level, 2023



Source: MOHE (2023), KRI calculations

Note: NEC Code 05 – Natural Sciences, Mathematics & Statistics; NEC Code 06 – Information & Communication Technologies; and NEC Code 07 – Engineering, Manufacturing & Construction

By study level, graduates from the Natural Sciences, Mathematics, and Statistics have the highest proportion of postgraduate and bachelor's degree levels, at 11.4% and 67.8%, respectively (Figure 3.3)—the highest share of graduates with bachelor's degree qualifications and above among the three T&T fields. Meanwhile, the graduate output for Engineering, Manufacturing and Construction fields is highest at the diploma level at 42.3% while also having the highest proportion of certificate holders among the T&T fields at 19.2%. In the Information and Communication Technologies study field, almost half of the graduates have bachelor's degrees (49.6%), while diploma holders make up 38.4% of ICT graduates.

The distribution of qualification level among the graduates in each T&T study field reflects the nature of the study, where courses that require a deeper understanding of theories and empirical modelling would need a higher level of certification compared to skill-based courses that could be offered at diploma and certificate levels.

The requirements of the study fields may also influence the job prospects. Graduates with higher degrees and specialised skills in areas such as statistics, pure science, actuarial science, communication, information technologies and mathematics are more likely to secure better employment outcomes[84] as these roles typically demand deeper technical expertise, which is usually signalled by a bachelor's or postgraduate qualification.

3.2.2. Transition into the Labour Market

This subsection examines the transition of graduates into the labour market, notably among those from T&T study fields, using data from the Graduate Tracer Study (GTS) by MOHE. The transition patterns across various T&T disciplines are analysed to assess employment outcomes and the relative marketability of each programme. This is crucial in assessing the effectiveness of various efforts, interventions and policies aimed at improving the employability of T&T graduates, particularly those from TVET and STEM programmes.

Following graduation, most graduates seek employment to realise returns on their investment in higher education. However, the transition is often hindered by challenges, as many Malaysian fresh graduates face skill mismatches, both vertical and horizontal, receive low starting pay, and are forced to take up non-standard employment[85]. Although the study shows that graduates tend to achieve better employment outcomes over time[86], the improvement is often insufficient to generate meaningful returns on higher education. This is even more pronounced for those who begin their careers in non-standard or low-paying jobs, resulting in a source of frustration for many, as higher education is generally perceived to offer better opportunities and upward mobility.

[84] KRI (2024a)
[85] Ibid.
[86] Ibid.

However, it must also be noted that, in addition to the misalignment between graduates' skills and job requirements, job creation for graduates has also been insufficient. Since 2015, the number of working graduates in the labour force has doubled the number of high-skilled jobs available in the market[87]. The systemic challenges must be addressed with substantive interventions, such as the creation of more high-value economic activities in order to generate high-skilled job creation. Otherwise, our graduates must opt for jobs abroad[88] or else get stuck in job mismatches for a longer period of time.

Directions after graduation

Figure 3.4 illustrates the job status of fresh graduates. Overall, 67.9% of graduates are working, while 16.6% furthered their studies. However, 10.2% of graduates were still unemployed. By study fields, the proportion of graduates of Engineering, Manufacturing and Construction who were employed was higher than the overall share, at 70.6% - the highest among the three T&T study fields. In comparison, Information and Communication Technologies had 64.7% of graduates who were working, while the Natural Sciences, Mathematics and Statistics study field had the lowest shares at 59.3%.

Over one-fifth of graduates in Natural Sciences, Mathematics and Statistics (23.8%) and Information and Communication Technologies (23.2%) pursued further studies after graduation. Engineering, Manufacturing and Construction graduates had a slightly lower share at 18.0%, in part due to the larger share of working graduates. Positively, the share of unemployed graduates in T&T study fields is below 10%, which is 9.1% for Natural Sciences, Mathematics and Statistics, 8.3% for Information and Communication Technologies, and 6.5% for Engineering, Manufacturing and Construction.

Figure 3.4: Breakdown of graduates, by study field and job status upon graduation, 2023

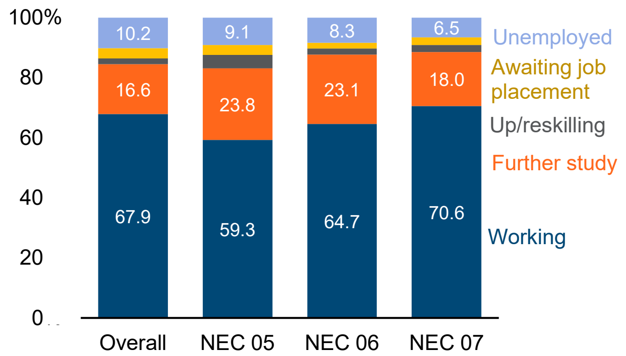
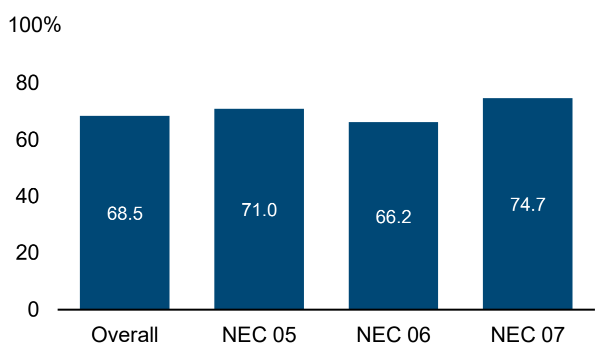


Figure 3.5: Prevalence of unemployed graduates who are looking for jobs, by study field, 2023



Source: MOHE (2023), KRI calculations

Note: NEC Code 05 – Natural Sciences, Mathematics & Statistics; NEC Code 06 – Information & Communication Technologies; and NEC Code 07 – Engineering, Manufacturing & Construction

Despite the high proportion of diplomas and certificate holders, Engineering, Manufacturing and Construction graduates show better employment outcomes compared to other T&T fields, with a relatively high share of those who are working and low unemployment rates. However, further examination of specific industry demands and types of employment that they get after graduation is required to identify gaps that could exist between the learning modules and industry expectations.

[87] KRI (2024a)
[88] Ibid.

Meanwhile, significant shares of graduates from Natural Sciences, Mathematics and Statistics, and Information and Communication Technologies prefer to get higher certifications, possibly due to the limited number of jobs in these fields and higher job requirements that require them to have post-graduate degrees. This is supported by a higher share of unemployed graduates, at 9.1%, which is slightly below the baseline. Besides that, the share of graduates who opt for upskilling/reskilling programmes from this study field is also the highest among all T&T study fields at 4.5%.

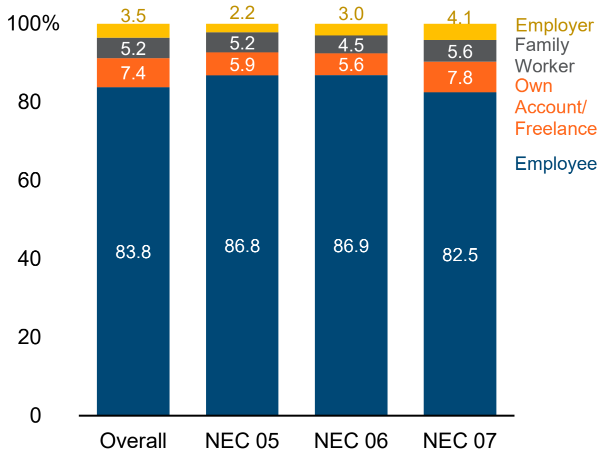
Among unemployed T&T graduates, the large majority are actively looking for jobs after graduation (Figure 3.5). Since this data captures graduate status within a maximum of 12 months post-graduation, it offers only a short-term view of employability outcomes and may not fully reflect longer-term career trajectories or job stability. Moreover, as the GTS relies on self-reported responses, there may be biases in how graduates perceive or report their employment status. Nonetheless, the high proportion of job-seeking graduates suggests that many remain optimistic and are actively engaging with the labour market. However, it is also noted that nearly half of the graduates are not fully aware of the job support programmes available to them[89].

Working graduates

Most working graduates are employees (Figure 3.6), with the highest shares observed in Natural Sciences (86.8%) and ICT (86.9%), above the overall average of 83.8%. These fields also have relatively lower shares of own-account or freelance workers[90]. In contrast, Engineering, Manufacturing and Construction record a lower employee share at 82.5% and a higher proportion of own-account or freelance workers at 7.8%, and that is above the overall average of 7.4%. This may reflect a mix of self-employment, small enterprise activity and freelance or gig work. While some may be leveraging technical skills to pursue independent income generation, it is a less secure form of work. Therefore, interpreting higher own-account shares requires caution, as it could signal both entrepreneurial drive and employment precarity.

[89] KRI (2024b)
[90] Own account worker is defined as a person who operates his own farm, business or trade without employing any paid workers in the conduct of his farm, business or trade. Source: DOS (2024c)

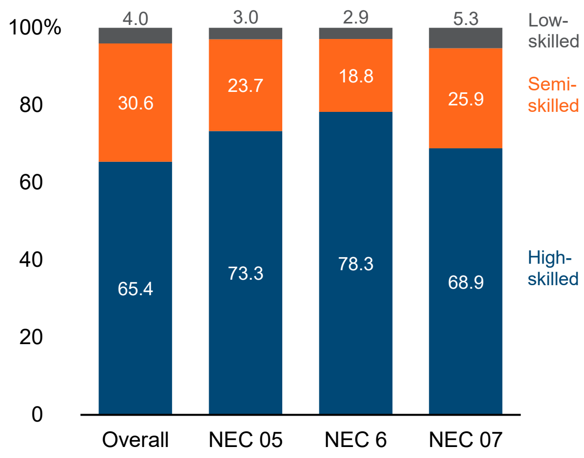
Figure 3.6: Breakdown of working graduates, by employment status, 2023



Source: MOHE (2023), KRI calculations

Note: NEC Code 05 – Natural Sciences, Mathematics & Statistics; NEC Code 06 – Information & Communication Technologies; and NEC Code 07 – Engineering, Manufacturing & Construction

Figure 3.7: Breakdown of working graduates, by skill level, 2023



Source: MOHE (2023), KRI calculations
Note: NEC Code 05 – Natural Sciences, Mathematics & Statistics; NEC Code 06 – Information & Communication Technologies; and NEC Code 07 – Engineering, Manufacturing & Construction

In addition to employment status, the skill level of the jobs held by graduates, starting pay, the economic sector in which they participated and employment type are among other indicators to assess the graduates' employment outcomes. Since the majority of them are employees, the observations also reflect the job market conditions in accepting our fresh graduates right after their graduation. The career progression later would be influenced by many factors, but the starting point plays a crucial role in ensuring better employment outcomes over time[91].

Figure 3.7 shows that overall, 65.4% of total working graduates have high-skilled jobs, 30.6% are in semi-skilled jobs and 4% work in low-skilled jobs. In comparison, T&T graduates showed a higher proportion of graduates in high-skilled occupations. Information and Communication Technologies graduates have the highest shares of high-skilled, at 78.3%, followed by Natural Sciences, Mathematics and Statistics, at 73.3% and Engineering, Manufacturing and Construction, at 68.9%. Concerningly, despite the high share of graduates in high-skilled jobs among Engineering, Manufacturing and Construction, there is also a significant number of graduates in low-skilled jobs, at 5.3%, which may point to large disparities in job availability within that industry.

High shares of graduates who work in high-skilled jobs reflect better employment outcomes, specifically among T&T graduates, even when the job market in Malaysia has only about one high-skilled position out of 4 positions available[92]. It is interesting to note that many T&T graduates could secure those limited high-skilled positions, possibly because of the skill set that they acquired in their studies. Besides that, the relevance of the technical modules would also contribute to high employment outcomes. Many employers are keen to employ T&T graduates who are ready to work in any specific job demand and specialisations.

[91] KRI (2024b)
[92] Ibid.

Besides skill level, starting pay could also be observed to understand the employment outcomes of T&T graduates. Overall, about half of the total graduates (51.3%) receive starting pay of RM2,000 and below (Figure 3.8). Two study fields have lower shares of those who get RM2,000 and below than the baseline, namely Natural Sciences, Mathematics and Statistics, and Information and Communication Technologies, with 44.9% and 37.5%, respectively. This is a welcoming outcome since the prospects of the study fields are better due to the higher demand and requirements of the job scope, thus, they would receive higher pay. Meanwhile, Engineering, Manufacturing and Construction graduates recorded higher shares of those with a starting pay of RM2,000 and below compared to the baseline, about 55.2%.

Figure 3.8: Breakdown of working graduates, by starting pay, 2023

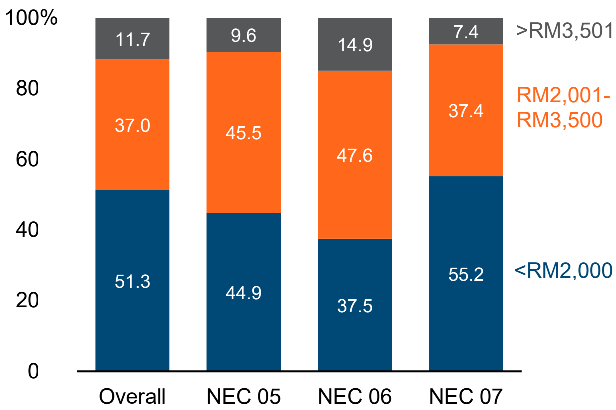
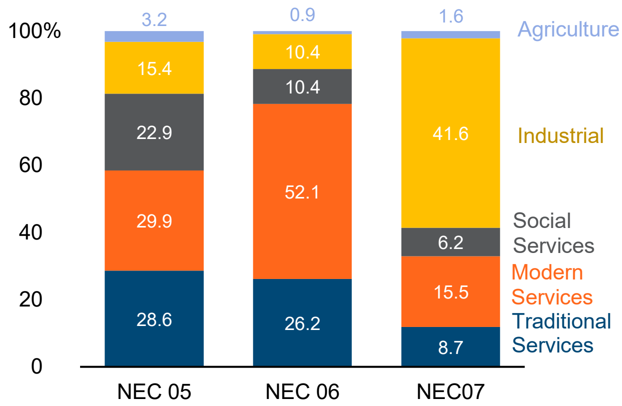


Figure 3.9: Breakdown of working graduates, by economic sector, 2022



Source: MOHE (2023), KRI calculations

Note: NEC Code 05 – Natural Sciences, Mathematics & Statistics; NEC Code 06 – Information & Communication Technologies; and NEC Code 07 – Engineering, Manufacturing & Construction

Overall, the percentage of graduates with starting pay between RM2,001 and RM3,500 is about 32.9%, while the percentage of those with starting pay of RM3,501 and above is 15.8%. All T&T study fields have larger shares of higher starting pay compared to the overall graduate outcomes. Natural Sciences, Mathematics and Statistics graduates have the highest share, at 40.8%, followed by Information and Communication Technologies, at 37.9%, and Engineering, Manufacturing and Construction, at 34.0%.

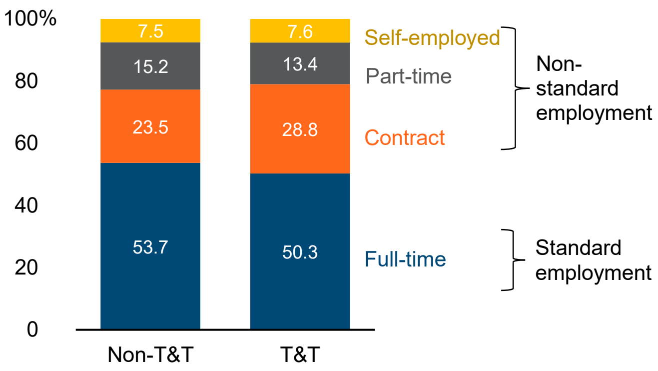
As for those who earn more than RM3,501, Information and Communication Technologies graduates score the highest share, at 24.6%, followed by Natural Sciences, Mathematics and Statistics, at 14.4%, Given that these two fields of study register high shares of those with high-skilled jobs, it is understandable that the shares of those with starting pay of more than RM3,501 are also higher.

However, Engineering, Manufacturing and Construction graduates had lower shares of those earning over RM3,501 at 7.4%. Additionally, despite the high share of these graduates with a pay of RM2,001 and above, the share of those who earn RM2,000 and below is also very significant. This is possibly due to the high shares of diploma and certificate holders and higher shares of those in low-skilled work.

Assessing economic sectors that graduates work in by study field, the Natural Sciences, Mathematics, and Statistics graduates have almost similar shares working in the Traditional Services[93], Modern Services, and Social Services sectors, at 28.6%, 29.9%, and 22.9%, respectively (Figure 3.9). Meanwhile, more than half of Information and Communication Technologies graduates work in the Modern Services sector, at 52.1%, and the Traditional Services sector, at 26.2%. As for Engineering, Manufacturing and Construction, about 41.6% of graduates work in the Industrial sector, and 35.1% are in the Traditional Services sector. All study fields have dominant economic sectors related to the subjects offered, and this has influenced the share of working graduates from each field. However, the Traditional services sector has almost similar significant shares of graduates from all study fields.

Another dimension that can be used to examine their employment type includes standard and non-standard employment. In this report, standard employment refers to full-time employment, while non-standard employment covers contract, part-time, and self-employed work. The categorisation is based on the nature and characteristics of the work. Figure 3.10 shows a comparison between non-T&T and T&T study fields in 2021.

Figure 3.10: Breakdown of working graduates, by employment type, 2021



Source: MOHE (2023), KRI calculations

Note: NEC Code 05 – Natural Sciences, Mathematics & Statistics; NEC Code 06 – Information & Communication Technologies; and NEC Code 07 – Engineering, Manufacturing & Construction

The proportions of standard and non-standard employment for both categories are almost identical. For non-T&T working graduates, the share of those who work in standard employment is about 53.7%, and non-standard employment is 46.3%. Meanwhile, for T&T working graduates, the share of those in standard employment is 50.3%, and in non-standard employment is 49.7%. Even though T&T working graduates record a slightly lower share of full-time employment, they have a higher share of contract employment compared to non-T&T graduates.

Job-qualification mismatch could also be used to explain the transition challenges faced by our graduates when they transition into the labour market. There are two types of mismatches, namely vertical mismatch[94] and horizontal mismatch[95].

Generally, a mismatch occurs when there is a misalignment between the study field, certification level and job requirements. This could expose graduates to several subsequent consequences, including low salaries, job dissatisfaction, high intention to change jobs, and limited prospects for career advancement. Over time, these conditions reduce the likelihood of achieving the expected returns from higher education.

[93] Traditional Services refer to wholesale and retail, transportation and storage, administration and support, accommodation and food, and other services. Modern Services include information and communication, financial and insurance/takaful activities, real estate activities, and professional, scientific, and technical activities, while Social Services consist of education, health, and social work, and public administration and defence and utility services. Source: KRI (2024b)

[94] Vertical mismatch is a scenario when the workers' qualification levels do not match the requirement level of the job. If the qualification level is higher than the job requirement, it is called overqualified, and vice versa. Source: KRI (2024a)

[95] Horizontal mismatch happens when the workers' field of study for their qualification is not similar to the field of areas that they work in. Source: Ibid.

As shown in Figure 3.11, around 70% of working graduates from all T&T study fields are in jobs that match their qualification levels (vertical match). Information and Communication Technologies graduates have the highest share of matched positions, at 79%. This is followed by Natural Sciences, Mathematics and Statistics, at 73.3%, while Engineering, Manufacturing and Construction is lowest, at 69.9%.

As for the mismatch, the Engineering, Manufacturing and Construction study field registers about 22% of overqualified working graduates and 8.1% of underqualified graduates. Interestingly, Natural Sciences, Mathematics and Statistics only registers overqualified working graduates at 26.7%, and an insignificant share of underqualified working graduates. As for Information and Communication Technologies, the mismatch is the lowest, with 18.5% of working graduates being overqualified and only 2.5% being underqualified.

Figure 3.11: Breakdown of working graduates, by vertical mismatch, 2023

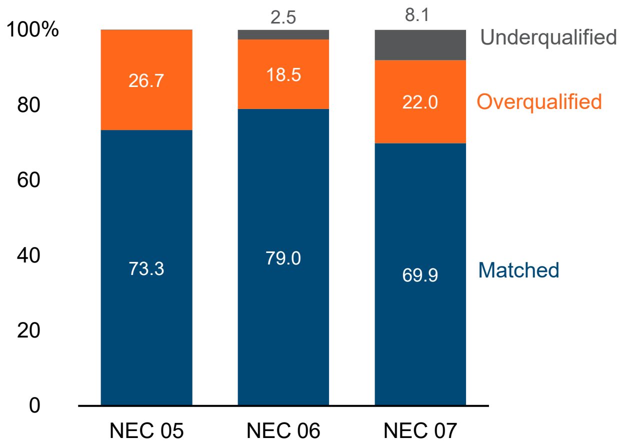
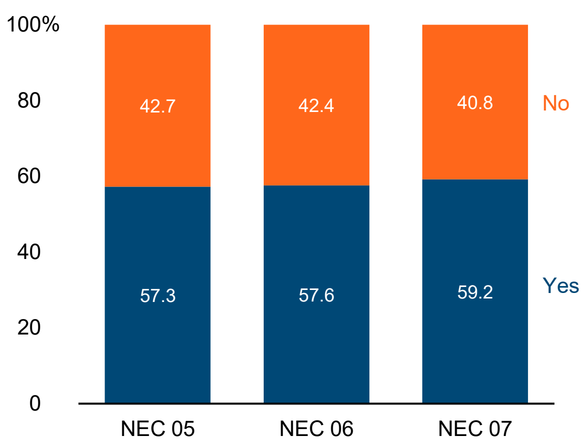


Figure 3.12: Breakdown of working graduates, by perceived horizontal mismatch, 2023



Source: MOHE (2023), KRI calculations

Note: NEC Code 05 – Natural Sciences, Mathematics & Statistics; NEC Code 06 – Information & Communication Technologies; and NEC Code 07 – Engineering, Manufacturing & Construction

Meanwhile, Figure 3.12 shows the proportions of working graduates by perceived horizontal mismatch. About half of the working graduates from all T&T study fields perceive that they are not working in areas related to their field of study, with shares ranging between 53.3% and 59.2%. This reflects a high prevalence of graduates who are not able to find employment in the industry similar to their educational background, even if they may be employed in high-skilled occupations.

3.3 Labour Market Outcomes of T&T Talent

This section aims to explore the outcomes of T&T talents in the labour market. The data used for this analysis was obtained from the Department of Statistics (DOS), drawing from several surveys including the Labour Force Survey (LFS), Salaries and Wages Survey (SWS) and the Informal Sector and Employment Survey. The report applies a cross-sectional analysis, providing a snapshot of labour market conditions as of 2023. These conditions are viewed as a continuation of the trends discussed in the earlier section on graduate transitions.

The previous section highlighted that T&T graduates' output from HEIs mainly comes from public universities, polytechnics and community colleges. By field of study, Engineering, Manufacturing and Construction courses produce the highest number of graduates, while other T&T courses, including Natural Sciences, Mathematics and Statistics, and Information and Communication Technologies, together make up less than half of T&T graduates. Additionally, the proportion of diploma holders among T&T talent is high, especially for Engineering, Manufacturing and Construction courses, where more than 40% of graduates were diploma-level holders.

In terms of the transition into the labour market, graduates from all T&T-related courses register lower shares of working compared to the percentage of the overall graduates, except for Engineering, Manufacturing, and Construction graduates. Meanwhile, more than 70% of unemployed graduates are actively looking for jobs. In terms of skill level, more than 70% are working in high-skilled positions. Despite this, over half of T&T graduates are still getting salaries lower than RM2,000 per month. Additionally, graduates are mostly working in the Services and Industrial sectors.

All these observations are examined from the supply side of the T&T talents. However, the observations remain incomplete without the consideration of the conditions within the labour market (demand-side), particularly for T&T-related talents and sectors. Therefore, this section discusses the labour market perspective by examining two key dimensions: employed persons and salaries and wages.

3.3.1. Employed Persons

In 2023, there were about 15.8 million employed persons in Malaysia. The Services sector registered the highest number of employed persons with more than 10.3 million (65.2%) workers, followed by Manufacturing with 2.6 million (16.4%), Agriculture with 1.4 million (9.1%), Construction with 1.3 million (8.1%), Mining and Quarrying with 0.09 million (0.6%), and households with 1 million (0.6%). Huge shares of employed persons in the services sector are contributed by 15 other subsectors that cover a wider range of Services, including Finance, Education, Technical, ICT and many more.

Meanwhile, based on Figure 3.13 shown below, about 7 million employed persons work in T&T-related sectors. The Manufacturing sector has the highest number of employed persons with about 2.6 million (16.4% out of total employed persons in Malaysia). This high share is likely due to the technical capabilities and technology applications required by the sector, and thus, where T&T talents are mostly hired.

This is then followed by Services with 1.6 million (9.9%), Agriculture with 1.4 million (9.1%), Construction with 1.3 million (8.1%), and Mining and Quarrying with 0.09 million (0.6%). The Services sector, in this case, only caters for five subsectors, namely Electricity, Gas, Steam, and Air Conditioning supply; Water supply, Sewerage, Waste Management and remediation activities; transportation and storage; information and communication; and professional, scientific, and technical activities. These subsectors are believed to represent T&T-related areas in the Services sector.

By gender, male workers make up the majority of the employed persons in T&T-related sectors, as shown in Figure 3.14, where the percentages are out of the total employed persons. The Manufacturing sector has the highest share of male workers, at 24.5%. Meanwhile, the Services, Agriculture, and Construction have similar shares of male workers, at 16.0%, 17.2%, and 16.2%, respectively.

For female workers, the highest share is registered for the Manufacturing sector, with 12.8%, followed by Services, with 6.3%. The shares of female workers in the Agriculture and Construction sectors are less than 4%.

These observations show that the majority of employed persons are male and that the gender distribution is likely based on the nature of work and job requirements. Men are dominating sectors that require physical labour, such as Agriculture and Construction. Meanwhile, women have a higher proportion in the Services and Manufacturing sectors, though men are still the majority. However, the imbalance of gender between sectors might also reflect that many jobs require more physical requirements instead of skills and expertise – implying more labour-intensive job scopes rather than capital-intensive ones.

Figure 3.13: Number and percentage of employed persons, by industry, 2023

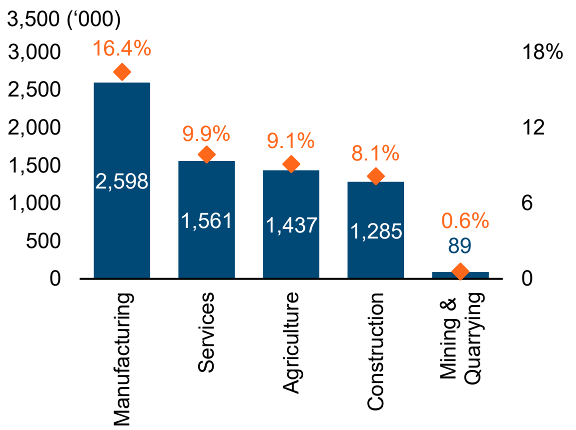
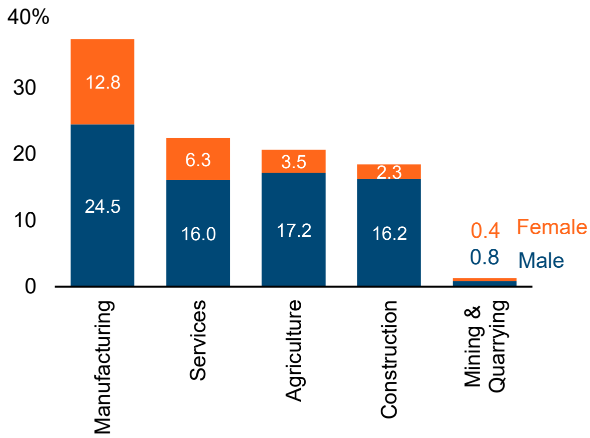


Figure 3.14: Proportion of employed persons, by industry and gender, 2023



Source: DOS (2024d), KRI calculations

Note: The T&T-related Services sector only includes electricity, gas, steam, and air conditioning supply; water supply, sewerage, waste management and remediation activities; transportation and storage; information and communication; and professional, scientific, and technical activities

In terms of employed persons by skill level, the majority of jobs are in semi-skilled positions, except for Mining and Quarrying sector (Figure 3.15), where despite the small number of workers in that sector, over half are in high-skilled occupations. In the Manufacturing and Services sectors, high-skilled workers make up the second-highest share. The Manufacturing sector registers a share of high-skilled workers, at 11.1%, and semi-skilled workers, at 23.8%. Meanwhile, the shares of high- and semi-skilled workers in the Services sector are 9% and 11.9%, respectively.

As for Agriculture, low-skilled workers make up the second-highest percentage, at 7.7%, after semi-skilled workers, at 7.7%. However, the Construction sector portrays a slightly different picture, where the shares of high- and low-skilled workers are almost similar, at 4.2% and 5.6%, respectively, after semi-skilled workers, at 8.6%. These observations mirror the overall conditions of the labour market, in which almost 60% of employed persons are semi-skilled workers. The relationship between job availability and the distribution of employment by skill level will be further explored in a next subsection.

Figure 3.15: Proportion of employed persons, by industry and skill level, 2023

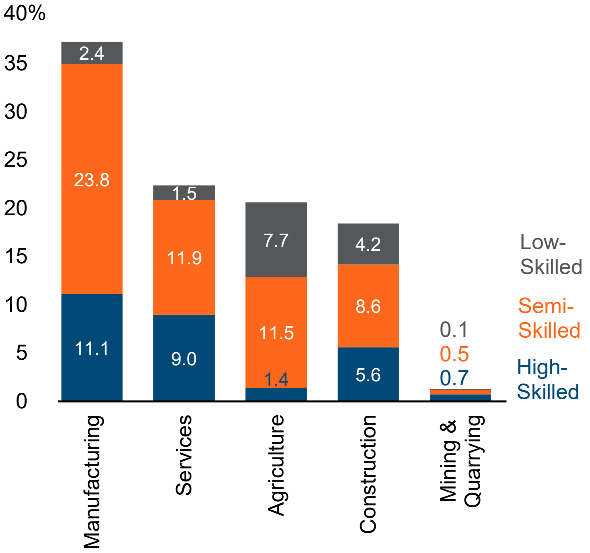
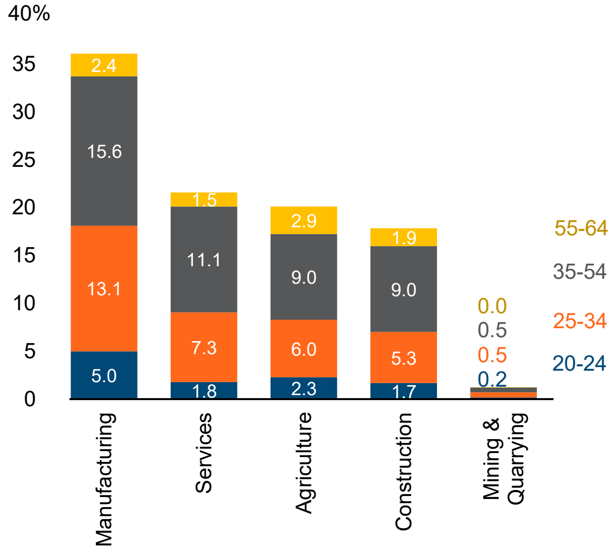


Figure 3.16: Proportion of employed persons, by age group, 2023



Source: DOS (2024d), KRI calculations

Note: The T&T-related Services sector only includes electricity, gas, steam, and air conditioning supply; water supply, sewerage, waste management and remediation activities; transportation and storage; information and communication; and professional, scientific, and technical activities

Across the age groups, the majority of employed people are aged between 25 and 54 (Figure 3.16), reflecting the national trend of the overall employed population. The Manufacturing sector records the highest shares of those aged 25-54, at 28.7% (out of the overall employed persons), followed by Services, at 18.4%. The Agriculture and Construction sectors have almost similar shares, at 15% and 14.3%, respectively. The Manufacturing sector has also registered the highest share of those aged 20-24, at 5%, while other sectors only record shares of 2.5% and below. Interestingly, the proportions of those aged 55-64 are higher in the Manufacturing and Agriculture sectors. Job availability and the different skill sets demanded from each sector are possibly the potential contributing factors to explain the observations.

Employees

In the labour market, employment status is categorised by DOS into employee, employer, own-account worker and unpaid family worker. These categories distinguish the nature of work undertaken by employed individuals. Employees represent the majority, accounting for approximately 78.5% of the employed population in 2023, followed by own-account workers at 15%. Due to both the dominant share of employees and limitations in the availability of detailed data for other groups, this subsection focuses on the characteristics of employees rather than all employment categories.

Similar to the employed persons, men dominate the employee category (Figure 3.17). The Manufacturing sector registers the highest share of male workers, at 20.9%. The Services and Construction sectors share almost similar proportions of men, at 12.4% and 12.2%, respectively. Meanwhile, the Agriculture sector registers only 9.9%. As for the female workers, the Manufacturing sector has the highest share of 9.7%, followed by the Services sector at 5.8%. These observations mirror the earlier findings from Figure 3.14.

In terms of the highest education obtained, over 70% of employed persons in the T&T-related industries have SPM and below (Figure 3.18). Next, the proportion of those with a degree is second highest, at 14.5%, followed by diplomas and certificates, at 8.8% and 4.2%, respectively. These observations are consistent throughout all T&T-related sectors, where the proportions of those with degree holders are higher compared to diplomas and certificates, though SPM and below level certificates still make up the majority of the T&T-related workforce.

Figure 3.17: Proportion of employees, by industry and gender, 2023

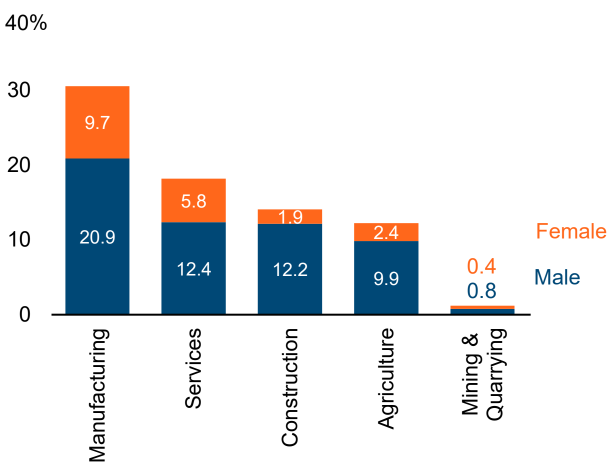
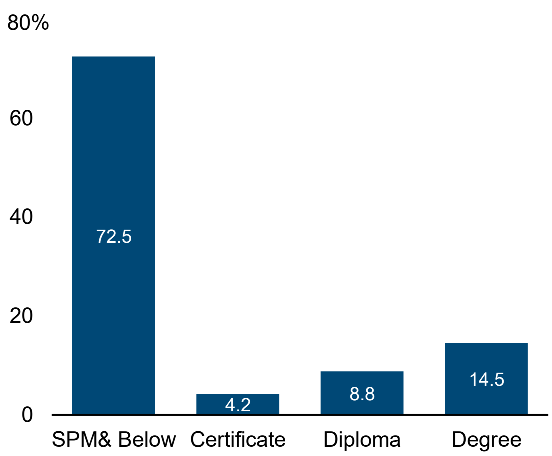


Figure 3.18: Proportion of employed persons, by highest certificates obtained, 2023



Source: DOS (2024d), KRI calculations

Note: The T&T-related Services sector only includes electricity, gas, steam, and air conditioning supply; water supply, sewerage, waste management and remediation activities; transportation and storage; information and communication; and professional, scientific, and technical activities

The conditions of T&T-related talents in the labour market are crucial to be examined to understand their challenges and landscape, particularly when further examining the findings in the second half of the report. Since T&T-related talents make up almost half the total employed persons in Malaysia, the trends identified mirror the general conditions of the labour market, with men dominating the T&T workforce and most T&T employees working in semi-skilled positions.

While earlier discussion looked into the formal employment sector of Malaysia's T&T talent, Box 3.1 briefly summarises the informal sector and employment landscape in Malaysia. The discussion ensures that all conditions of employed persons, including those who work in the informal sector, both the informal sector[96] and employment[97] are examined. However, due to data limitations, the informal data below is not discussed within the scope of T&T-related sectors, but rather as the total employed persons in all sectors.

[96] The Informal sector includes enterprises that are not registered with the Companies Commission of Malaysia, professional bodies, or Local Authorities (Sabah and Sarawak); all or at least one of the goods or services produced is meant for sale or barter transactions; the size in terms of employment is less than 10 persons and is not registered under a specific form of national legislation; and all sectors include agriculture. Source: DOS (2024b)

[97] The informal employment refers to any worker who does not have access to at least one social security scheme or employment benefit, whether carried out in formal sector enterprises, informal sector enterprises or households. Source: DOS (2024c)

Box 3.1: Informal sector and employment in Malaysia

There are two types of work arrangements in the labour market, namely formal and informal sectors. Although those two sectors are not mentioned explicitly in the discussion above, understanding the informal sector and employment is beneficial for understanding the overall conditions of the labour market. However, due to data limitations, the discussion on the informal sector and employment does not specifically focus on T&T-related economic sectors. Instead, it provides a general overview of the informal sector and employment conditions in Malaysia.

According to DOS, the informal sector refers to enterprises that are not registered under any specific form of national legislation, such as the Companies Commission of Malaysia. Meanwhile, informal employment is defined as workers who have no access to at least one social security scheme or employment benefits. The informal sector and informal employment are captured to understand the vulnerabilities of such groups in the labour market. In this box article, we shall examine some characteristics of informal employment, mainly their proportions in the labour market, skill level and education level. In 2023, there were about 15.8 million employed persons in Malaysia, about 12.3 million (77.8%) in formal employment and 3.45 million (22.2%) in informal employment. Out of 3.45 million informal workers, there are about 1.59 million (46.1%) in the formal sector and 1.83 million (53%) in the informal sector.

In terms of skill level, the majority of informal workers are in semi- and low-skilled positions, in both formal and informal sectors, as shown in Figure 3.19. The proportion of informal employment for semi-skilled positions is 26.3% in the formal sector and 29.5% in the informal sector. As for the low-skilled positions, the shares are 14.3% in the formal sector and 20.7% in the informal sector. Higher shares of informal employment in the informal sector are concerning as this group has low and limited access employment support and works in enterprises that are not registered. By economic sectors, as shown in Figure 3.20, the Services sector recorded the highest share of informal employment in both formal and informal sectors, at 31.2% and 27.1%, respectively. The proportions of informal employment in both formal and informal sectors for the other sectors are less than 7%, except for Agriculture, at about 14.4%.

Figure 3.19: Proportion of informal employment, by skill level and formal/informal sector, 2023

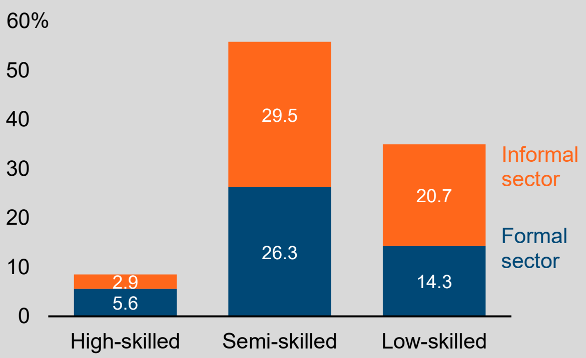
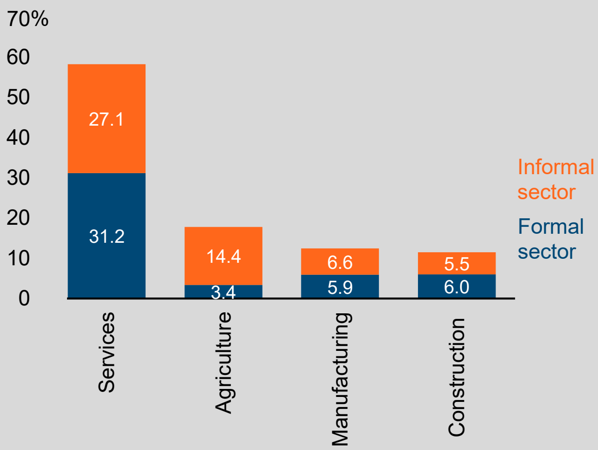


Figure 3.20: Proportion of informal employment, by economic sector and formal/informal sector, 2023



Source: DOS (2024b), KRI calculations

3.3.2. Salaries & Wages of T&T Talent

The return on higher education is normally measured by the employment outcomes, including indicators such as the attainment of high-skilled jobs and decent remuneration. Often, those who are in high-skilled occupations are likely to receive better income, while higher education qualifications are also linked to more skilled jobs and higher pay[98].

Earlier, Section 3.2 explored the starting pay among fresh graduates, highlighting that over half of our graduates are getting less than RM2,000 per month. However, this varied by study field, where those who graduated from Natural Sciences, Mathematics and Statistics, and Information and Communication Technologies are getting better pay. This is likely related to the level of certifications that they acquired, where their graduates are obtaining higher degrees compared to the other study fields, thus getting a better starting pay.

This section examines the salaries of T&T talents in the labour market using data from the Salaries and Wages Survey obtained from DOS. A time-series analysis is applied to provide insight into salary growth over a defined period, looking at the years: 2010, 2015, 2020 and 2023. The duration is believed to be sufficient to observe the conditions, specifically in terms of the salaries of T&T talent in the labour market. The observations are made based on the economic sectors that they work in, cut across multiple dimensions, including gender, age group, skill level and highest certificates obtained. As for the economic sectors, the Services sector is divided into two main categories, namely Services (T&T-related) and Services (non-T&T). This is to provide a relevant argument between those two perspectives based on the objectives of this report.

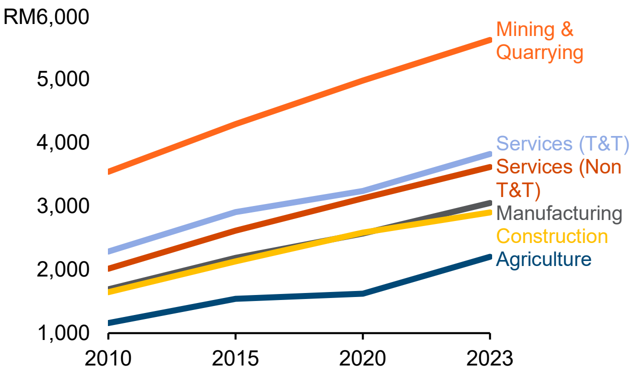
By economic sector, the Mining and Quarrying sector registered the highest mean salaries, as shown (Figure 3.21). Despite having the lowest number of employed persons among all other sectors (as in Figure 3.13), the average wage in this sector is likely driven by highly paid positions in the Oil and Gas industry. Meanwhile, the Services (T&T-related) sector has the second-highest mean salaries, slightly above the mean salaries of the Services (non-T&T) sector. This is followed by mean salaries of the Manufacturing, Construction, and lastly the Agriculture sectors.

The high mean salaries for the Services (T&T) sector are likely attributed to the Information and Communication, and Professional, Scientific and Technical Activities subsectors, as shown in Figure 3.22. These subsectors are also grouped as Modern Services, together with Real Estate, Finance, and other subsectors that are not in T&T-related areas. The analytical and statistical skills that are required by jobs in those sectors would also come with a high salary range and better career opportunities. Thus, it illustrates why more than half of the Information and Communication Technologies, and Natural Sciences, Mathematics and Statistics graduates get more than RM2,000 per month as their starting pay, particularly those who are working in this subsector.

Meanwhile, the Traditional Services subsectors, namely transportation, electricity, water supply, and other services, register mean salaries almost equivalent to those of the Manufacturing and Construction sectors. Despite having the highest number of employed persons, Manufacturing does not provide better pay. This is possibly due to the high number of semi-skilled workers and those with diplomas.

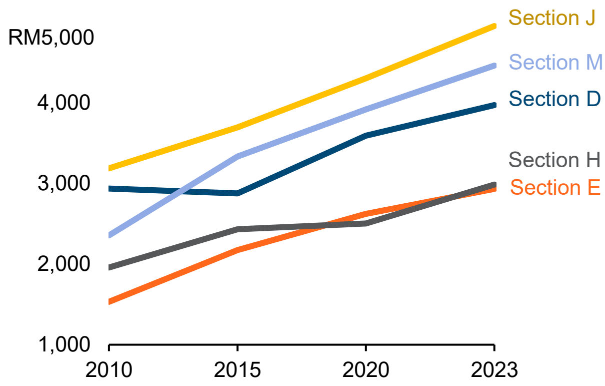
[98] Hawati Abdul Hamid (2022)

Figure 3.21: Mean monthly salaries & wages of employees, by industry, 2010-2023



Source: DOS (2024e), KRI calculations

Figure 3.22: Mean monthly salaries & wages of employees in T&T-related services sectors[99], by industry, 2010-2023



Source: : DOS (2024e), KRI calculations

Figure 3.23 and Figure 3.24 compare mean salaries between genders across the different economic sectors. It is observed that male workers are getting higher mean salaries than female workers in all sectors, except Construction. Despite the Mining and Quarrying sector was the highest paying sector for both male and female workers, the mean salaries of males are far higher than those of females.

The Services (T&T) sector has the second-highest mean salaries for men, while the Services (non-T&T) sector is the second sector that provides the highest mean salaries for women workers. A possible reason is that many women are involved in the education, health, and finance subsectors, which are not in T&T-related service sectors but still offer decent pay.

Figure 3.23: Mean monthly salaries & wages of male employees, by industry, 2010-2023

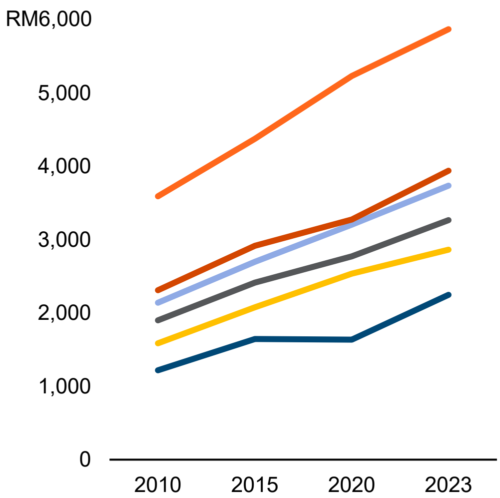
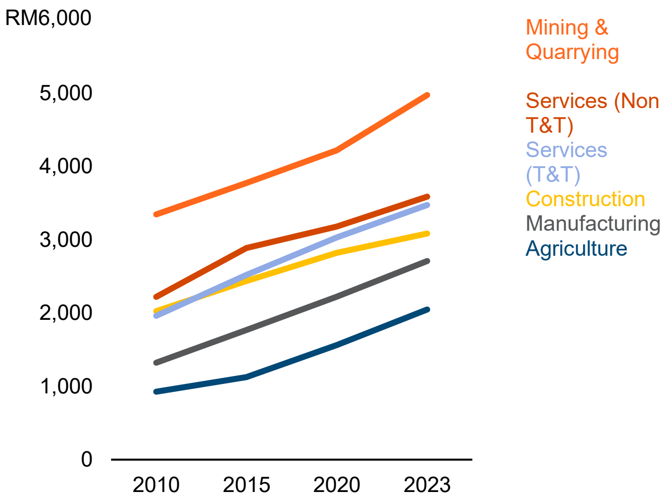


Figure 3.24: Mean monthly salaries & wages of female employees, by industry, 2010-2023



Source: : DOS (2024e), KRI calculations

[99] MSIC 2008 classifications are as follows: Section D – Electricity, Gas, Steam and Air Conditioning; Section E – Water Supply, Sewerage, Waste Management and Remediation activities; Section H – Transportation and Storage; Section J – Information and Communication; and Section M – Professional, Scientific and Technical activities.

Since many T&T employees are in the 35-54 age group, the salary analysis is categorised into two main groups, namely those aged 34 and below (Figure 3.25) and those aged 35 and above (Figure 3.26). Between the two age groups, older workers tend to earn higher salaries across all economic sectors, suggesting the presence of career progression, where longer participation in the labour market is associated with higher compensation levels. Positively, the salary and wages of both age groups and sectors are trending upwards, showing a slight improvement in mean salary in the past 13 years. Regardless, the growth has been dismal for most of the sectors, pointing to challenges in slow wage growth in all sectors.

However, gaps between sectors vary between the age groups. In Figure 3.25, the difference in mean salaries of workers aged 34 and below between the sectors is relatively small. Meanwhile, in Figure 3.26, which shows the larger differences in mean salaries of the older workers between the sectors. Mining and Quarrying sector registered the highest mean salaries for workers aged 35 and above, with the gap in mean salaries between other sectors widening. This shows that workers in the Mining and Quarrying sector are much more highly paid, on average, compared to other sectors.

Figure 3.25: Mean monthly salaries & wages of employees aged 34 and below, by industry, 2010-2023

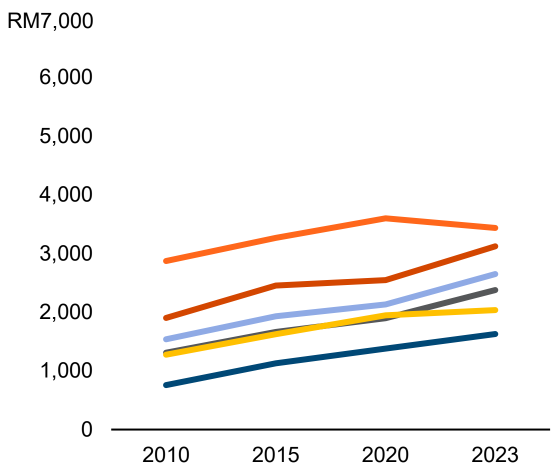
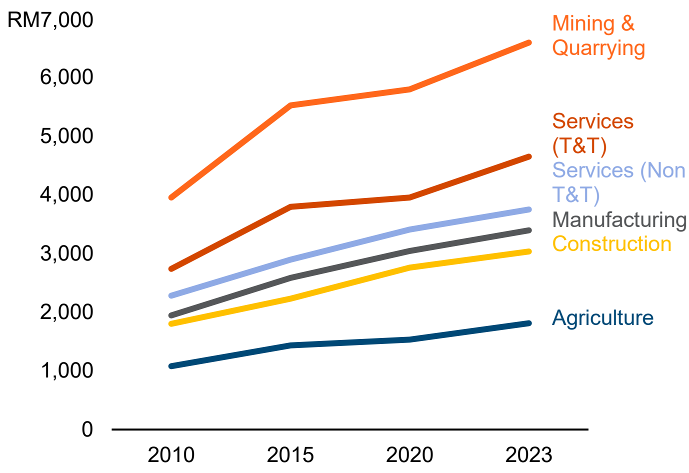


Figure 3.26: Mean monthly salaries & wages of employees aged 35 and above, by industry, 2010-2023



Source: : DOS (2024e), KRI calculations

When comparing semi-skilled (Figure 3.27) and high-skilled (Figure 3.28), high-skilled workers had much higher mean salaries across all the economic sectors – reflecting the better compensation for more technical roles or positions which require higher qualifications. While mean salaries for semi-skilled workers in all sectors have been on an upward trend since 2010, they do not exceed the RM2,500 mark. Concerningly, for Construction, Manufacturing, and Agriculture, the mean salaries are still between the RM1,500-RM2,000 mark, which, while it meets the national minimum wage requirement, is not enough to afford a decent living wage, which is estimated to be around RM2,200 for a single person.

Figure 3.27: Mean monthly salaries & wages of semi-skilled employees, by industry, 2010-2023

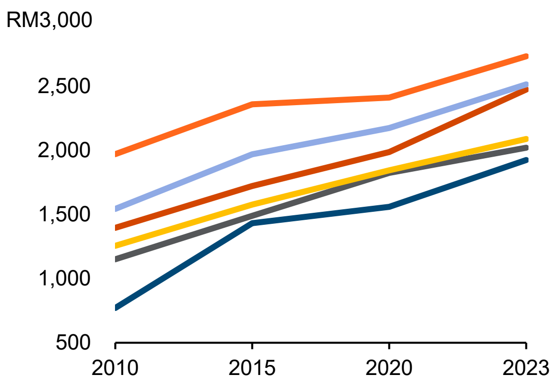
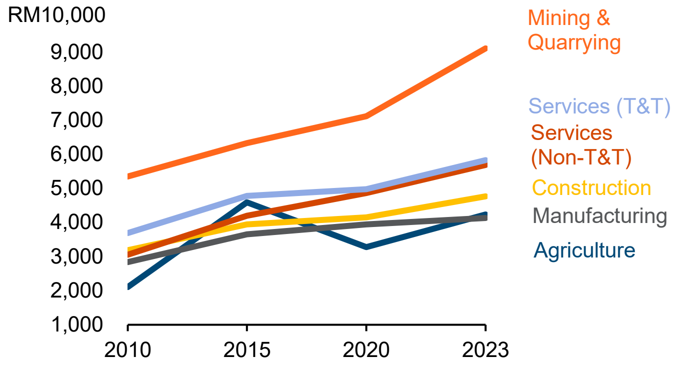


Figure 3.28: Mean monthly salaries & wages of high-skilled employees, by industry, 2010-2023



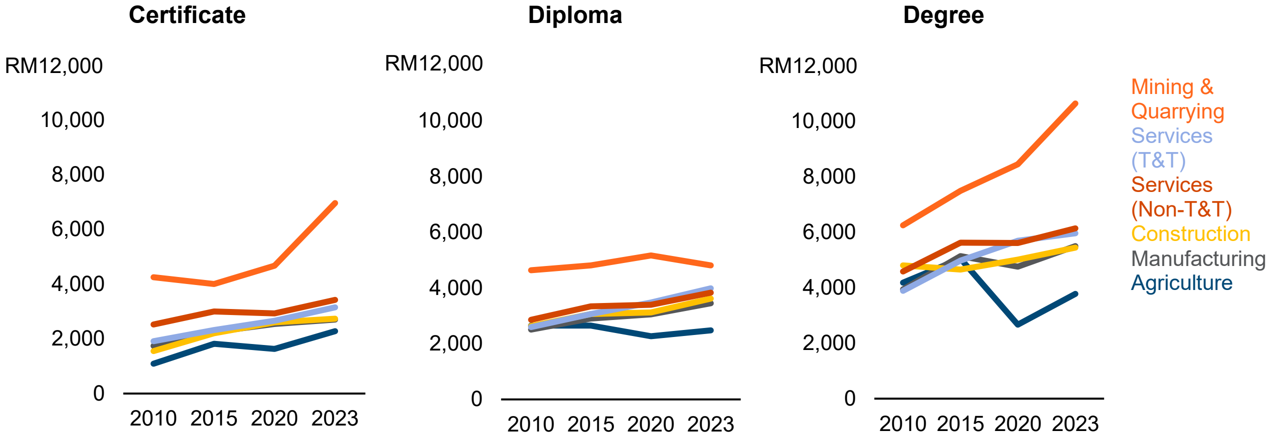
Source: : DOS (2024e), KRI calculations

In contrast, mean salaries for high-skilled workers are between RM3,000 and RM5,000 for all sectors except Mining and Quarrying, which exceeds RM9,000. These positions are also those that require tertiary education, with the higher-ranking positions likely to require a degree and above. Thus, TVET courses should encourage degree-level qualifications to increase their earning potential. However, high-skilled workers account for only about one-fourth of total employees. This is likely due to the limited availability of high-skilled positions in the labour market, a topic that is further discussed in Section 3.3.

Figure 3.29 shows the relationship between the level of certification and the mean monthly salary, by economic sector. In 2023, workers with degrees in most sectors earn mean salaries in the range of RM4,000 to RM5,000. Meanwhile, Mining and Quarrying had higher averages, with a mean salary of over RM10,000. On the opposite end, Agriculture has the lowest mean, with degree-level graduates in that sector earn on average RM3,000.

The mean salary range is lower for workers with diplomas for all sectors, between RM3,000 and RM4,000, except for Mining and Quarrying, and Agriculture, at RM5,000 and RM2,000, respectively. Meanwhile, the mean salaries for those with certificates are even lower in the range of RM2,000 to RM3,000 for all sectors except for Mining and Quarrying, and Agriculture. Across all levels of certificates, the trend for economic sectors shows similar results. The Mining and Quarrying sector pays the highest mean salaries, followed by Services (T&T), Services (Non-T&T), Construction, Manufacturing and Agriculture.

Figure 3.29: Mean monthly salaries & wages of employees, by industry and highest certificate obtained, 2010-2023



Source: : DOS (2024e), KRI calculations

Overall, the Mining and Quarrying sector has outpaced all other economic sectors in compensating its workers. This is believed to be attributed to the high-paying jobs in the Oil and Gas industry. The industry also provides better career progression and salary growth over the years. The specialised technology used in the industry requires skilled workers, who are then compensated well for their expertise.

Meanwhile, workers in the Services (T&T) sector earn slightly better pay than those in the Services (non-T&T) sector. T&T Services subsectors such as information and communication and scientific and technical are hugely contributing to this trend, despite high-potential subsectors such as education, health, and finance in the Services (non-T&T).

However, the Construction and Manufacturing sectors are competing with mid-range mean salaries, mainly due to the high number of semi-skilled positions in the industries. This further highlights the relationship between qualification, job skill level, and pay, whereby those with higher certification show better pay and are more likely to have high-skilled occupations.

3.4 Talent Demand in T&T Related Sectors

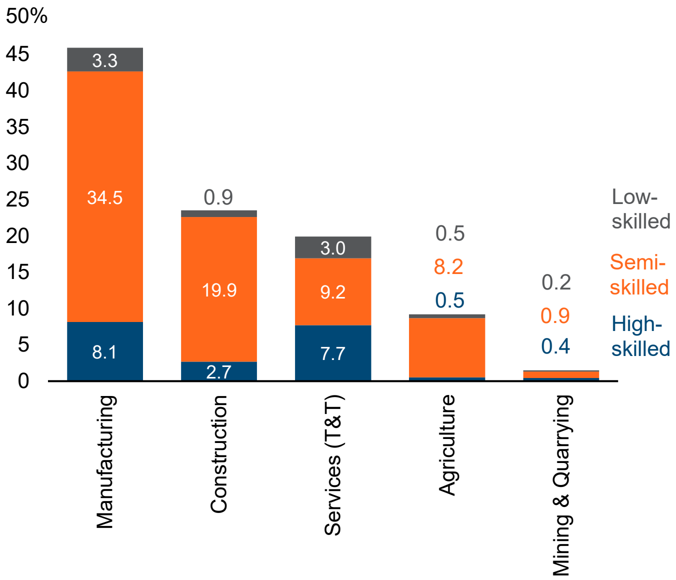
The previous sections examined graduate output, graduates' transition into the labour market and the conditions of existing workers as a means to understand the landscape of the talent supply, specifically for T&T-related sectors. Talent supply, by looking into the graduate output, is essential in ensuring a steady flow of potential workers in the labour market.

However, the analysis would also need to examine the demand for talent by exploring indicators such as job availability, vacancies and job creation in the market. The observations made are useful in understanding the challenges that our graduates face in their first jobs and their employment outcomes after a certain period of time in the labour market.

3.4.1. Job Availability

Figure 3.30 summarises the total number of jobs available in the formal private sector in Malaysia's labour market, retrieved from the Employment Statistics. According to DOS, jobs include the total labour required by the establishment, which comprises filled jobs and vacancies. Since it covers only the formal sector, the total number of jobs in each economic sector is slightly less than the total number of employed persons, as discussed in the previous section.

Figure 3.30: Proportion of total jobs, by industry and skill level, 2023



Source: DOS (2024a), KRI calculations

Note: The T&T-related Services sector only includes Electricity, Gas, Steam, and Air Conditioning Supply; Water Supply, Sewerage, Waste Management and Remediation activities; Transportation and Storage; Information and Communication; and Professional, Scientific, and Technical activities

The Manufacturing sector registered the highest share of total jobs (45.9%), followed by Construction (23.5%), Services (19.9%), Agriculture (9.2%), and Mining and Quarrying (1.5%). Similar findings are observed; whereby semi-skilled positions make up the majority of jobs in all sectors. In the Manufacturing sector, the share of semi-skilled jobs is the highest, at 34.5% (out of the total number of jobs), while the Construction sector has about 19.9% of them. The shares of semi-skilled jobs for T&T-related Services, Agriculture, and Mining and Quarrying sectors are below 10%. For high-skilled jobs, all sectors have registered shares of below 10%. The share of high-skilled jobs is highest in the Manufacturing sector at 8.1%, followed by Services at 7.7%.

Total jobs consist of filled jobs and vacancies. Filled jobs are matched jobs between potential workers and vacancies. Thus, unfilled jobs, or vacancies, are considered empty and are where employers are actively seeking candidates to be employed. The vacancies must also be ready to be filled, and the candidates could start the work within 30 days. These features define job vacancies, as shown in Figure 3.31 where the total vacancies in 2023 was around 173,000.

Figure 3.31: Proportion of job vacancies, by industry and skill level, 2023

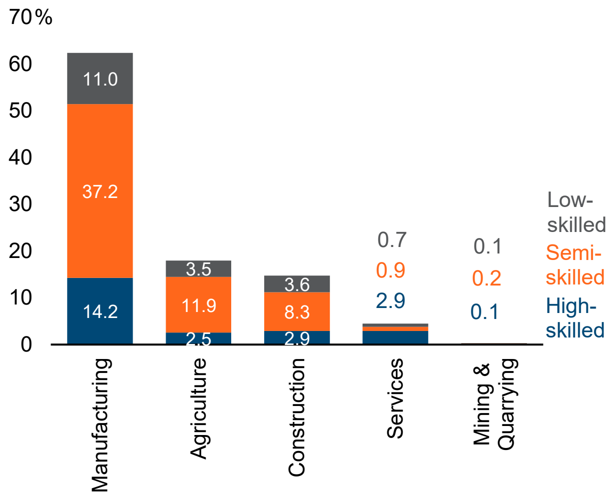
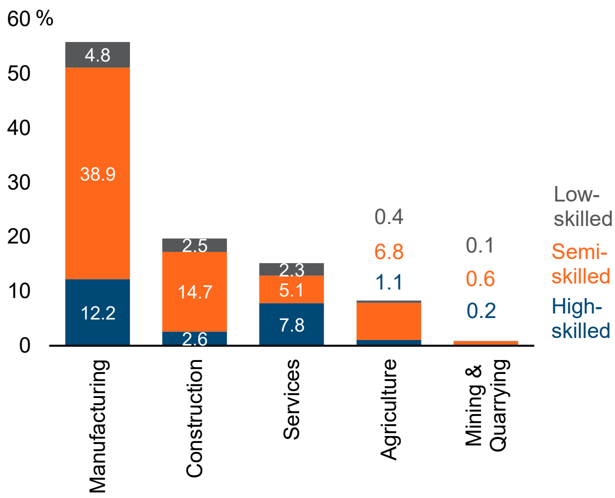


Figure 3.32: Proportion of jobs created, by industry and skill level, 2023



Source: DOS (2024a), KRI calculations

Note: The T&T-related Services sector only includes Electricity, Gas, Steam, and Air Conditioning Supply; Water Supply, Sewerage, Waste Management and Remediation activities; Transportation and Storage; Information and Communication; and Professional, Scientific, and Technical activities.

Among the sectors, Manufacturing had a significantly higher share of vacancies, at 62.5%. This is followed by Agriculture at 18.0% and Construction at 14.8%. Services and Mining and Quarrying registered even lower shares, below 5.0%. Thus, Manufacturing, given its large demand for talent, offers large opportunities for employment, particularly for the T&T talent. The high share of vacancies in the sector also shows that many jobs are not being taken up, either driven by skill mismatches, lack of access to the jobs, or high turnover practices in the sector.

Meanwhile, Agriculture, the second-highest sector with vacancies, may have low interest in working there due to its precarious, difficult, and labour-intensive jobs. The construction sector is hiring workers sustainably. The sector's vacancy share is proportional to the total number of jobs that are offered.

When examining job vacancies, it is also important to consider newly created jobs, as illustrated in Figure 3.32. In 2023, approximately 74,000 new jobs were created. These positions may subsequently be filled or remain vacant, depending on labour market dynamics. The trends for job creation are very similar to those for total jobs. The Manufacturing sector registered the highest share of newly created jobs, with more than 55% of the total jobs created being in that sector. This is then followed by Construction at 19.7% and Services at 15.2%. The other two sectors, namely Agriculture and Mining and Quarrying, have shares lower than 10%.

The services sector has a lower share of job vacancies due to an efficient matching process between potential workers and unfilled jobs. Despite having a significant share of newly created jobs, its vacancies remain low. The sector's skills and expertise, possibly driven by Modern Services subsectors, are easily filled and matched. In terms of skill level, many of the vacancies are for semi-skilled positions. This aligns with the trends that we have identified for the total jobs.

Job availability, mainly in the formal sector, portrays the market's capacity to absorb talent, specifically those in T&T fields. Every year, HEIs produce a large number of T&T graduates. These graduates then transition into the labour market, where many still face mismatches and underemployment. Meanwhile, the number of total jobs, including vacancies and newly created ones, is not responding to the talent supply. This may drive many graduates to opt to work in non-standard employment as a means to financially support themselves – thus underutilising the potential skills they have acquired through tertiary education.

3.4.2. Policy in Job Creation

While observing current job availability is beneficial in understanding the existing conditions of the labour market, examining the policies on job creation is another important perspective to consider. National industrial, investment and development plans are crucial in ensuring that the demand for T&T talents is sustainable and valid in the long term. Job creation is based on economic activities and growth, which are a part of any economic masterplan introduced by the government. Thus, we shall explore a few government initiatives that have imposed job creation efforts.

From 2021 onwards, four main documents relevant to the development of Malaysia's labour market, specifically jobs, are the Twelfth Malaysia Plan (12th MP), New Industrial Master Plan (NIMP) 2030 and National Energy Transition Roadmap (NETR) 2050. Manufacturing remains a core pillar in driving job creation in the country. However, the government is also shifting its focus towards emerging technologies, industry-related services and sustainability. These sectors are gaining global importance and are expected to influence both the creation and elimination of jobs in the coming years.

Table 3.1 summarises the plans. Each plan's duration and scope vary, as it is supposed to address different needs and objectives. The 12th MP, for instance, covers mid-term planning from 2021 to 2025. It plans to create about 1.1 million jobs during the period in some of the focused sectors such as electrical and electronics (E&E), global services, aerospace, creative industries, tourism, Halal, smart farming and biomass.

Table 3.1: **Summary of key points for 12th MP, NIMP 2030 and NETR**

National Development Framework	12th MP	NIMP 2030	NETR 2050
Duration	2021 – 2025	2023 – 2030	2022 – 2050
Job creation targets	1.1 million jobs	700,000 (high-skilled jobs in the manufacturing sector)	310,000 jobs (by 2050)
Focus/priority sector	E&E, global services, aerospace, creative, tourism, Halal, smart farming & biomass	E&E, aerospace, chemical, pharmaceutical & medical services	-
New growth area / catalyst project	-	Advanced materials, electric vehicles, renewable energy & CCUS	Energy efficiency, renewable energy, hydrogen, bioenergy, green mobility & CCUS

Source: EPU (2021), MITI (2023), and MOE (2023)

As for NIMP 2030, the plan targets to create about 700,000 jobs, mainly high-skilled jobs in the manufacturing sector, by 2030. Other than its four focus sectors, the plan has also identified a few catalyst projects in advanced materials, electric vehicles, renewable energy and CCUS (carbon capture, utilisation and storage). Similarly, the NETR 2050 also identified new opportunities in growth areas such as energy efficiency, hydrogen, bioenergy and green mobility, targeting to create more than 310,000 jobs by 2050 in those areas.

All these new catalysts identified by the government are encouraging and relevant for T&T talents in the long run. Many action plans must be put in place for the master plan to succeed. However, an overview of what the future industry should look like is crucial in ensuring that our talents are future-ready and skilled enough to cater for the requirements set by those catalyst industries.

Besides that, given the conditions of the T&T talents in the labour market, many are also looking for jobs abroad, specifically in Singapore, Australia, the United States of America, the United Kingdom and Canada. Hence, brain drain has been a phenomenon for many years due to limited job opportunities and low wages in Malaysia, as the country is dominated by semi-skilled jobs. Interestingly, even when trying to get better jobs, there are those who are still doing precarious work, especially those who work in Singapore, who constitute more than half of the Malaysian diaspora. More than 60% of Malaysians in Singapore work in semi- and low-skilled positions. However, possibly because of the advantage gained by currency exchange, the benefits seem more attractive compared to working locally[100].

Despite working abroad, it is believed that many want to come back. Government interventions in creating more high-skilled jobs and policies surrounding better wages in the country would motivate them to work here. There are many motivations identified to attract them back here, among others, salary mismatch expectations and acceptance of cross-cultural skills that they have gained abroad[101]. While many employers would appreciate the global skills that their employees possess, the salary package that they offer is still below expectations.

Thus, job creation initiatives, especially in emerging and high-value industries, could possibly become a catalyst for the Malaysian diaspora to return home. This must also be supported by an attractive salary package, higher awareness and acceptance of cross-cultural skills in the labour market, and a smoother transition from overseas into local jobs.

3.5 Discussion and Policy Implications

While this chapter has deepened our understanding of the supply and demand landscape for T&T talents in Malaysia, there remains room for further policy refinement. Despite numerous government initiatives, additional policy considerations could help ensure that T&T talents and their associated industries contribute more effectively to national economic growth. These proposed measures also aim to improve labour market efficiency, particularly in aligning talent supply with market demand, and in turn, enhance employment outcomes for graduates.

Develop policies that encourage more job creation in technology and technical-related Services subsectors to support the Global Value Chains

Existing government efforts to drive investments in emerging sectors, such as renewable energy, green mobility and advanced materials, have already laid the groundwork for new economic opportunities. These subindustries are expanding rapidly, and Malaysia must take proactive steps to harness their full potential.

[100] The Edge (2024)
[101] HAYS (2019)

While these sectors have shown promise in generating employment, a persistent gap remains where many graduates still struggle to secure suitable jobs despite holding tertiary qualifications. The labour market continues to be dominated by semi-skilled roles across various industries, many of which offer limited compensation, resulting in financial strain for workers.

The findings in this chapter indicate that certain subsectors, such as ICT, Modern Services, Natural Sciences, Education and Health, require highly qualified talents and offer comparatively better pay schemes. In response, policy efforts could be directed toward increasing investment and strategic development within these areas to foster the creation of high-quality jobs. Focused development, with intensified efforts in promoting the subsectors, may enhance the value chain. These technology and technical-related Services subsectors are also crucial and significant in the economic development of any country, including Malaysia.

Additionally, care and social work stand out as integral components of the economy. Direct government interventions in care work can improve quality and access, while indirect policy may impose better labour market participation rates. Affordable and accessible care would also put some groups of society members in a better position, either as paid care workers or even unpaid carers. Within T&T-related industries, subsectors like communications and IT under the umbrella of Modern Services have consistently yielded more favourable employment outcomes, reinforcing their importance in shaping Malaysia's future workforce.

Shift the focus of HEIs to produce graduates for economic sectors that have high demand and greater employment benefits

Over the past several years, Malaysia's HEIs have placed significant emphasis on producing graduates in fields such as Business, Administration, and Law. Private HEIs, in particular, contribute nearly half of the total graduate output in these areas. This approach has undoubtedly supported the demand for skilled talent across a broad range of occupations.

Similarly, the large number of graduates in Engineering, Manufacturing, and Construction reflects the government's longstanding focus on industrial sectors—both in terms of job creation and human capital development. However, this focus has led to a trend where many graduates, particularly from these fields, enter the labour market holding diploma or certificate qualifications. As a result, their long-term career progression and earning potential may be limited.

Further compounding this issue is that the job market remains heavily concentrated in semi-skilled roles. Consequently, a significant number of graduates experience job mismatches, in both vertical (qualification level) and horizontal (field of study) mismatches, even after extended periods in the workforce. While some may attribute this to a perceived gap in graduate competencies, evidence suggests that structural mismatches persist, particularly in the low creation of high-skilled occupations. Aside from this, the oversupply of graduates in certain fields compared to industry demand complicates the structural challenges even more.

Given these challenges, it may be timely for the government to reconsider the current orientation of graduate production. A shift in focus toward other technology and technical (T&T)-related study areas, such as Communications, Information Technologies, Scientific fields, and Statistics, could better align graduate skills with emerging industry needs, particularly within the rapidly growing Services sector. Redirecting efforts in this direction may help ensure that future graduates are better positioned to secure quality first jobs, paving the way for stronger career advancement and long-term benefits.

Produce more TVET graduates with higher certifications and recognitions that could increase career growth and opportunities in the strategic economic sectors

Ongoing initiatives on TVET have primarily centred on expanding the pool of graduates across various qualification levels, particularly at the certificate and diploma tiers. Public HEIs are driving the efforts, while private HEIs are increasingly offering programmes that demonstrate stronger employment outcomes and long-term career value. The National TVET Policy 2030 provides a comprehensive governance and accreditation framework, aiming to uplift the overall quality and credibility of TVET institutions in Malaysia.

A key objective of these initiatives is to nurture a pipeline of highly skilled and well-compensated T&T talents. This ambition is in line with global trends, where nations are focusing on equipping their future workforce with skills that meet industry needs. Addressing the issue of job mismatches is also central to this effort, with the goal of ensuring that graduates reap the full benefits of their educational investments.

Findings from past studies show that many TVET graduates have better employment opportunities at their first jobs than non-TVET graduates. This is largely due to the practical orientation of their training and the relatively higher pay associated with industry-aligned roles. However, career advancement remains a challenge. A significant portion of TVET graduates hold diploma or certificate qualifications, and many find themselves in semi-skilled roles that offer limited upward mobility. Over time, this can lead to career stagnation and suboptimal professional fulfilment.

To address this, the government may consider policies that promote greater enrolment of TVET graduates in higher-level programmes, including bachelor's and postgraduate degrees. Doing so would not only strengthen the competencies of the workforce but also elevate the global competitiveness of Malaysian TVET talent. Furthermore, recognition and accreditation by professional technical bodies are critical for enhancing both the quality of TVET programmes and the long-term career potential of their graduates. Recognition and accreditation provided by professional bodies can play an important role in enhancing talent potential and improving the quality of TVET programmes offered by higher education institutions.

3.6 Concluding Remarks

This chapter explores the current landscape of supply and demand for T&T talents in Malaysia, with a particular focus on graduates' transition from education to employment and their standing in the labour market. Using a cross-sectional analysis, the chapter provides a snapshot of graduate outcomes and the broader employment environment, while also examining policy initiatives that influence job creation.

Each year, Malaysia produces over 250,000 graduates, with nearly 30% coming from T&T-related programmes. Most of these graduates are from Engineering, Manufacturing, and Construction fields, followed by ICT, Natural Sciences, Mathematics, and Agriculture. Public HEIs account for the majority of T&T graduates, particularly from universities, polytechnics, and community colleges. However, private HEIs dominate in the ICT field, likely driven by favourable employment outcomes and strong industry demand. Some T&T programmes also tend to produce more degree holders than diploma or certificate graduates, indicating a push towards higher qualifications in certain fields.

Graduate employment outcomes vary by field of study. Slightly more than half of T&T graduates are employed, while others pursue further education or training, or remain unemployed but actively seeking work. More than 70% of graduates from ICT and Natural Sciences courses work in high-skilled jobs, which has resulted in higher shares of workers with mean salaries of RM2,000 and above compared to other study fields. These graduates are largely absorbed into Modern Services sectors. In contrast, Engineering and Agriculture graduates show lower representation in high-skilled roles, with Agriculture recording the lowest. Patterns in earnings reflect these trends, and perceptions of job mismatch are common, particularly horizontal mismatches between the field of study and job type.

In the labour market, most employed people are in the Manufacturing sector, followed by Services (T&T-related), Agriculture, Construction, and Mining and Quarrying. In the T&T-related industries, men make up the large majority of the workforce. As for skill level, semi-skilled workers have a higher share compared to other skill levels. However, high-skilled workers make up about a quarter of the workforce. Workers aged 35–54 form the largest age group, but the Manufacturing sector sees a higher share of young workers (20–24), likely due to easier entry. Most workers in T&T industries hold SPM-level qualifications or lower.

Wage patterns vary, with Mining and Quarrying offering the highest salaries. Meanwhile, in the services sector, T&T Services, particularly ICT and Natural Sciences, offer better pay than non-T&T services. Additionally, older workers, high-skilled workers, and those with a degree also earn higher mean salaries. Concerningly, there are wage disparities between genders, whereby male workers often have higher mean salaries than female workers, with a notable exception for those in the non-T&T Services sector.

Although a significant number of new jobs are being created across various sectors, vacancy trends remain relatively consistent—except in the Services sector. Despite the high volume of job creation, vacancies in Services are relatively low, suggesting a more effective job-matching process within the sector. Nonetheless, government masterplans continue to prioritise job creation in industrial and technology-related sectors, reflecting ongoing national development strategies.

REFERENCES

Azizan, Norizan, Faizuniah Pangil, and Md Lazim Mohd Zin. 2021. "Human Capital Development in Malaysia: Issues and Challenges." *Modeling Economic Growth in Contemporary Malaysia*. Emerald Publishing Limited, 151–75.

DOS. 2024a. "Employment Statistics 2023."

———. 2024b. "Informal Sector and Informal Employment Survey 2023." Putrajaya: Department of Statistics Malaysia.

———. 2024c. "Labour Force Statistics Malaysia Report May 2024." Putrajaya: Department of Statistics Malaysia. https://storage.dosm.gov.my/labour/lfs_month_2024-05_en.pdf.

———. 2024d. "Labour Force Survey 2023."

———. 2024e. "Salaries & Wages Survey 2023."

EPU. 2021. "Twelfth Malaysia Plan, 2021-2025." Putrajaya: Economic Planning Unit. https://rmke12.ekonomi.gov.my/en.

GOM. 2023. "Speech by Prime Minister during the Launching of NIMP 2030."

Hawati Abdul Hamid. 2022. "Memahami Statistik Kebolehpasaran Graduan." Views 4/22. Kuala Lumpur: Khazanah Research Institute.

HAYS. 2019. "What Is the True Value of Repatriated Skilled Talent in Asia?"

KRI. 2018. "The School-to-Work Transition of Young Malaysians." Kuala Lumpur: Khazanah Research Institute.

———. 2024a. "Shifting Tides: Charting Career Progression of Malaysia's Skilled Talents." Kuala Lumpur: Khazanah Research Institute.

———. 2024b. "The Financialization of Our Lives: Values and Trade-Off." Kuala Lumpur: Khazanah Research Institute.

MITI. 2023. "New Industrial Master Plan 2030." Policy Document. Kuala Lumpur: Ministry of Investment, Trade and Industry Malaysia. https://www.nimp2030.gov.my/.

MOE. 2023. "National Energy Transition Roadmap." Ministry of Economy.

Mohd Amirul Rafiq Abu Rahim and Shazrul Ariff Suhaimi. 2022. "Fresh Graduate Adversities: A Decade's Insight on the Graduate Tracer Study." Working Paper 6/22. Kuala Lumpur: Khazanah Research Institute.

MOHE. 2023. "Graduate Tracer Study."

Nur Sofea Hasmira Azahar. 2024. "Strengthening STEM Foundations in Primary Education to Reach the 60:40 Goal."

The Edge. 2024. "Malaysia's Brain Drain Problem." 2024. https://theedgemalaysia.com/node/702060.

[THIS PAGE INTENTIONALLY LEFT BLANK]

CHAPTER

04

UNDERSTANDING REGIONAL POTENTIALS FOR TECHNOLOGY ADVANCEMENT THROUGH SPATIAL EMPLOYMENT ANALYSIS

CHAPTER 4

UNDERSTANDING REGIONAL POTENTIALS FOR TECHNOLOGY ADVANCEMENT THROUGH SPATIAL EMPLOYMENT ANALYSIS

Dr Diana Abdul Wahab

Malaysia's economic corridors are designed to harness the unique strengths and resources of specific regions, driving balanced development across the country.

Malaysian Investment Development Authority (2024)

4.1 Introduction

Over the past decade, Malaysia's economic trajectory has reflected a nation that strives to achieve a balance and rapid industrialisation, urbanisation and equitable growth across its regions. As a middle-income economy with aspirations of achieving advanced nation status by 2030, understanding the spatial distribution of employment and the forces that drive it has become increasingly critical.

To do so, we need to investigate where jobs are concentrated, why they are clustered and how spatial dynamics known as agglomeration economies affect the productivity and regional labour outcomes. Building upon employment statistics data by states and industries from the Labour Force Survey that spans from 2010 to 2023, this chapter offers an evidence-based view of spatial employment patterns across Malaysia. While the terms job concentration, job clustering and agglomeration are closely related, each carries distinct implications:

1. Job Concentration: Describes the distribution of employment and proportionate share of jobs across states.
2. Job Clustering: Refers to the geographic clustering of jobs in similar or related industries that are geographically grouped in the same area.
3. Agglomeration: An economic phenomenon that benefits from the emergence of clustering.

Thus, this chapter seeks to describe how spatial employment patterns evolve and what the implications are for Malaysia's economic strategy, regional competitiveness and development equity.

4.2 Mapping Malaysia's Labour Landscape: Background and Context

Historically, Malaysia's economic structure has evolved significantly from an agriculture-based economy to one that is driven by manufacturing, services and more recently, digital industries[102]. This shift is largely driven by the surge of export-oriented industries such as electronics, semiconductors and Information and Communication Technology (ICT), enabled services that have not only been accelerated by external trade but also the transformation and development of digital capabilities across sectors[103].

In 2024, the services industry in Malaysia emerged as the dominant sector for employment, with approximately 4.7 million job positions, accounting for a significant portion of the labour market[104]. The distribution of employment across different sectors illustrates a notable shift over the years. In 2014, the services sector represented 60.2% of total employment, a stark increase from 46.3% in 1990[105]. This transformation is another evidence attributed to Malaysia's economic evolution from an agriculture-based economy to one that increasingly relies on high-value and innovative manufacturing and knowledge-based services. By comparison, employment in agriculture plummeted to just 12.3% in 2014, further highlighting the country's economic restructuring[106].

The increase in job growth is particularly seen in urban and industrial states that produce goods for exports, such as Selangor, Johor and Pulau Pinang (P. Pinang)[107]. As such, this reflection of structural shift toward knowledge-based and urban-centric jobs accounted for over 60% of total employment between 2010 to 2020[108]. This evolution underscores the growing convergence between export competitiveness and digital industrialisation, particularly in Western Peninsular Malaysia.

However, this growth has been spatially uneven. Over 30% of the country's workforce is located in less than 10% of the whole of Malaysia, mostly in the Klang Valley[109]. In contrast, rural states such as Kelantan and Sabah lag in job creation, relying heavily on agriculture and informal sectors. Bank Negara Malaysia (BNM) emphasises that post-pandemic recovery has further accentuated these divides, with urban areas rebounding faster due to their proximity to global supply chains and infrastructure investments[110]. These trends align with broader labour market dynamics, including rising labour income shares in urbanised regions, which have been attributed to agglomeration effects within more industrialised states[111].

While there is anticipated demand for high-skilled employers, particularly for high-growth sectors, as outlined in the NIMP 2030, the country continues to experience relatively low creation rates of such jobs. In the fourth quarter of 2024, only 8,400 new high-skilled jobs were created, which is a 1.9% decline compared to the same period in-2023, highlighting a persistent gap between the supply of graduates and the availability of high-skilled roles[112]. Chapter 3 provides more stories on the labour market outcomes for the T&T sector.

[102] BNM (2000)
[103] Said (2024)
[104] DOS (2025b)
[105] ILMIA (2017)
[106] Ibid.
[107] EPU (2016)
[108] EPU (2016); Said (2024)
[109] Arus (2021)
[110] BNM (2021)
[111] Ng, Tan, and Tan (2018)
[112] DOS (2025b)

However, the overall employment landscape has shown resilience. Total employment in the economic sector grew by 1.3% year-on-year, reaching 9.05 million jobs, with the Services sector leading at 4.7 million jobs, followed by Manufacturing (2.5 million), Construction (1.27 million) and Agriculture (502,000)[113]. This growth reflects a positive trend, indicating a job market that is gradually expanding despite structural challenges.

4.2.1. Industrial Clusters, Job Concentration and Regional Economies

Industrial clusters, job concentration, and regional economics in Malaysia refer to the spatial distribution of economic activities and employment opportunities and outcomes across various sectors within the country. This concept has gained policymakers' attention as Malaysia seeks to transition from an agriculture-based economy to one that is industrialised and service-oriented and aspires to find balanced regional development across the country.

Industrial clusters are formed through interconnected enterprises within specific geographical areas. The formation of the clusters fosters collaboration, enhances productivity and promotes innovation by facilitating knowledge spillovers among firms and research institutions. Several major industrial clusters are noteworthy for their contributions to Malaysia's economy. For instance, the electronics industry in P. Pinang is recognised as a leading hub, while Johor is known for its furniture and palm oil industries[114]. The Klang Valley is a prominent centre for ICT[115]. These clusters are not only significant in terms of production but also serve as a catalyst for technological advancement and economic growth.

The impact of industrial clusters could extend beyond immediate economic benefits. Research has shown that these clusters enhance the long-term performance of high-tech small and medium enterprises by improving innovation capabilities and reducing production costs[116]. The competitive environment created within clusters encourages firms to invest in research and development, leading to a higher degree of product differentiation and overall industrial upgrading. Furthermore, the concept of clustering aligns with Porter's competitive advantage theory, which posits that the geographic concentration of industries fosters national competitiveness and innovation[117].

Technological innovation is a key external benefit of industrial clusters. Reports indicate that these clusters facilitate knowledge spillovers and learning effects that enhance the research and development capabilities of enterprises[118].

The interactions among firms within a cluster create an ecosystem that promotes the exchange of tacit knowledge, ultimately leading to improved performance and productivity within the industry[119]. This phenomenon highlights the significance of industry clusters in bolstering Malaysia's position in the global market and driving sustainable economic growth.

[113] DOS (2025b)
[114] Ariff (2008)
[115] MITI (2023)
[116] Tong et al. (2023)
[117] Ibid.
[118] BNM (2024)
[119] OECD (2021)

As such, the Malaysian government has consistently recognised the role of industrial clusters in the economy, particularly through various Industrial Master Plans. The Malaysian government's strategic initiatives, particularly the Industrial Master Plans introduced since the 1990s, emphasise the importance of job concentration and regional economic development. Vision 2020, launched by former Prime Minister Mahathir Mohamad, aimed to position Malaysia as a fully developed nation by 2020, catalysing various policies that prioritised industrial clusters as engines of economic growth. This vision catalysed a series of industrial policies that emphasised the significance of industrial clusters in fostering economic growth and enhancing competitiveness. The second Industrial Master Plan (1996-2005) marked one of the first comprehensive approaches to promote cluster-based development. This was further reinforced in the third Industrial Master Plan (2006-2020), which highlighted the importance of research-based industrial cluster development at both national and regional levels.

More recently, the New Industrial Master Plan (NIMP) 2030 has set ambitious targets for the manufacturing sector, focusing on increasing employment and Gross Domestic Product (GDP) contribution while addressing the challenges posed by technological advancements and a changing job market[120]. This strategic initiative illustrates Malaysia’s commitment to leveraging its existing industrial clusters while fostering the development of new high-potential industries, thus solidifying the framework for job concentration and regional economic development

Agglomeration, i.e. the benefits of clustering economic activity in specific geographic areas, plays a pivotal role in Malaysia’s regional development narrative and urbanisation. This is attributed to the fact that agglomeration economies are magnets for investment and labour due to their positive characteristics such as such as reduced transport costs and knowledge spillover and enhance productivity in urban centres[121]. For instance, Klang Valley region benefits from a dense network of firms, skilled workers and infrastructure, fostering innovation and job growth. Similarly, agglomeration in manufacturing hubs like Johor has bolstered Malaysia’s export competitiveness, with firms benefiting from shared resources and localised supply chains in the state[122].

Therefore, supporting the establishment of industry clusters has been central to Malaysia’s regional development strategies with the ambition to promote collaboration among businesses, spurring local innovations and research activities, thus realising a competitive region. Industrial clusters are expected to promote job concentration and thus influence regional economies. Chapter 5 looks further on how the spatial strategies are used to tap into agglomeration benefits that are expected to boost urbanisation of a region, hence, creating more balanced regional economic outcomes in the country.

[120] MITI (2023)
[121] World Bank (2022)
[122] MIDA (2024b)

Box 4.1: Regional economic trends in Malaysia

Regional economics in Malaysia examines the spatial distribution of economic activities, highlighting the concentration of industries and the emergence of industry clusters across different regions. This discipline focuses on understanding how geographical factors, technology and networks contribute to regional specialisation and economic performance.

Regional disparities in job concentration are evident across Malaysia, with states such as Selangor, Johor and P. Pinang demonstrating stronger local economic activity and relatively low unemployment rates. In the fourth quarter of 2024, Selangor recorded the highest labour force participation rate (LFPR) at 76.4%, followed by P. Pinang (73.2%) and Johor (71.9%), indicating a high level of workforce engagement in these regions. Additionally, Selangor and Kedah reported the lowest unemployment rates at 1.7%, with Johor and P. Pinang close behind at 2.2%.

Source: DOS (2025a)

Preparing the future amidst the labour market dynamics

Malaysia's labour market is undergoing rapid transformation, influenced by technological advancements and the transition to a digital and green economy. According to the NIMP 2030, this shift is expected to generate millions of new jobs by 2030, particularly in high-value, innovation-driven sectors aligned with the Industrial Revolution 4.0[123]. However, this shift necessitates a robust focus on training and upskilling to equip the workforce with the requisite capabilities for new roles.

This rapid transformation has not been without challenges; significant regional disparities persist, with states such as Selangor and Kuala Lumpur (KL) flourishing while others lag behind[124]. Despite the positive trajectory, Malaysia's labour market exhibits structural challenges. The workforce is increasingly characterised by an ageing population, which poses long-term implications for labour supply and productivity[125].

At the same time, youth unemployment remains a concern, with the unemployment rate for individuals aged 15 to 24 recorded at 10.3% in December 2024, representing approximately 299,700 unemployed youths[126]. Additionally, the country continues to experience brain drain, as a significant portion of its skilled workforce seeks better opportunities abroad, a trend that has been consistently highlighted in national labour reports and policy discussions[127].These factors necessitate comprehensive reforms aimed at aligning education outcomes with labour market demands, ensuring that graduates possess the requisite skills to thrive in a competitive environment.

Beyond the aspirations in industrial policy, digitalisation is also reshaping the geography of work. Despite the potential to decentralise opportunities through remote working and digital platforms, access to digital infrastructure remains unequal. Digital infrastructure and digital skills are largely concentrated in urban regions, exacerbating the urban-rural divide. Without targeted policy, digital transformation risks reinforcing, not reducing, existing spatial inequalities.

[123] MITI (2023)
[124] MEA (2019)
[125] DOS (2024b)
[126] Ibid.
[127] DOS (2024a)

This situation is also exacerbated by migration. Malaysia remains heavily reliant on low- and mid-skilled migrant labour, especially in construction and manufacturing, while simultaneously experiencing a brain drain of high-skilled Malaysians seeking opportunities abroad. Despite commendable initiatives by TalentCorp, such as the Returning Expert Programme, there has been marginal success, which is mainly because of wage gaps, government challenges and lack of career development[128]. While these trends are continuously debated in silos, they are closely intertwined. Each issue shapes where jobs are created, who has access to them and how national policies translate into on-the-ground outcomes.

4.2.2. Addressing Gaps in Malaysia's Job Concentration Research

Malaysia's current focus on economic development through promoting the establishment of industrial clusters presents significant opportunities for job creation, as evidenced by the approval of over 6,700 projects in 2024, expected to generate more than 207,000 new jobs across key sectors[129]. Initiatives aimed at fostering startups and SMEs, including access to funding, mentorship and technical assistance, which are central to Malaysia's strategy for nurturing innovation and driving employment growth.

To address graduate unemployment, the government has introduced platforms such as the Graduates Reference Hub for Employment and Training (GREaT), which connects graduates with job opportunities, training programmes and career resources, reflecting a proactive approach to labour market challenges[130].

Several studies have examined job creation trends in Malaysia, particularly in the manufacturing sector[131]. However, these studies primarily focus on the impact of technology, industrial policies and R&D investment on employment trends rather than spatial job clustering. Other research has investigated economic concentration and competition in Malaysian industries, but it lacks a comprehensive spatial analytical approach[132]. Additionally, research on job mismatch and labour market inefficiencies highlights underemployment and skills misalignment as pressing issues in Malaysia's labour economy[133]. While these studies provide perspectives on labour market imbalances, they do not assess the geographic clustering of jobs or examine the regional disparities in employment growth.

Motivation and research aims of this chapter

The relevance of this research extends to multiple stakeholders. For policymakers, understanding job concentration can inform regional development strategies, such as the allocation of infrastructure funds or incentives for rural industrialisation. Malaysia's urban bias in job creation risks widening income gaps, a concern that spatial analysis can address by identifying underserved regions[134]. Urban planners, meanwhile, can use these insights to manage congestion and resource strain in agglomerated areas like KL. Economists stand to benefit from a deeper understanding of how agglomeration influences productivity, wages and innovation in a middle-income context.

[128] TalentCorp (2020)
[129] MOF (2025)
[130] MOHE (n.d.)
[131] Samsi et al. (2018); Maamor et al. (2019)
[132] Bhattacharya (2002); Abdullah and Abdul Jalil (2006)
[133] Hamid (2010); Tey and Lai (2022)
[134] World Bank (2022)

Building upon KRI's earlier work[135] that highlighted the evolving composition and geographic distribution of Malaysia's workforce, this study seeks to further examine the spatial drivers behind these transformations, an area that remains insufficiently explored.

This chapter addresses several critical research questions to advance our understanding of employment dynamics across Malaysia's states, spotlighting what this means for agglomeration and the country's economic growth through these scopes:

1. Analyse the concentration of economic activity within specific regions using principles of economic geography and regional analysis
2. Identify potential growth drivers to help policymakers pinpoint a region's most competitive and vulnerable economic sectors
3. Investigate spatial autocorrelation to determine if high employment in certain regions spills over into neighbouring areas.

Our study aims to deepen the understanding of employment trends across Malaysia's states and their implications for agglomeration effects and the nation's overall economic growth.

4.3 Data and Context

4.3.1. Data Description

This study uses data drawn from the Department of Statistics Malaysia's Labour Force Survey (LFS). We obtained annual observations on employment counts from 2010 to 2023 across all states and key industries which include:

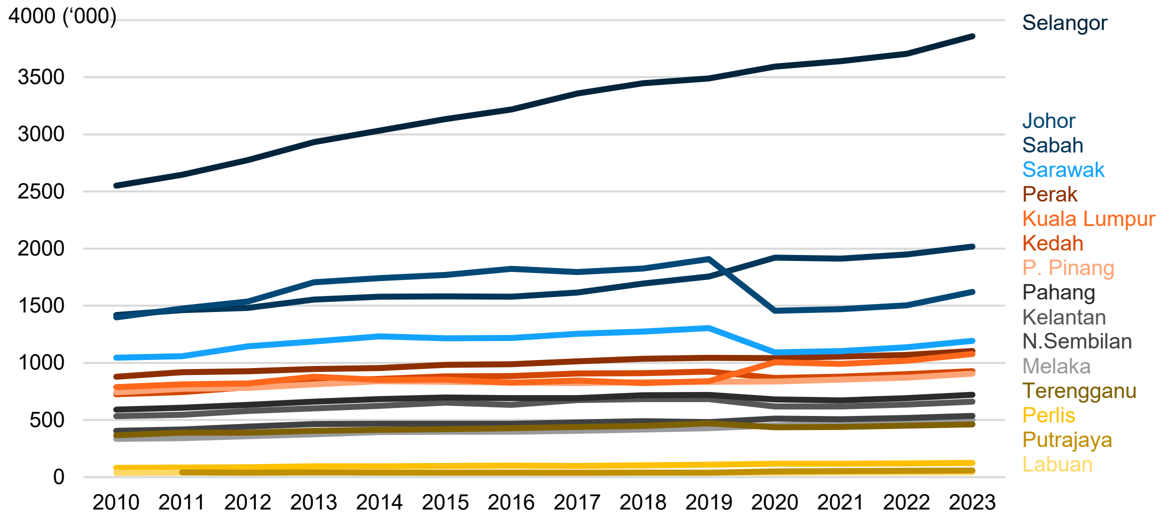
1. Agriculture
2. Construction
3. Manufacturing
4. Mining and Quarrying
5. Services

Figure 4.1 reveals a persistent and substantial unevenness in the development of Malaysia's labour market. Selangor emerges as the dominant locus of employment, rising steadily from approximately 2.5 million to nearly 4 million workers. Johor records similarly robust gains, moving from around 1.4 million to above 2 million, reflecting its strategic industrial expansion and proximity to Singapore.

In contrast, KL's employment grows more modestly, likely shaped by urban capacity constraints. Smaller states such as Perlis, Labuan and Putrajaya exhibit little change over time, maintaining persistently low employment levels and signalling limited economic dynamism. The East Malaysia states, Sabah and Sarawak, achieve only moderate gains and remain far behind the leading regions. The rest of the states, including Kelantan, Terengganu and Melaka, display gradual, incremental increases that do little to close these gaps. The observed pattern illustrates a labour market characterised by spatial concentration of employment growth and entrenched regional disparities in productive opportunities.

[135] KRI (2020)

Figure 4.1: Employment trends by state, 2010-2023



Source: DOS, n.d., KRI calculations
Note: Data for Putrajaya in 2010 is unavailable

4.3.2. Methodological Approaches

To answer these questions, this study integrates several spatial economic tools, combining descriptive and causal techniques to capture both where jobs are concentrated and why. Table 4.1 summarises the methodological approaches utilised in this chapter. Detail of each approach is further discussed in Appendix B.

Table 4.1: Summary of methodological approaches

Method	Purpose	Application	Policy Relevance
Location Quotient (LQ)	Measures regional industry specialisation relative to the national average	Identifies states with high concentrations of specific industries (basic vs. non-basic sectors)	Reveals regional industrial strengths; informs targeted investment or reskilling strategies
Shift Share Analysis (SSA)	Decomposes regional employment change into national, industry and regional effects	Assesses whether growth is driven by industry structure or local competitiveness	Identifies outperforming or lagging regions; supports localised economic planning
Moran's I	Detects spatial clustering or dispersion of economic activity	Tests whether employment patterns are geographically concentrated or random	Confirms spatial inequality; guides infrastructure or labour mobility policies

Limitations

While the multi-method approach enhances the study's depth, several limitations warrant consideration:

- State-level aggregation in the dataset used masks sub-state variation (e.g. urban-rural disparities within Selangor), potentially underestimate localised agglomeration effects. The absence of district-level data limits the granularity of spatial analysis, particularly for Moran's I, which would benefit from a more detailed geographic breakdown;
- The LFS data does not capture informal work arrangements. As such, the analysis may underestimate sectoral concentration in states where informal work accounts for a substantial share of employment (e.g. agriculture in Kelantan). This will underrepresent the true scale of sectoral employment in the affected regions; and
- The LQ and SSA assume static benchmarks (national averages), ignoring dynamic inter-state spillovers (e.g. Johor's growth linked to Singapore). Moran's I mitigate this but relies on a simplistic spatial weights matrix, which may not capture complex economic linkages (e.g. trade routes).

These limitations suggest caution in generalising findings beyond the dataset's scope, though triangulation across methods and sensitivity analyses (e.g. excluding 2020–2021) will bolster reliability.

4.4 Results and Analysis

4.4.1. Location Quotient Analysis of Malaysia's Regional Economic Specialisation

The Location Quotient (LQ) measures the relative concentration of an industry in a specific region compared to the national average. An LQ value **greater than 1 indicates a higher concentration**, suggesting regional specialisation, while a **value below 1 implies a lower concentration**. The LQ results for Malaysia, as presented in Table 4.2, reveal distinct patterns of sectoral specialisation across states, driven by geographic, economic and policy factors. This analysis groups findings by key industries, namely Agriculture, Manufacturing, Mining and Quarrying, Services and Construction, and their spatial concentrations across states:

i. **Agriculture** shows high specialisation in resource-rich states and less urbanised regions. Sabah, Sarawak and Pahang exhibit strong Agricultural concentration, reflecting land availability and commodity suitability (e.g. palm oil, timber and rubber). Kelantan and Perlis also show higher LQ in agriculture. However, national employment in Agriculture has declined to 5.6%[136] as compared to 2010 signifying structural shifts that could be due to industrialisation, service-oriented urbanisation, and undercounting of informal work.
ii. **Manufacturing** remains concentrated in key industrial hubs and more urbanised states. P. Pinang and Johor lead in Manufacturing concentration, aligned with their global value chain integration and industrial ecosystem maturity. Johor benefits from proximity to Singapore, while P. Pinang plays a key role in Electronics and Semiconductor supply chains[137]. Moderate Manufacturing activity is observed in Kedah and Melaka. Selangor's LQ is close to the national average despite its status as Malaysia's industrial powerhouse that contributing over 30% of national Manufacturing output. This likely due to its diversified economy where Services and Construction also play major roles.

[136] DOS (2024b)
[137] Penang Institute (2023)

iii. **Services** are highly concentrated in urban and administrative centres. Services dominate employment nationally (65.8%) and are concentrated in urban and administrative centres like KL, Selangor and Putrajaya. This reflects the rise of Finance, ICT, Tourism and Government administration as economic anchors. Selangor posits as a diversified economic hub, led by its strong Services sector and highlights its broad-based growth and urbanisation.

iv. **Mining and quarrying** show distinct specialisation in select states. Labuan registers an exceptionally high LQ in mining, linked to offshore oil and gas activities, despite a small portion of workforce. Terengganu and Selangor's higher LQs reflect Quarrying activity tied to urban development and infrastructure demand. Putrajaya's high LQ is likely Administrative in nature, not based on extraction.

v. **Construction** activity reflects infrastructure priorities and regional development plans. Construction activity is concentrated in Terengganu and Kelantan, supported by public infrastructure projects under East Coast Economic Region (ECER). Selangor also shows strong Construction activity, that reflect its ongoing urban expansion and alignment with Quarrying-related demands.

Table 4.2: Job concentration measured by LQ, 2023

	Agriculture	Construction	Manufacturing	Mining and Quarrying	Services
Johor	0.684	1.004	1.480	1.238	0.921
Kedah	1.095	0.867	1.208	0.455	0.956
Kelantan	1.090	1.474	0.611	0.239	1.033
Kuala Lumpur	0.038	0.978	0.498	0.180	1.268
Labuan	0.228	0.849	0.659	17.019	1.072
Melaka	0.447	0.870	1.336	0.422	1.014
N. Sembilan	0.636	0.884	1.056	1.017	1.050
P. Pinang	0.196	0.747	2.167	0.078	0.859
Pahang	2.382	0.700	0.671	0.610	0.932
Perak	1.162	0.929	1.051	0.510	0.978
Perlis	0.793	1.003	0.570	0.282	1.142
Putrajaya	0.057	1.182	0.010	2.720	1.340
Sabah	2.781	0.901	0.518	0.445	0.891
Sarawak	2.476	1.051	0.703	0.870	0.865
Selangor	0.229	1.060	0.986	1.823	1.095
Terengganu	0.983	1.732	0.737	2.130	0.968

Source: DOS (2023b), KRI calculations
Note: Green > 1 (high), Yellow = 1 (average), Red < 1 (low)

Job concentration over the years based on time series location quotient analysis

To understand the evolving patterns of regional economic specialisation in Malaysia, we analyse the time series LQ from 2010 to 2023. This time series approach enables us to track changes in industry concentration across 16 Malaysian states for the key sectors, relative to the national average. Figure 4.2 illustrates the top 5 LQ trends by industry and state from 2010 to 2023:

i. **Agricultural** specialisation remains strongest in resource-rich states such as Sabah, Sarawak and Pahang, with consistently high LQ values (often >2), driven by commodities like palm oil, timber and rubber. Sabah reached a peak LQ of 2.83 in 2015, while Sarawak maintained high values across the years. In contrast, urbanised states like KL and Selangor show minimal Agricultural activity (LQ < 0.2), consistent with land use patterns. Kedah, Kelantan and Perak exhibit moderate specialisation (LQ 1–1.5), reflecting shifts in output and policy.

ii. **Manufacturing** is highly concentrated in P. Pinang (LQ 1.8–2.16), affirming its role as a key hub for Electronics and Semiconductors. Johor and Melaka also record strong specialisation (LQ > 1.3), supported by diverse industrial bases and regional spillovers from Singapore. Selangor and Kedah maintain moderate LQ values (1–1.2), aligned with their diversified economies. States like KL, Perlis and Sabah remain less Manufacturing-intensive (LQ < 0.6), while Putrajaya shows near-zero levels.

iii. The **Services** sector shows a broad national presence, with most states recording LQ values between 0.8 and 1.2. KL (LQ > 1.3) leads in services, anchored by Finance, ICT and Tourism. Putrajaya also shows high LQ (1.3–1.6), aligned with its administrative role. Sabah and Sarawak fall slightly below the national average, pointing to underrepresentation relative to more urbanised states.

iv. **Construction** activity is relatively balanced nationwide, with most states recording LQ values between 0.7 and 1.3. Terengganu (LQ 1.92 in 2021) and Putrajaya (LQ 1.41 in 2022) show surges linked to public infrastructure projects under regional corridors like ECER. Kelantan and Labuan also experienced periodic peaks, suggesting localised development-led booms.

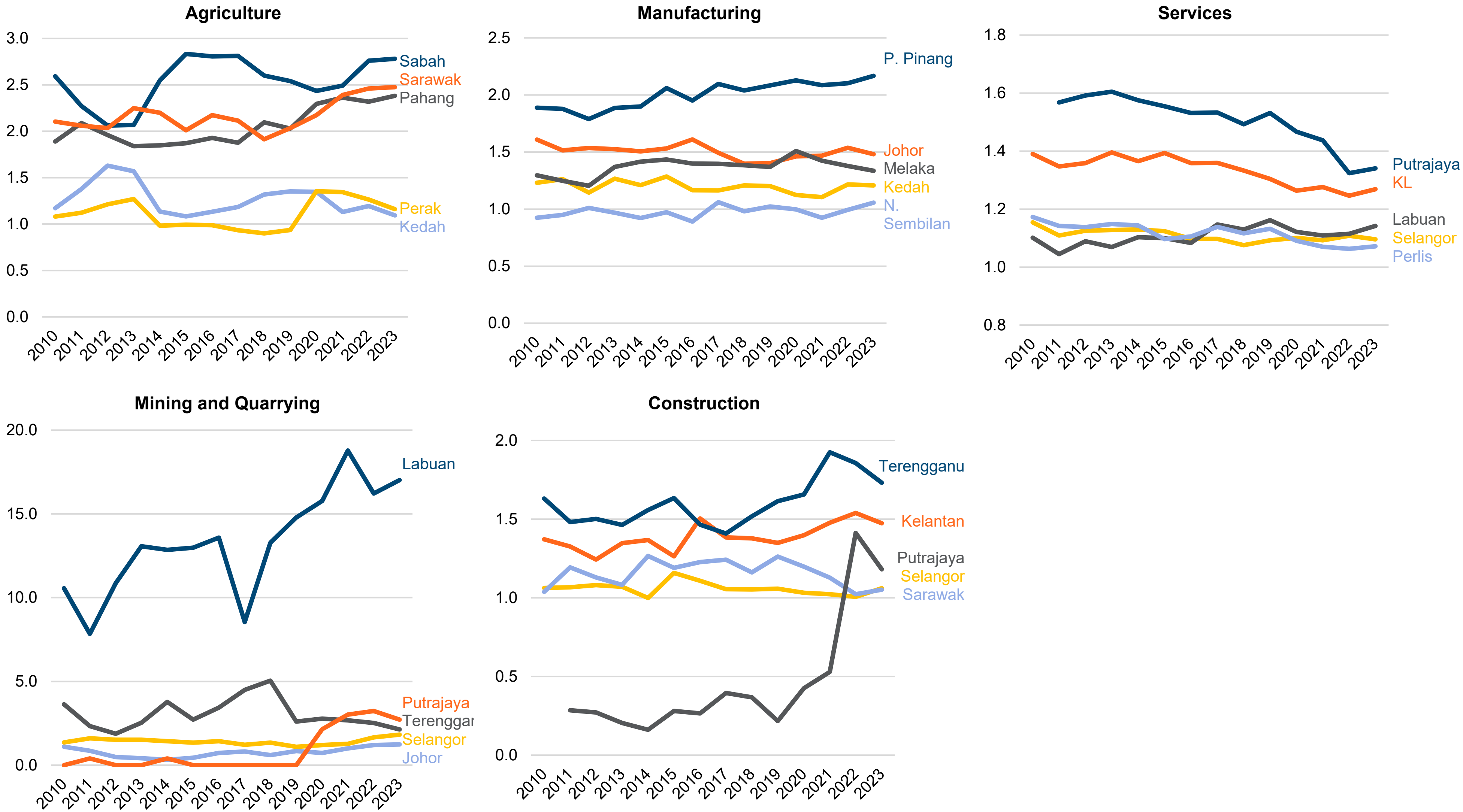
v. **Mining and quarrying** sector remains niche but highly concentrated. Labuan shows extreme specialisation (LQ 7.8–18.8), driven by offshore Oil and Gas activities. Terengganu also displays high LQ values, particularly in earlier years, linked to South China Sea exploration. Sarawak and Selangor show intermittent peaks, while most other states maintain low levels (LQ < 0.6). Putrajaya's occasional spikes are likely statistical anomalies rather than reflective of actual extraction activity.

Regional clustering

Malaysia's economic sectoral landscape reflects distinct regional clusters shaped by resource availability, urbanisation and policy priorities. East Malaysia (Sabah and Sarawak) remains specialised in primary sectors, particularly Agriculture and Mining, but lags in Manufacturing and Services. In contrast, the west coast of Peninsular Malaysia (especially P. Pinang and KL) demonstrates strong specialisation in manufacturing and services, and it is well-aligned with global value chains and national industrial strategies. Northern and eastern states such as Kedah, Perlis and Terengganu exhibit mixed patterns, combining moderate Agricultural and Manufacturing activity with Construction and Mining, which are often linked to infrastructure corridors like the East Coast Economic Region (ECER). Notable outliers like Labuan (Mining) and Putrajaya (Services) reflect highly concentrated, function-specific economies.

Across sectors, Services are becoming more evenly distributed across states, driven by urbanisation and economic diversification, while Agriculture and Mining remain uneven, concentrated in rural or resource-rich areas. Declining Agricultural specialisation in traditionally agrarian states signals an ongoing structural shift, while consistent Manufacturing strength in P. Pinang, Johor and Melaka indicates industrial resilience. Meanwhile, volatile Mining activity in Labuan and Terengganu highlights the risks of resource dependency. These regional patterns support the case for spatially targeted policies under NIMP 2030, especially in expanding renewable energy and high-value industries to reduce regional disparities, particularly in East Malaysia.

Figure 4.2: Top 5 states with highest LQ in each key sectors, 2010 - 2023



Source: DOS, n.d., KRI calculations
Note: Data for Putrajaya in 2010 is unavailable

4.4.2. Shift-Share Analysis (SSA)[138]

Next, the SSA is used to explore what drives employment growth across regions. Unlike basic LQ, SSA breaks down changes in employment into national, sectoral and regional factors. SSA helps us understand whether growth comes from overall national trends, strong sectors or regional strengths. Through the Competitive Effect (CE), Regional Industry Mix Effect (RIE), and Regional Sectoral Effect (RSE), we can better understand which sectors and regions are doing well and which may need targeted support. Table 4.3 summarises the key characteristics of SSA results according to typology classification on intrinsic regional effects.

Table 4.3: Typology classification based on intrinsic regional effects of the SSA

CE	RIE	RSE	Typology	Key characteristics
+	+	+	T1	Engine growth: Strong in all three dimensions; sectors with strong competitive advantages both nationally and regionally, within an overall regional economy that outperforms the national average.
+	+	-	T2	Sectoral strengths amidst regional headwinds: Strong sectors in underperforming regions; sectors that maintain competitive advantages at both national and regional levels yet operate within regional economies that are less dynamic than the national one.
+	-	+	T3	National competitors with regional specialisation gaps: Nationally competitive sectors lagging behind other regional sectors; sectors with national competitive advantages and benefit from a regional economy than the national average but surprisingly show competitive disadvantages at the regional level.
+	-	-	T4	Isolated national strengths in struggling regions: Sector that maintains a competitive advantage only at the national level, but faces competitive disadvantages regionally and is situated within a regional economy growing slower than the national average.
-	+	-	T6	Local importance, national disadvantage: Sector that exhibit competitive disadvantages at the national level, operate within less dynamic regional economies, but surprisingly show competitive advantages at the regional level.
-	-	+	T7	Sector-specific weaknesses in strong regional economies: sectors with competitive disadvantages at both nations and regional levels, despite being located within regional economies that are stronger than the national one.
-	-	-	T8	Deep-seated challenges: sectors exhibit competitive disadvantages at both national and regional levels and are situated within regional economies that are less dynamic compared to the national one.

Source: Montanía et al. (2024)
Note:

1. Competitive Effect (CE) measures the competitiveness of a specific sector (i) in region (j) relative to the same sector at the national level. A positive CE indicates that the regional sector is growing faster than its national counterpart, suggesting a competitive advantage due to region-specific factors such as innovation, productivity, or favourable local conditions. A negative CE implies that the regional sector is underperforming compared to the national sector, highlighting a competitive disadvantage that may require targeted interventions to improve sectoral performance.
2. Regional Industry Mix Effect (RIE): evaluates the performance of sector (i) within region (j) compared to the overall regional economy. This effect assesses whether the region has a comparative advantage or disadvantage in the specific sector relative to other sectors within its economy. A positive RIE suggests that the sector is more dynamic than the regional average, indicating a regional specialisation or strength in that sector. Conversely, a negative RIE implies that the sector is less dynamic than other sectors in the region, pointing to a lack of regional specialisation.
3. Regional Sectoral Effect (RSE) compares the overall growth of the regional economy (g) to the national economy's growth across all sectors (G) This effect evaluates the relative strength or weakness of the entire regional economy compared to the national economy, regardless of the specific sector.

[138] The comprehensive non-spatial shift-share analysis (SSA) applied in this study is built upon the framework proposed by Montanía et al. (2024)

Table 4.4 highlights the state-sector categories based on typology classifications and outlines their key implications. The analysis highlights the importance of distinguishing between national competitiveness, regional specialisation and overall regional economic dynamism (in terms of labour market outcomes) to formulate effective, targeted policies for sustainable growth across Malaysia's diverse economic landscape.

Table 4.4: Results of the SSA intrinsic regional effects according to typology classification (key state examples), 2010 and 2023

Typology	Sector	State	Employment change (2010 vs 2023)
T1	Services	Selangor	432,900
		Melaka	59,100
		N. Sembilan	47,900
		Perlis	19,400
	Manufacturing	Johor	90,200
		Kuala Lumpur	43,000
		P. Pinang	35,600
	Construction	Johor	36,500
T2	Manufacturing	Perak	23,200
		Terengganu	9,900
	Agriculture	Perak	17,600
		Sarawak	9,200
	Construction	Terengganu	7,300
		Kedah	8,800
T3	Services	Kuala Lumpur	202,100
		Johor	193,700
		Putrajaya	-3,800
T4	Agriculture	Pahang	-3,600
		Terengganu	-600
T6	Services	Kedah	45,100
		Pahang	18,600
		Sabah	-49,400
		Sarawak	-25,700
T7	Services	Pahang	37,700
	Manufacturing	Selangor	-68,700
T8	Services	Perak	32,900
	Agriculture	Sabah	-94,300
		Kedah	-35,000
		Kelantan	-29,900
	Construction	Sabah	-32,200
		Sarawak	-24,000
	Manufacturing	Sabah	-23,600
		Sarawak	-35,900

Source: DOS, n.d. and KRI calculations

Most sectors in more urbanised states can be considered important drivers of national growth and employment, even though some remain regionally underdeveloped—for example, the service sector in Johor and Kuala Lumpur. Meanwhile, sectors in Sabah and Sarawak generally fall into lower-ranked typologies of competitiveness (except Sarawak's agriculture), highlighting the need to address regional challenges beyond purely industrial concerns. Some sectors in less developed regions could be considered 'dark horses', as they remain nationally competitive, such as agriculture in Perak, Sarawak, Pahang, and Terengganu.

These findings underscore the need for targeted policies to sustain and enhance regional competitiveness while uplifting rural economies that have the potential to contribute significantly to both regional and national growth. Furthermore, addressing data limitations—particularly in capturing smaller sectors, government interventions, and labour market outcomes—is essential to ensure accurate economic assessments.

4.4.3. Moran's I Statistics

Moran's I is used to identify patterns across employment distribution across states in Malaysia. The objective is to explore regional disparities and identifying economic clusters.

The spatial autocorrelation results (see Appendix B) show no statistically significant clustering in employment across the five major sectors—Agriculture, Construction, Manufacturing, Mining & Quarrying, and Services (all p-values > 0.05). The finding suggests that employment distribution in each sector does not follow strong spatial concentration or dispersion patterns. In other words, states with high (or low) employment in a sector are not consistently surrounded by states with similar employment intensity, pointing to a largely fragmented or spatially random employment geography.

Although quadrant positions (e.g. Sabah in High-High, Johor in High-Low; see Table B.2) may suggest some intuitive patterns, but these are not statistically robust. They likely reflect sector-specific industrial roles, administrative specialisation, or geographic isolation rather than true spatial clustering.

The lack of significant spatial autocorrelation may indicate:

- Sectoral decentralisation (e.g. Services spread across states rather than concentrated);
- Administrative or economic specialisation (e.g. KL and Putrajaya's low employment due to administrative focus); and
- Limitations in capturing intra-state dynamics (e.g. urban-rural splits obscured in state-level aggregation).

4.5 Discussion and Policy Implications

The following discussion illuminates the interconnected nature of regional specialisation, growth drivers and spatial distribution of economic activity. The LQ analysis shows clear sectoral specialisation across Malaysian states that reflects how certain industries are more concentrated in specific areas. High LQ values point to geographic clustering that brings economic advantages. For example, P. Pinang and Johor have high LQ in Manufacturing. pointed out the presence of strong industrial hubs. These clusters benefit from shared infrastructure, skilled labour and efficient supply chains, which help reduce costs and improve competitiveness as seen in P. Pinang's Electronics and Semiconductor industries[139]. Similarly, KL and Selangor show high LQ in Services, where the concentration of Finance, IT, Tourism and Professional Services supports knowledge sharing, collaboration and innovation[140].

These specialised hubs attract and retain skilled workers through strong labour markets that benefit both employers and employees. The close concentration of firms also drives competition that influences businesses to innovate and become more efficient. In turn, productivity increases across the sector. Together, these high-LQ activities in states like Selangor, P. Pinang, Johor and KL serve as key drivers of Malaysia's economic growth and contribute significantly to the country's GDP[141].

[139] World Bank (2021)
[140] UNCTAD (2021)
[141] DOS (2023a)

However, despite these signs of local agglomeration, the Moran's I results tell a different story. Most sectors show weak or even negative spatial autocorrelation. This means that strong industrial or service hubs often stand alone, with little spillover to nearby states[142]. For example, the growth seen in Selangor and Johor does not appear to benefit their neighbours in the same sectors in terms of similar labour outcomes.

On the other hand, it might also be the case that spillovers in the regional economic context might occur in a slightly different relationship, beyond Moran's limitation. For example, neighbouring Klang Valley and Selangor might not influence N. Sembilan to have similar labour outcomes in its service sector but could influence its agriculture and construction sectors. In fact, in its State Structure Plan, N. Sembilan designates its districts for modern agricultural activities to support the needs in Klang Valley (Selangor). Similarly, N. Sembilan is tapping into Sepang's economy (Kuala Lumpur International Airport) in Selangor with the ambition to be the main 'feeder' through the development of Malaysia Vision Valley near the area.

Perhaps the best way to identify spillovers through Moran's analysis is to use more granular geographic data, such as districts or mukim-level. For example, a calculation where the Nilai-Sepang relationship could be observed makes more sense than the Selangor-N. Sembilan.

Insights from both the LQ and SSA analyses point to clear opportunities for strategic intervention to promote more balanced and inclusive growth. SSA, in particular, offers a deeper view of regional employment trends by breaking down growth into components that highlight competitive advantages, specialisation and regional dynamism. This makes it a valuable tool for designing more targeted and effective policies.

For states and sectors identified as "Engines of Growth", categorised in T1 typology, such as Selangor's services sector and manufacturing hubs in Johor, KL and P. Pinang, policy should focus on sustaining their competitive edge. To stay competitive, these regions need continued investment in advanced infrastructure, specialised talent development, vibrant innovation ecosystems and attracting high-value foreign direct investment to ensure these key regions remain drivers of national growth[143].

The SSA adds detail for designing targeted interventions, especially for regions with complex development paths. In "Bright Spots Amidst Headwinds" (T2 typology), such as Perak's Manufacturing or Sarawak's Agriculture, sectors show internal strength but are constrained by weaker regional economies. Policy efforts should aim to unlock their potential as growth catalysts through strengthening inter-sectoral linkages, improving infrastructure to support trade and offering incentives to diversify economic activity around these anchor sectors.

At the same time, Agriculture presents a key opportunity and not just as a traditional sector, but as a modern driver of food security and rural development. Although its national employment share has declined, Agriculture maintains high LQ in states like Sabah, Sarawak and Pahang, reflecting its structural importance. However, cases like Pahang (T4) and Sabah (T8) reveal challenges of regional specialisation within regional struggles.

[142] Anselin (1995)
[143] EPU (2021)

Key strategies could be looked into include the shift toward modernising the entire agricultural value chain, such as adopting Agri-tech, promoting high-value crops and supporting sustainable practices. Such efforts can enhance food security while making rural employment more attractive, helping to retain talent, strengthen local economies and reduce the rural–urban divide[144].

"Areas for Deeper Intervention" (T4, T6, T7 and T8) reflect more entrenched challenges that require tailored and potentially transformative strategies. For instance, sector-specific weaknesses in otherwise strong regions such as the decline of manufacturing in Selangor (T7) despite the state's broader economic strength would call for targeted diagnostics to uncover root causes like automation or global competition. Further, targeted reskilling initiatives, technology adoption support and other sector-specific policy responses may be required in addressing these issues[145].

Finally, regions and sectors classified as "Deep-Seated Challenges" (T8), such as Sabah's Agriculture or Sarawak's Manufacturing may require fundamental restructuring. While Sarawak has shown notable state-led efforts to drive economic development, both Sabah and Sarawak continue to face critical infrastructure gaps that hinder broader progress.

Interventions must therefore prioritise long-term investment in basic infrastructure, comprehensive human capital development, including the capacity of local industries to attract talent, and supports for entrepreneurship that can provide specialised industrial needs or for local consumption. In this regard, policies that support a holistic, place-based intervention are most needed to bridge the rural–urban divide and promote more equitable and inclusive development[146]

4.6 Concluding Remarks

Malaysia's sectoral distributions, as revealed through the combined lenses of LQ, SSA and Moran's I reflect a deeply polarised structure shaped by stark urban–rural divides. Urban centres such as KL, Selangor, P. Pinang and Johor emerge as "Engines of Growth", leading in high-value sectors like Manufacturing and Services. These regions exhibit strong national competitiveness and regional specialisation, supported by advanced infrastructure, foreign investment and integration into global value chains.

In contrast, rural states such as Sabah, Sarawak, and Pahang remain reliant on primary sectors such as Agriculture and Mining, but struggle with limited diversification and underdeveloped infrastructure. The result is a fragmented economic landscape, where high-performing industrial and service hubs remain spatially disconnected from surrounding regions, as evidenced by weak or negative spatial autocorrelation in most sectors. An exception is found in Mining and Quarrying, where resource-rich East Malaysia exhibits clustering due to the geographic concentration of natural resources.

[144] OECD (2020); Chopra et al. (2022)
[145] World Bank (2022)
[146] Yusof and Kalirajan (2021)

For Malaysia's labour market, this creates a dual challenge: sustaining the momentum of dynamic urban economies while promoting inclusive growth in underdeveloped regions. Urban centres continue to attract talent and create better-paid jobs but face negative externalities such as congestion, wage compression, and high living costs, questioning their urban productivity. Rural areas, meanwhile, need targeted interventions to diversify their economic base and modernise employment, especially in agriculture and natural resource–based sectors. While developing, rural areas will likely not be able to attract and retain talent due to limited economic opportunities.

As such, economic corridor councils, such as the ECER and Sarawak Corridor of Renewable Energy (SCORE), will need to continue to play a key role in narrowing regional gaps by boosting infrastructure and industrial capacity in less urbanised areas. These efforts have catalysed new activity in states like Terengganu, Kedah and Perak, suggesting early signs of economic transition and diversification. Yet, the persistence of low competitiveness in rural states signals that more sustained and targeted policy efforts are needed to bring these regions fully into the national economic fold. The next chapter of this report further discusses the federal and state government commitments to boost industrial capacity with spatial strategies and their outcomes.

REFERENCES

Abdullah, Muhammad Ridhuan Bos, and Suhaila Abdul Jalil. 2006. "Industrial Structure and Concentration in Malaysian Manufacturing Industry." *International Journal of Management Studies (IJMS)* 13. Universiti Utara Malaysia:83–101.

Anselin, Luc. 1995. "Local Indicators of Spatial Association—LISA." *Geographical Analysis* 27 (2). Wiley Online Library:93–115.

Ariff, Mohamed. 2008. "New Perspectives on Industry Clusters in Malaysia." https://www.eria.org/uploads/media/Research-Project-Report/RPR_FY2007_3_Chapter_9.pdf.

Arus, Faiza Rusrianti Tajul. 2021. "Unemployment News Type in Malaysia by Topic Modelling and Cluster Analysis Approach." In . Kuala Lumpur: Department of Statistics.

Bhattacharya, Mita. 2002. "Industrial Concentration and Competition in Malaysian Manufacturing." *Applied Economics* 34 (17):2127–34. https://doi.org/10.1080/00036840210135683.

BNM. 2000. "Deputy Governor Dato' Dr. Zeti's Speech at the Venture Capital Europe-Asia 2000 Conference - 'Accelerating Economic Growth through Venture Capital' - Bank Negara Malaysia." 2000. https://shorturl.at/uR6ax.

———. 2021. "Getting the Great Reset Right: Structural Labour Market Issues in the Post-COVID-19 World." Kuala Lumpur: Bank Negara Malaysia. https://www.bnm.gov.my/documents/20124/3026377/emr2020_en_box3_labourmkt.pdf.

———. 2024. "The Case for Labour Market Reforms in Malaysia: Challenges and Opportunities." Kuala Lumpur: Bank Negara Malaysia. https://www.bnm.gov.my/documents/20124/12141961/emr2023_en_box3.pdf.

Chopra, Ritika, Cosimo Magazzino, Muhammad Ibrahim Shah, Gagan Deep Sharma, Amar Rao, and Umer Shahzad. 2022. "The Role of Renewable Energy and Natural Resources for Sustainable Agriculture in ASEAN Countries: Do Carbon Emissions and Deforestation Affect Agriculture Productivity?" *Resources Policy* 76. Elsevier:102578.

DOS. 2023a. "Gross Domestic Product by State, 2015-2023." Putrajaya: Department of Statistics Malaysia. https://storage.dosm.gov.my/gdp/gdp_state_2023_infographic.pdf.

———. 2023b. "Statistics of Employed Persons by Industry, State."

———. 2024a. "Labour Force Statistics Malaysia Report May 2024." Putrajaya: Department of Statistics Malaysia. https://storage.dosm.gov.my/labour/lfs_month_2024-05_en.pdf.

———. 2024b. "Labour Force Statistics Report June 2024." Putrajaya: Department of Statistics Malaysia. https://storage.dosm.gov.my/labour/lfs_month_2024-06_en.pdf.

———. 2025a. "Employment Statistics, Fourth Quarter 2024." Putrajaya: Department of Statistics Malaysia. https://storage.dosm.gov.my/labour/lfs_qtr_2024-q4.pdf.

———. 2025b. "Statistics of the Labour Force, Malaysia, December and Fourth Quarter 2024." Putrajaya: Department of Statistics Malaysia. https://www.dosm.gov.my/uploads/release-content/file_20250210120655.pdf.

———. n.d. "Statistics of Employed Persons by Industry, State."

EPU. 2016. "Strategy Paper 9: Transforming Technical and Vocational Education and Training to Meet Industry Demand." Eleventh Malaysia Plan 2016-2020. Putrajaya: Economic Planning Unit. https://ekonomi.gov.my/sites/default/files/2021-05/Strategy%20Paper%2009.pdf.

———. 2021. "Twelfth Malaysia Plan." Putrajaya: Economic Planning Unit. https://ekonomi.gov.my/.../pdf.

Hamid, Zarinah. 2010. "Concentration of Exports and Patterns of Trade: A Time-Series Evidence of Malaysia." *The Journal of Developing Areas* 43 (2). Tennessee State University College of Business:255–70.

ILMIA. 2017. "Employment by Sector." 2017. https://shorturl.at/OiUqU.

KRI. 2020. "Work in an Evolving Malaysia." The State of Households 2020 Part II. Kuala Lumpur: Khazanah Research Institute.

Maamor, Selamah, Aznita Samsi, Siti Nur Fatihah Samsuddin, Norehan Abdullah, Hussin Abdullah, and Sabri Nayan. 2019. "Developing the Dynamic of Job Creation Augmented Model for Malaysian Manufacturing Sectors." *Int. J Sup. Chain. Mgt Vol* 8 (2):1186.

MEA. 2019. "Shared Prosperity Vision 2030." Putrajaya: Ministry of Economic Affairs. https://www.epu.gov.my/sites/....202030.pdf.

MIDA. 2024a. "Malaysia's Economic Corridors." Malaysian Investment Development Authority. 2024. https://www.mida.gov.my/news-year/2024/.

———. 2024b. "Manufacturing Opportunities in Malaysia." Malaysian Investment Development Authority. 2024. https://www.mida.gov.my/mida-news/manufacturing-opportunities-for-malaysia/.

MITI. 2023. "NIMP 2030." 2023. https://www.nimp2030.gov.my/.

MOF. 2025. "Malaysia Records Historic High RM378.5 Billion in Investments, with 14.9% Y-O-Y Growth, Generating More than 207,000 Jobs in 2024." Invest Malaysia. 2025. https://www.investmalaysia.gov.my/resources/latest-announcements/malaysia-records-historic-high-rm3785-billion-in-investments-with-149-y-o-y-growth-generating-more-than-207-000-jobs-in-2024/.

MOHE. n.d. "Graduates Reference Hub for Employment and Training (GREaT)." Accessed July 1, 2025. https://great.mohe.gov.my/.

Montanía, Claudia V., Miguel A. Márquez, Teresa Fernández-Núñez, and Geoffrey J. D. Hewings. 2024. "Toward a More Comprehensive Shift-Share Analysis: An Illustration Using Regional Data." *Growth and Change* 55 (1):e12693. https://doi.org/10.1111/grow.12693.

Ng, Allen, Theng-Theng Tan, and Zhai Gen Tan. 2018. "What Explains the Increase in the Labor Income Share in Malaysia?," no. 894 (November). https://www.adb.org/publications/what-explains-increase-labor-income-share-malaysia.

OECD. 2020. "Rural Well-being: Geography of Opportunities. OECD Rural Studies." *Organisation for Economic Co-operation and Development*. OECD Publishing.

———. 2021. "Entrepreneurship in Regional Innovation Clusters: Case Study of Chiang Mai and Chiang Rai, Thailand, OECD Studies on SMEs and Entrepreneurship." https://www.oecd.org/content/dam/oecd/en/publications/reports/2021/11/entrepreneurship-in-regional-innovation-clusters_c1f6a1f7/2a24a552-en.pdf.

Penang Institute. 2023. "Strategy for Economic Ecosystem Development (Penang SEED)." Penang Institute. https://penanginstitute.org/wp-content/uploads/2023/06/Penang-SEED.pdf.

Said, Farlina, and Angeline Tan. 2024. "Malaysia's Semiconductor Ecosystem amid Geopolitical Flux." https://www.isis.org.my/wp-content/uploads/2024/06/Malaysia%C2%80%C2%99s-semiconductor-ecosystem-amid-geopolitical-flux.pdf.

Samsi, A., Siti Nur Fatihah Samsuddin, Norehan Abdullah, and Selamah Maamor. 2018. "Job Creation Patterns in the Malaysian Manufacturing Sector: Does Technology Matter?" *ResearchGate*. https://doi.org/10.14716/ijtech.v9i8.2746.

TalentCorp. 2020. "Brain Drain in Malaysia: Why Malaysians Don't Want to Come Back Home." 2020. https://www.talentcorp.com.my/resources/news-events/brain-drain-in-malaysia-why-malaysians-dont-want-to-come-back-home/#:~:text=Some%20want%20to%20come%20back,overseas%20and%20not%20come%20home.

Tey, Nai Peng, and Siow Li Lai. 2022. "Population Redistribution and Concentration in Malaysia, 1970-2020." *Planning Malaysia* 20.

Tong, Tong, Norzalina Binti Zainudin, Jingwen Yan, and Azmawani Abd Rahman. 2023. "The Impact of Industry Clusters on the Performance of High Technology Small and Middle Size Enterprises." *Sustainability* 15 (12). MDPI:9333.

UNCTAD. 2021. "World Investment Report 2021: Investing in Sustainable Recovery." United Nations publication issued by the United Nations Conference on Trade and Development UNCTAD/WIR/2021. New York: International Trade Centre. https://unctad.org/system/files/official-document/wir2021_en.pdf.

World Bank. 2021. "Aiming High: Navigating the next Stage of Malaysia's Development." Kuala Lumpur: The World Bank. https://www.worldbank.org/en/country/malaysia/publication/aiminghighmalaysia.

———. 2022. "Malaysia Economic Monitor: Catching Up." https://openknowledge.worldbank.org/handle/10986/37531.

Yusof, Yusniliyana, and Kaliappa Kalirajan. 2021. "Variations in Economic Growth across States in Malaysia: An Exploratory Analysis." *Journal of Economic Studies* 48 (3). Emerald Publishing Limited:699–719.

[THIS PAGE INTENTIONALLY LEFT BLANK]

CHAPTER

05

TAPPING AGGLOMERATION BENEFITS FOR TECHNICAL AND TECHNOLOGY TALENT DEVELOPMENT

CHAPTER 5

TAPPING AGGLOMERATION BENEFITS FOR TECHNICAL AND TECHNOLOGY TALENT DEVELOPMENT

Muhammad Nazhan Kamaruzuki

Kita perlu memperkenalkan formula pembangunan yang lebih bersepadu, menyeluruh lagi dinamik. Sudah sampai masanya, pusat perkembangan dan pertumbuhan tidak harus hanya tertumpu di Lembah Klang. Justeru itu, Kerajaan akan membangunkan kawasan-kawasan pertumbuhan baru, termasuk mengambil pendekatan merentasi sempadan negeri untuk membolehkan sesuatu projek memberi manfaat kepada beberapa negeri secara serentak.

Tun Abdullah Ahmad Badawi (2006)

5.1 Introduction

This chapter aims to provide an observation on how the agglomeration approach has been embedded in existing policies and initiatives, particularly in setting up national economic aspirations and translating them into regional and development strategies. The landscape and outcomes of supply and demand for technology and technical talents have been discussed in the previous chapters, while this chapter continues the discussion by providing an analysis on spatial policy surrounding technology and technical development in Malaysia.

This chapter reviews relevant planning documents at the national, regional, state and local levels to identify strategies that spur local industries and human capital, particularly in sectors expected to generate high-value jobs for local Technology and Technical (T&T) talents. The underlying hypothesis is that industrialisation plays an important role to foster urbanisation thus achieving regional development goals such as higher standards of living and advanced economic activities. In addition, training centres for technology and technical talents in Malaysia are likely to be collocated with industries such as in industrial zones, business hubs, or identified economic clusters. This colocation is significant in capturing the benefits of agglomeration economies and further enhancing a regional innovation system. The general policy implication is that the ambition of building a thick labour market, one with dense concentrations of firms and skilled workers, can be realised through advanced economic activities aligned with high-skilled talent in a particular region, which could influence Malaysian Board of Technologists (MBOT) roles.

5.2 Malaysian Regional Development Strategy

Since independence, Malaysia has been rigorously promoting economic growth strategies in the Malaysia Plan (MP), from the 1st Malaysia Plan to the 12th Malaysia Plan. Each Malaysia Plan typically spans five years and serves as a roadmap for national development in Malaysia. Over time, regional development has become an integral component, with the aspiration to achieve an inclusive development through a balanced growth across the country. Though strategies and focus areas could be different, the core objective of regional planning remains consistent: to enhance competitiveness, generate economic opportunities and ensure balanced socio-economic development across the country[147].

Throughout the plans, regional economic direction and priorities have shifted from rural agricultural activities to export-oriented economic bases. With that shift, the priorities have to focus on high value-added activities such as electrical and electronics, petroleum and chemical products and modern agriculture. These industries are not only technologically advanced but also demand a skilled, knowledgeable workforce.

Similarly, regarding the regional development agenda, strategies to address physical infrastructure needs have been complemented with strategies to urbanise rural areas that are to be coiled with commercial and industrial activities. During the early post-independence period, the regional development strategy in Malaysia had been focusing on rural land ownership, addressing infrastructure gaps and agriculture sector was the main economic driver, but the emphasis has been shifted towards urbanization of rural areas by developing regional manufacturing, construction and services sectors[148]. New townships and industrial zones were established to stimulate job creation and attract economic activity. It is believed that urbanisation would lead to higher economic productivity; therefore, it has been identified not just one of the goals in regional economic development plan but also serves an important factor for economic prosperity[149].

Without strong local economic bases, such as the availability of jobs, urbanisation could be hard to realise. Urbanisation can only begin with localisation of economic activities or in other words, a region must have a strong economic base, mostly through industrialisation, which serves as a regional economic strength that can attract labour mobility (labour pooling). Only then, urbanisation process will take place.

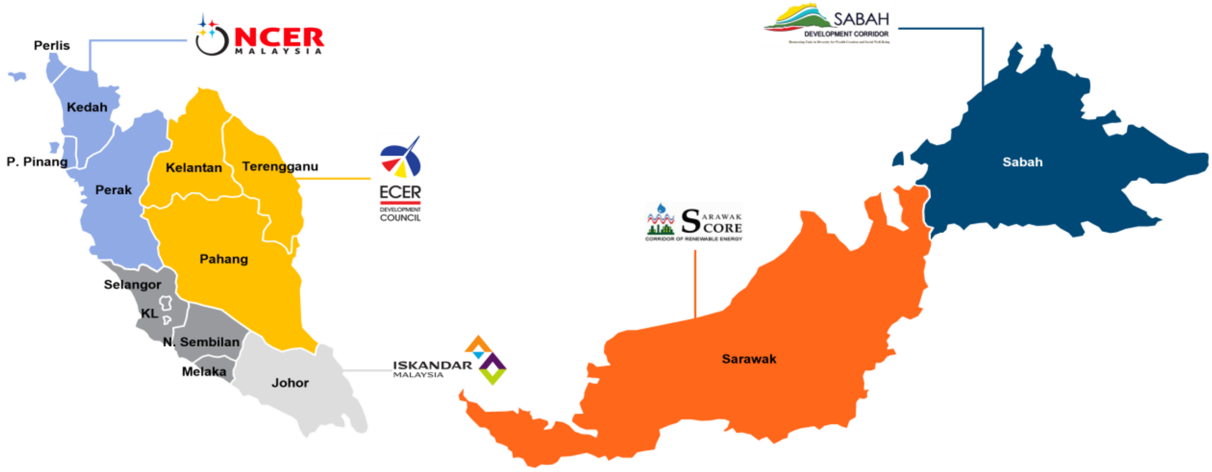
Hence, the federal government has strategically promoted propulsive sectors[150] (sectors with strong forward-backward linkages) to drive growth in specific regions. This effort is most clearly seen in the establishment of five economic corridors under the 9th Malaysia Plan, and the economic engines of these five corridors were further outlined in 10th Malaysia Plan. These corridors are designed around clusters of economic activities based on sectoral strengths and geographic advantages[151]. Figure 5.1 illustrates the regional development authorities responsible for driving growth to spur the development of the identified economic corridors. While some corridors contain multiple states, others are state-specific.

[147] Noor Suzilawati Rabe, Mariana Mohammed Osman, and Syahriah Bachok (2013)
[148] Ibid.
[149] EPU (2010)
[150] Propulsive sectors are sectors with forward-backward linkages and typically highly innovative. Source: Yuko Aoyama, Susan Hanson, and Murphy (2010)
[151] EPU (2010)

These authorities coordinate planning, investment and resource mobilisation across federal, state and local levels. The regional development authorities serve as a central hub that aligns public and private sector efforts and ensuring that development is tailored to the unique economic strengths of each region (Table 5.1).

Whether the selected propulsive industries are organic in nature or driven by the government, the public resources and efforts are expected to generate economic spillovers to local talents. As such, all stakeholders, whether public institutions or a business entity, should work collaboratively in order to align regional strategies with national aspirations.

Figure 5.1: Malaysian Economic Corridors and Regional Development Authorities



Source: MIDA (2024); EPU (2021)
Note: Dark grey is the central region

Table 5.1: Propulsive sectors Identified in the 10th Malaysia Plan

Economic Corridors	Economic sectors	Key projects/growth nodes
Iskandar Malaysia	Education; Healthcare; Finance; Creative Industry Logistics; and Tourism	Johor Premium Outlet, MSC Cyberport City and Johor Bahru City Transformation
Northern Corridor Economic Region (NCER)	Modern Agriculture: High-Value add Manufacturing; Tourism; Logistics	NCER Central Conurbation, Penang International Airport, Second Penang Bridge
East Coast Economic Region (ECER)	Tourism; Oil and Gas; Petrochemical Manufacturing; Agriculture; and Education	ECER Special Economic Zone (ECER SEZ), Cross Border Development (Tumpat-Kota Bharu-Bachok-Tok Bali-Besut), Kuala Terengganu City Centre-Kenyir-Dungun Triangle, Mersing-Rompin, Gua Musang-Kuala Lipis and Bentong-Raub
Regional Corridor Development Authority (RECODA)	Energy and Power Generation, particularly Hydropower. Secondary Growth in Aluminium, Glass, Steel, Oil-Based, Palm Oil, Fishing and Aquaculture (Halal Hub), Livestock, Timber-Based, Marine Engineering and Tourism	Smart City Mukah, Tanjung Manis Port City and Halal Hub, Samalaju Heavy Industries Center and Tourist and Resource-based hub in Baram and Tunoh Secondary growth centres such as Semop, Balingian, Selangau, Samarakan, Bakun and Nanga Merit
Sabah Development Corridor (SDC)	Agriculture, Tourism and Oil and Gas	Sandakan-Beluran-Kinabatangan Bio-Triangle, Lahad Datu-Kunak-Semporna-Tawau AgroMarine Belt, The Interior Food Valley, Kinabalu Gold Coast Enclave, Brunei Bay Integrated Development Area
Greater Klang Valley (also identified as a national key economic area)	Financial Service and City Tourism	Kuala Lumpur International Financial District, Sime Darby Vission, Intergrated World Class Botanical Garden of Lake Garden, Mass Rapid Transit System

Source: EPU (2010)

5.3 Agglomeration and Firm Clustering: The Opportunity for Technical and Technology Talents

Businesses benefit from locating near one another and this situation is known as positive externalities, which are what make firms cluster. Clustering gives the advantage of economies of scale, where firms can share resources such as transportation costs from their suppliers. In addition, clustering encourages positive spillover of knowledge and labour pooling power for businesses.

As localisation economies emerge from an industry clustering, they attract more people and businesses to the location. Over time, it would lead to urbanisation economies, where more jobs and business opportunities are offered as the location is increasingly urbanised. Urbanisation not only builds on the existing local economic activities but also scales up the economy by introducing a wider variety of industries. It then leads to the greater economic growth of a location, which is crucial for the regional development agenda and reduce disparities in income and access to amenities.

For example, the localisation of economic activity in metropolitan Seattle, Washington is known for aerospace production. In 2016, the employment in the sector contributed to 5% of total employment in the region. Although the 5% figure may seem modest compared to employment in other sectors within the metropolitan region, it far exceeds the national average of 0.7%—highlighting how the concentration of jobs and localisation of economies react.

Beyond employment, Washington's economy is also known for its top tier performance in industrial research, innovation and labour productivity in aerospace manufacturing—portraying how technological strength and firm clustering can drive regional competitiveness[152].

In Malaysia, tapping the benefits of firm clustering or localisation of economies has been an integral strategy in regional development. Learning from Seattle, the clusters are expected to provide employment opportunities and job concentration as well as industrial innovation that can drive the urbanisation process.

5.4 Setting National Aspiration in Local Realities

5.4.1. Inclusive Regional Development as a Continued National Aspiration

The direction outlined in the Malaysian Plans is grounded in the vision of a knowledge-intensive, high-tech economy supported by modern and integrated infrastructures. Additionally, it calls for economic activities that are regionally dispersed and integrated to ensure holistic and balanced growth across the country based on its geographical advantages.

In the New Industrial Master Plan (NIMP) 2030, the aspiration to spur the nation’s development through the dispersal of high-value economic sectors is further continued, apart from the aspiration for national key growth sectors. In particular, Mission 4: Safeguard Economic Security and Inclusivity of the NIMP 2030 outlines the government’s commitment to strengthening industrial clusters and regional development strategy (under Strategy 4.3). The strategy would involve strengthening existing economic clusters and facilitating the formation of new ones, with the goal of creating positive spillover effects across neighbouring states.

[152] Aero Dynamic Advisory (2022)

Table 5.2: National key growth sectors focused in NIMP 2030 and their locations

Sectors	Prominent Hubs
Aerospace	KLIA Aeropolis, Subang Aerotech Park, Senai Aerospace Park, Serendah High Value Manufacturing Park, Kulim High Tech Park and Penang Technology Park@Bertam
Chemical	Integrated complexes in Kerteh, Gebeng, Pengerang and Pasir Gudang
Electrical and Electronics	Scattered but mostly in P.Pinang and Klang Valley
Pharmaceutical	Bukit Jalil Technology Park, Techpark@Enstek, Penang Science Park and Kulim High Tech Park
Medical Devices	Kulim High Tech Park, Penang Science Park, Port Klang Free Zone, Techpark@Enstek, Nusajaya Johor.

Source: MITI (2023)
Note: These priority sectors are expected to generate high economic and knowledge spillovers. The list of hubs may not be exhaustive

The NIMP 2030 further emphasises the vision to enhance inter-regional connectivity, particularly through Economic Accelerator Projects (EAPs) aligned with the East Coast Rail Link (ECRL). These projects aim to connect 11 industrial parks across Kelantan, Terengganu, Pahang and Selangor in which The Ministry of Investment, Trade and Industry (MITI) will lead coordination efforts across stakeholders. In the previous chapter, we observed that states and regions in Malaysia often operate as economically self-contained units, with limited interdependence or spillover to neighbouring areas. This fragmentation reflects a failure of spatial equilibrium: although costs of living and land are lower in less-developed areas, firms and talent remain concentrated in more advanced regions due to structural barriers such as poor connectivity and limited services.

Therefore, enhancing physical connectivity—such as through ECRL—is vital to unlock the economic potential of lagging regions by linking them more effectively to urban-industrial cores. However, the objectives of such infrastructure should go beyond just logistics or export facilitation (moving goods only). The goal should be to enable functional linkages between industrial zones across the country, allowing smaller regions to participate and gain benefits in the national and global value chains. In addition to that, increasing the knowledge and technology creation by Malaysian capacity should be one of the primary goals in any infrastructure development, including ECRL.

From here, we can see how the federal government has been committed in taking steps to decentralise high-value economic and tech-based activities into regions across the nation as well as to make economic activities more integrated with the provision of logistic infrastructure.

Such efforts can bring high-quality job opportunities to other regions that are less developed, hence accelerate the urbanisation process in the regions, which then can improve the well-being of the local population through better social and physical infrastructure provision.

In addition to that, for industry and knowledge creation, it can support the regional innovation system when talents and industry are matched and concentrated in the right spaces. Ultimately, it will bring the nation to the accomplishment of a long-desired aspiration i.e. to achieve balanced growth and development across the nation.

However, based on the prominent hubs list, the priority clusters mainly sit in Peninsular Malaysia and the Central Region, given the risks of leaving West Malaysia behind. Resources from both the public and private sectors are more likely to be concentrated in Peninsular, hence accelerating unbalanced growth even further. While NIMP 2030 does highlight that the government will commit to the development of Sabah and Sarawak, especially in the energy and renewable energy sector, unlike the Peninsular, they still have unique challenges in terms of inadequate and non-integrated infrastructure.

5.4.2. Policy Pushes for TVET Talent

As regional growth continues to be linked with industrial economic activities, the development of T&T talent, particularly through the TVET system, has become essential for Malaysia's development strategy. T&T talents serve human capital needs in industrial economic activities. As the regional government aspires to meet these needs, these high-level aspirations must translate into concrete and operational initiatives across ministries, agencies and statutory bodies. These would involve coordination among the Federal Government, state governments, or even local authorities. This section examines how the Federal Government plays a role in ensuring human capital readiness, especially in T&T fields.

The NIMP 2030 has positioned TVET as a strategic lever for industrial competitiveness and human capital development. Among the key action plans in the NIMP 2030 are to expand TVET programmes for high-skilled jobs in critical sectors and leverage MyNext and MYFutureJobs for strategic workforce planning to address long-term demand-supply requirements, including in the TVET sector. Furthermore, the government also aspires to a strong integration between TVET institutes with industry players through the identification of talent insufficiencies and the co-development of TVET syllabus. These reflect a shift from seeing TVET as secondary education to treating it as central to economic and industrial transformation.

According to the TVET Madani database, nearly 1,400 TVET institutions are currently operating across the country, with a relatively balanced distribution between public and private providers. The number of public TVET institutions is well dispersed nationwide and primarily administered by the Ministry of Rural and Regional Development (KKDW). However, there are regional disparities in private providers. The central region, particularly Selangor and Kuala Lumpur (KL), hosts significantly higher number of private TVET institutions (Table 5.3). In addition, the east coast states (Kelantan, Terengganu and Pahang) have relatively fewer institutions.

Table 5.3: Public and private Malaysian TVET institutions

	Federal	State	Private	Total
Perlis	14	NA	1	15
Kedah	52	1	22	75
Pulau Pinang (P. Pinang)	39	1	46	86
Perak	70	3	47	120
Selangor	**71**	**3**	**221**	**295**
Kuala Lumpur	**25**	**1**	**120**	**146**
Putrajaya	1	1	NA	2
Melaka	34	2	29	65
N. Sembilan	29	2	36	67
Johor	77	2	54	133
Kelantan	**41**	**NA**	**10**	**51**
Terengganu	**38**	**3**	**16**	**60**
Pahang	**51**	**4**	**13**	**68**
Sarawak	66	2	46	114
Sabah	61	4	35	100
Labuan	4	NA	NA	4

Source: TVET Madani (n.d.) as of October 2024
Note: States highlighted in blue have higher number of private institutions, yellow are the ones with lower numbers

The disparities on the location of TVET providers may have implications in terms of regional labour market outcomes. As private-led TVET institutions concentrate in the central region, which suggests stronger alignment and proximity with urban labour markets and industrial clusters, they may tend to be more responsive to industry needs and operate on a demand-driven basis.

This geographic skew may reinforce urban-rural disparities in skills development, job matching and thus socioeconomic outcomes. Consequently, T&T talents in the rural areas may face greater barriers to employment in high-growth sectors or be forced to migrate to urban centres for training and work—potentially weakening local economic development and contributing to regional brain drain.

The government further guides TVET development through the National TVET Policy 2030 that emphasises on improving employability and meeting future industry demands. It identifies several high-potential sectors expected to generate quality employment and require advanced technical skills: (1) Energy transition-based industry; (2) Technology and digital-based industry; (3) High-value electrical and electronics industry; (4) Agricultural and agro-based industry; and (5) Rare-earth elements.

While the National TVET Policy 2030 sets a strong direction, it lacks granularity of sector-specific strategies to guide the integration of TVET talent into these industries. There are minimal to no mentions of the types of jobs and skills needed in the aspired sectors. Thus, coordination with other national plans, such as the NIMP 2030 and other sectoral strategies like the National Energy Transition Roadmap (NETR) and sectoral analysis, are needed to ensure coherent implementation in terms of skills and technology required, spatial and capital strategies. Moreover, the promising projections for job creation in these sectors (as outlined in Table 5.4) highlight the urgency of defining actionable milestones to reflect returns on government investment in TVET and ensure these opportunities translate into real employment for local talent.

Table 5.4: Projected talent demands in the aspired sectors with high-quality jobs for TVET talents

Sector	Projected Demand	Key Insights
Energy Transition	62,000 skilled workers by 2050	Aligned with the National Energy Transition Roadmap targeting 70% renewable energy generation. Roles include solar technicians, energy engineers and maintenance supervisors
	310,000 jobs by 2050 in green energy sector	Long-term employment potential for energy transition-related employment across multiple sub-sectors
Technology and Digital	10,000 AI engineers and experts	Demand is distributed across digital tech, aerospace, semiconductors, data management; recognized in NIMP 2030 as key to economic growth
High-Value Electrical and Electronic (E&E)	Key employment are in in semiconductors, chip design, manufacturing	Malaysia produces 13% of global semiconductors; E&E contributes ~5.8% to GDP
Agriculture and Agro-Based	Steady demand for skilled workers, especially in agrotech	• Focus on modern agriculture, agro-tech, food processing; promoted under TVET rural development initiatives. • Most relevant policy is policy thrust 3: Youth participation remains low with only approximately 15.0% youth employed in the sector in 2015. In addition, only 4.2% of tertiary students consider a career in agriculture in 2016. The annual GDP/worker in agriculture (RM63,345) is also lower that of those in manufacturing (RM121,944) and services (RM82,488)
Rare Earth Element (REE)	6,550 jobs by 2025; ~4,000 more jobs possible by 2030	High-growth industry with strategic national importance. Projected GDP contribution: RM9.5 billion by 2025

Source: Various sources, KRI compilation[153]

[153] MIDA (n.d.); Shahrizal (2024); MGTC (2024); Sahimi (2025); Ali (2024); MAFS (2021); Anuar Che Mi (n.d.); Ashman (2021)

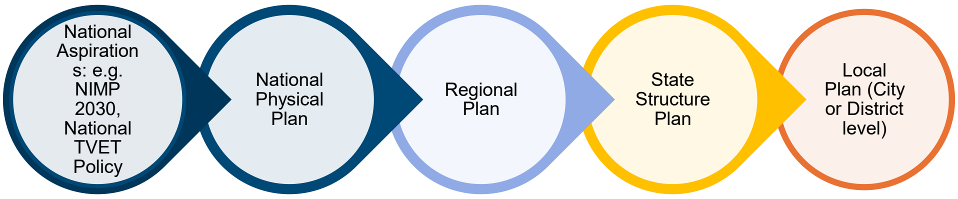
5.4.3. Deployment in Local Strategies

Executing national aspirations at localities

While national-level policy frameworks such as Ekonomi MADANI, the NIMP 2030, Malaysia Plans and National TVET Policy, set the economic aspirations of the country as a whole and try to address gaps in the industries, physical planning documents are equally important as they provide the direction to make use of the physical resources i.e. land use. The planning documents execute the national aspirations at regional, state and local levels. They may directly impact or give direction in terms of the spatial sense in the supply and demand of talent and labour development, particularly in the high-growth and tech-heavy economic sectors that are driven by higher-level aspirations.

In general, physical planning serves as a critical link between national intent and spatial execution. It determines how land is used, where industries are located and how talent and infrastructure are distributed. These plans have the potential to shape the supply and demand for local labour by directly influencing the geographic alignment of economic activities and educational institutions.

Figure 5.2: Spatial planning document from aspirations to local realities



Source: KRI illustration

Malaysian physical development is generally guided by three important documents: the National Physical Plan, the State Structure Plan and the Local Plan. As required by the laws, the physical planning documents are statutory in nature; thus, the plans are crucial to policymakers to concern on, unlike the other higher-level policy documents that do not have similar legal-enforceability capacity. In some states, gazetted structures and local plans carry additional legal weight and in certain districts, Special Area Plans (e.g. for heritage or strategic zones) further shape spatial outcomes. In addition to that, in some localities or districts, their physical planning could be shaped by special area planning documents.

Regional growth strategy through Special Economic Zones (SEZ) and Industrial parks

As the focus of Malaysia's regional development has shifted from basic infrastructure toward industrialisation and high-value economic activities, the establishment of industrial parks and SEZs has become an important spatial strategy to support the spur of agglomeration economies. In developing countries, including Malaysia, industrial parks are frequently used as a strategy to promote industrial development by offering shared infrastructure that encourages firms to cluster in specific locations, helping to create agglomeration economies and enhance overall productivity[154]. As highlighted earlier, lower costs in shared physical infrastructures could make firms locate closer to each other, reflecting increasing returns to scale.

[154] Tham Siew Yean and Siwage Dharma Negara (2020)

The SEZ builds on this model but typically operate at a larger scale and offer more significant incentives and support from the government, such as tax exemptions, regulatory flexibility and a business-friendly regulatory environment[155]. The unique feature of SEZ is that it designed with specific legal regimes to address local institutional barriers[156], making them attractive to investors.

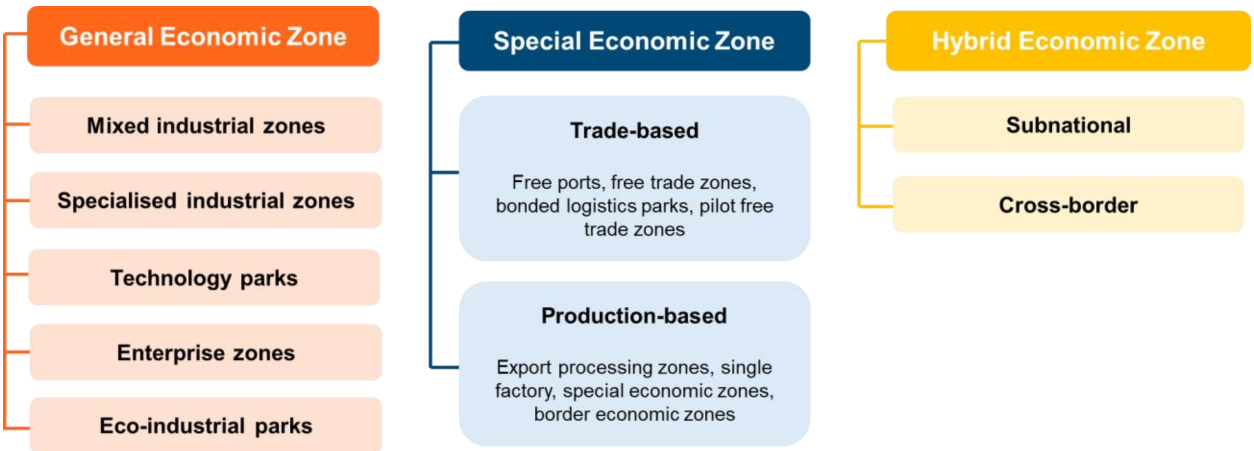
Other "local zoning" strategies to realise agglomeration economies

Beyond the establishment of industrial parks and SEZ, Malaysia and many other countries have explored other typologies of economic zones to promote agglomeration economies. In general, there are three types of economic zones:

1. General Economic Zone,
2. Specialised Economic Zones
3. Hybrid Economic Zones.

They are categorised based on their operational legal frameworks or geographical, institutional and economic features, distinct features[157]. For example, a Special Economic Zone offers significant incentives but has a more tailored regulatory framework for the economic activities that follow a different local planning process.

Figure 5.3: Types of economic zones as an agglomeration strategy



Source: Asian Development Bank (2022)

It is worth noting that the government has invested in the development of Science and Technology Parks (STP), with the ultimate objective, of course, being to create home-grown innovation and technology. Though it is not the objective of these economic zones and STPs to contribute directly to T&T talent development, the spillovers of these 'physical' strategies must be realised for training institutions to enhance T&T talents with the skills and knowledge needed by the industries.

[155] Ayman Falak Medina (2024)
[156] Asian Development Bank (2022)
[157] Ibid.

Table 5.5: Malaysian science parks and innovation incubators

Name of Science Park/Incubator	Location	Size (acre)	Year Established	No. of Firms	Technology Focus
Technology Park Malaysia / MRANTI	KL	750	1995	120	ICT, biotechnology
Kulim Hi-Tech Park	Kulim, Kedah	630	1996	33	High-tech manufacturing
Selangor Science Park	Selangor	478.4	2001	N/A	N/A
Technovation Park, UTM Campus	Skudai, Johor	130	1995	21	High-tech activities
UPM-MTDC Technology Incubator Centre One	Serdang, Selangor*	18	1997	32	IT and multimedia
UKM-MTDC Smart Technology Centre	Bangi, Selangor*	6	1999	10	Biotechnology, pharmaceuticals
UTM–MTDC Technology Innovation Centre One	Skudai, Johor*	N/A	1999	N/A	Advanced electronics, advanced manufacturing
MSC Central Incubator	Cyberjaya, Selangor*	N/A	2000	35	IT and multimedia
Sciences & Arts Innovation Space - SAINS@USM	Bayan Lepas, P. Pinang	31	2008	N/A	Interdisciplinary innovation encompassing science, technology and the arts

Source: Asian Development Bank (2022)

Observation and discussion for policy options

Based on the observation of the national aspiration for high-growth sector development, the relevant structure plans show that they translate these aspirations into strategic land use and infrastructure planning. structure plans even committed to their ambition of developing an economic cluster that can stimulate regional growth, as envisioned at the national level. This can be seen through the continuous commitment to create clustering spaces such as industrial parks, technological parks, or even designated economic zones.

Physical plans function as the enforcement arm of national development aspirations, operationalising growth strategies through spatial planning and land use regulation at the state and district levels. These plans translate high-level visions into tangible, location-specific interventions that shape how and where development occurs.

The institutionalisation of agglomeration strategies—reflected in the proliferation of industrial parks, free trade zones and special economic zones, as well as the establishment of regional development authorities such as Iskandar Malaysia, the ECER and the NCER—demonstrates a deliberate effort to spatially organise the economy for productivity gains, innovation and labour market thickening. For instance, the Malaysia Vision Valley and Kulim Hi-Tech Park are emblematic of attempts to create industrial and innovation clusters that attract investment and skilled workers and knowledge creation in the southern and northern regions of the country.

However, zoning and physical clustering alone are not sufficient. Their effectiveness depends heavily on how well they are integrated with a robust talent development ecosystem, particularly TVET institutions and local skills. Without this alignment, these zones risk of underutilising local talents or relying on imported talents, undermining their purpose.

Moreover, while Malaysia's current zoning frameworks offer a degree of flexibility to accommodate diverse sectoral needs, such as allowing mixed-use industrial zones or adaptive repurposing of logistics corridors, this flexibility necessitates greater policy coherence and inter-agency coordination. Without it, development outcomes risk being uneven, with some regions thriving while others lag behind due to fragmented implementation or mismatched priorities.

Finally, agglomeration strategies must evolve beyond a narrow focus on spatial proximity. Proximity alone does not guarantee innovation, talent development, or inclusive growth. Economic zones must be conceived as integrated ecosystems, not merely real estate ventures. This means embedding education and training institutions, research centres, housing, transport and social amenities into the design of these zones. Without this holistic approach, there is a risk of creating enclaves that are economically active but socially disconnected. True regional development requires these spaces to foster inclusive participation, innovation diffusion and upward mobility for local communities.

One key observation from the government's initiatives is the establishment of the National TVET Council, which is tasked with coordinating and governing strategies to strengthen TVET and technology talents in Malaysia. This coordination initiative is necessary not only to ensure alignment among the various ministries involved in TVET development but also to serve as a strong branding effort to overcome negative perceptions of TVET. As a record, TVET institutions are spread across multiple ministries, agencies, state governments and private entities, each with its own learning modules and objectives.

However, the ministries represented in the Council are limited to those that oversee TVET institutions or are involved in the supply segment of the sector. In contrast, key ministries and agencies that govern economic activities, such as Ministry of Economy, MITI, regional development authorities, state economic planning units and Malaysian Investment Development Authority (MIDA), are not part of the Council, despite their critical role in shaping the demand for TVET talent[158]. Thus, a more inclusive governance structure is needed to ensure that both supply and demand perspectives are aligned in the national TVET strategy.

5.5 Unlocking Talent Through Colocation and Integration with Industries

While the governments at various level have mobilised public resources to attract business through various incentives in the aspired economic sectors, it is equally important to examine the coherency of the human capital development strategy to fit into the local demand for talents and skills, especially for the sectors or industries that regions and the nation aspires to as high growth.

In theory, the close proximity between training institutions and industries enhances inter-organisational relationships, i.e., the relationship and synergy between training institutions and industry. It in turns, may lead to regional growth through networks of innovation and knowledge sharing as spillovers. For T&T talents, whose skills are inherently hands-on, such colocation is even more important. Proximity facilitates real-time responsiveness to industry shifts, improve academic curriculum and teaching materials, as well as support industry-training alignment, which can encourage internship and apprenticeship linkages that boost employability[159].

In other countries, the benefits of collocating industries and training institutions have been observed to spur knowledge and promote innovation, such cases were found from literature for China, Taiwan and Japan. Though TVET graduates show a remarkable employability rate compared to non-TVET graduates[160], the job location for our TVET talents remains a question. If they are more likely to migrate to bigger cities like Klang Valley, where industries are concentrated and their skills are needed and can be practised, the creation of a regional innovation system in the lagging regions will likely be missing as well.

[158] Chang Da Wan (2025)
[159] Jane E Fountain (1998); Rossi et al. (2024)
[160] Hawati Abdul Hamid (2023); Hawati Abdul Hamid and Tan Mei Yi (2023)

For T&T talents, whose skills are inherently hands-on, such colocation is even more important as it promotes close interaction between talents and real industries. Studies show that the proximity facilitates real-time responsiveness to industry shifts, improves academic curriculum and teaching materials, as well as supports industry-training alignment, which can encourage internship and apprenticeship linkages that boost employability[161]. It might be because face-to-face learning is still a superior mode of learning as it provides tacit knowledge transfer, learning-by-doing, social networks and ultimately innovation[162]. Hence, the proximity and interaction between skilled and knowledgeable talents and industries are essential for a regional innovation system, i.e., the rapid diffusion of skills, knowledge and industrial best practices.

Despite the fact that Malaysian TVET graduates show a remarkable employability rate compared to non-TVET graduates[163], the job location for our TVET talents remains a question. If they are more likely to migrate to bigger cities like Klang Valley, where industries are concentrated and their skills are needed and can be practised, the creation of a regional innovation system in the lagging regions will likely be missing as well. It should remain as an aspiration that our highly trained TVET talents are able to contribute to big roles in the local industries such as improve industrial practices and business solutions.

Table 5.6: Cases for colocation of industries and educational institutions in selected countries

Country	Proximity Context	Industry	Findings (benefits of colocation and interaction)
China	Industrial zones near universities	General industry	Physical proximity reduces geographical distance, making it easier for businesses to access university resources and for universities to understand industry needs. Strengthens trust, shared goals and fosters dynamic university-industry relationships.
Taiwan	National Cheng Kung University (NCKU)	High-tech, SMEs, large firms	Geographical proximity influences collaboration models. Large firms prefer contract research for long-term partnerships, while SMEs balance contract and joint research for cost-effectiveness. Proximity enhances university-industry interactions.
Taiwan	Taiwan	General industry	Strategic policies (e.g. easing restrictions, digital platforms) strengthen university-industry collaborations, fostering innovation, entrepreneurship and industrial leadership. Proximity and government support are key to successful University-Industry Collaboration.
China	Zhongguancun Science Park (ZSP)	High-tech	Physical proximity between universities, R&D centres and industries drives knowledge exchange, innovation and entrepreneurship. Zhongguancun Science Park (ZSP) clustering model enhances industrial competitiveness and technological progress.
Japan	Kyoto Research Park (KRP)	IT, new media	Physical proximity between research institutions and industries enhances Kyoto's innovation ecosystem. Kyoto Research Park (KRP) integrates local businesses, universities and government programmes, fostering regional innovation and high-tech entrepreneurship.

Source: Various sources, KRI compilation[164]

[161] Jane E Fountain (1998); Rossi et al. (2024)
[162] Yuko Aoyama, Susan Hanson, and Murphy (2010)
[163] Hawati Abdul Hamid (2023); Hawati Abdul Hamid and Tan Mei Yi (2023)
[164] Shi and Wang (2024); Lin, Kung, and Wang (2015); Truong, Lin, and Tung (2025); Zhu and Tann (2005); Edgington (2008)

5.5.1. Observation on the Colocation with Industries – Malaysia's context

The most common highlighted issues across majority of the sectors in the NIMP 2030 are related to manpower, which include limited talent availability, outdated training, skills mismatches, the need for upskilling and reskilling and a shortage of individuals with basic STEM[165], despite the fact that the government and private sector are both involved in talents development, especially in the TVET sector. This subsection examines whether the location of TVET institutions is strategically located near key industrial clusters outlined in national policy, i.e. the NIMP 2030. Utilising geo-mapping of TVET training institutes and industrial locations, the study assess potential for talent-industry blending to address manpower challenges.

First, the selection of industrial locations is chosen based on the anticipated economic impacts of clustering strategies as mentioned in the national aspiration document i.e. the NIMP 2030. The NIMP 2030 have identified several economic clusters that ought to be the pillar for regional economic activities. In addition, the policy document also lists catalyst projects, e.g. industrial parks, as a government strategy to support the economic clusters' activities.

Table 5.7: Anticipated high-impact industrial clusters in the planning

Regions	Selected Zones/Industrial Parks	Focused advanced-sectors
NCER	Kulim Science and Technology Park Chuping Valley Industrial Area Sidam Logistics, Aerospace & Manufacturing Hub Kedah Rubber City	Aerospace Medical Devices Pharmaceutical E&E Halal Hubs Nanotechnology
ECER	Tok Bali Industrial Park Malaysia-China Kuantan Industrial Park Gebeng Industrial Park, Kuantan Pekan Automative Park Kerteh Biopolymer Park	Petrochemicals/chemicals Logistics Automative Biochemicals
Iskandar	Nusajaya Tech Park i-Tech Valley, Gelang Patah Tanjung Langsat Industrial Complex Pengerang Integrated Petrochemical Complex	ICT High-tech manufacturing Petrochemicals
Sarawak	Sama Jaya High Tech Park Gedong Biotech District SCORE Areas for Renewable Energy	Biotech Green and Renewable Energy
Sabah	Kota Kinabalu Industrial Park Sipitang Oil and Gas Industrial Park Palm Oil Industrial Cluster Lahad Datu	E&E Petrochemicals Pharma Ingredients
Central Region (including Greater Klang Valley)	UMW High Value Manufacturing Park	Aerospace Automotive Advanced manufacturing

Source: Various sources, KRI compilation[166]

From the selection, we examined how national aspirations under the NIMP 2030 are translated into action at the state and local levels, particularly through state structure plans and local physical development plans. The analysis focuses on whether spatial planning reinforces national goals of aligning talent development with industrial expansion.

[165] Chang Da Wan (2025)
[166] MIDA (2024); MEA (2019)

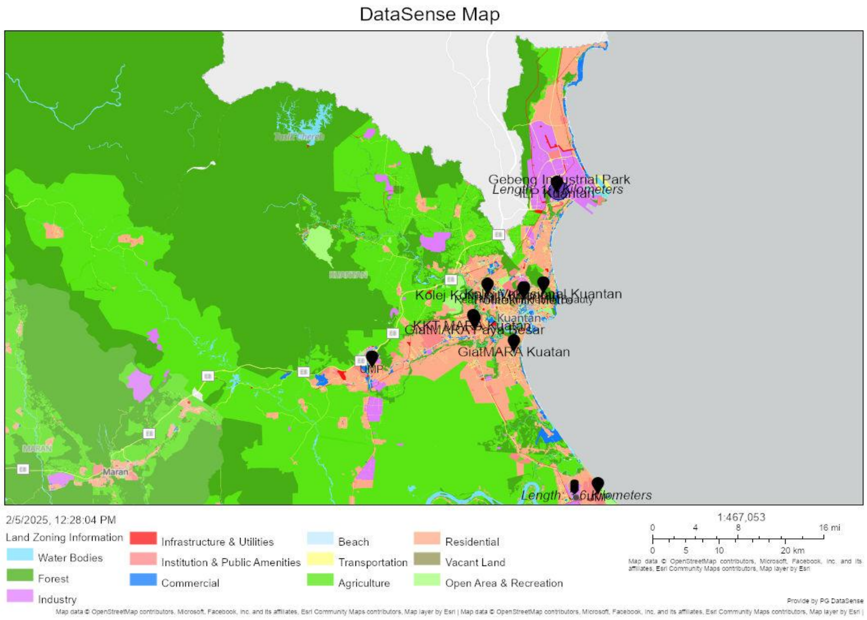
The findings highlight clear variation in the degree of colocation between TVET institutions and industrial zones. Some locations, such as Kuantan in Pahang, demonstrate good proximity and coordination. Others, particularly newer industrial clusters such as Pengerang, Johor and UMW's industrial park in Serendah, Selangor, show gaps in proximity alignment, indicating areas for policy intervention in integrating industrial needs and talent development.

5.5.2. Case Study: Gebeng-ILP Kuantan

A good case of proximity between industrial agglomeration and training institutions could be observed in Kuantan, Pahang i.e. Gebeng Industrial Park (GIP) and *Institut Latihan Perindustrian Kuantan* (ILP Kuantan). According to their respective coordinates, the distance between them is less than 2km and they are located within a designated industrial zone according to the land use zoning information. This spatial proximity reflects deliberate planning and provides a strong foundation for alignment between TVET training and local industry needs.

Furthermore, Gebeng-and Kuantan serve as an important role not only in driving Pahang's economic growth but also as the anchor for industrial development across the East Coast region. The area is expected to generate spillover effects into neighbouring state of Kelantan and Terengganu as well. According to the Pahang Structure Plan 2030, the development of GIP is also listed as one of the key projects in the east coast regional master plan as well being classified as a special economic zone[167]. In the second ECERDC master plan document, GIP is envisioned to be a home of top global market players such as BASF, Kaneka, Eastman and Amoco, as well as Eastern Chemicals[168].

Figure 5.4: Proximity of Gebeng Industrial Park and ILP Kuantan

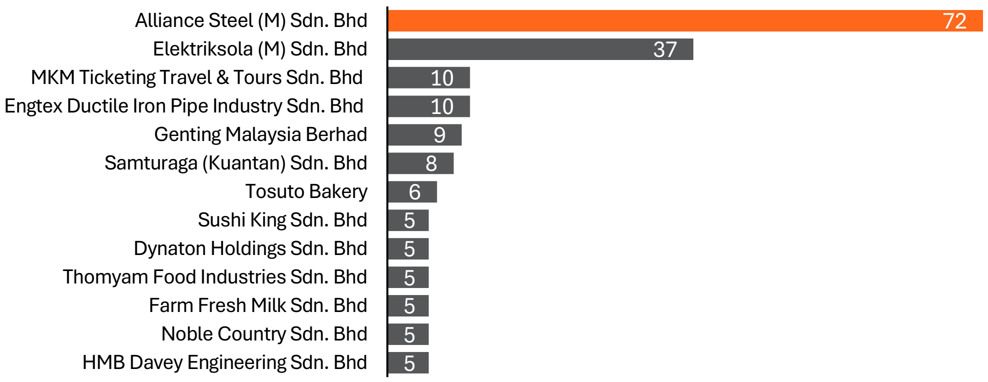


Source: PropertyGuru, n.d.

[167] PlanMalaysia@Pahang (2007)
[168] ECERDC (2018)

While spatial planning and proximity between TVET institutions and industry clusters appear promising on the map, the actual demand for TVET talent tells a more interesting story. Figure 5.5 presents the top 10 companies in Pahang that have the most job vacancies for TVET talents in Pahang, in Alliance Steel, a globally significant player in steel production, provides the highest number of vacancies for TVET talents, not only in Kuantan but across Pahang. In addition to that, Alliance Steel is also an important player in Gebeng, where it is located in the Malaysian Chinese Kuantan Industrial Park 1 (MCKIP1), neighbouring the Gebeng Industrial Park, which is also a joint steel production industrial programme between the Chinese and Malaysian governments[169]. As such, Gebeng and Kuantan are on the trajectory to become the economic anchors of the East Coast Region by hosting a global player that requires local talents for its business activities.

Figure 5.5: Top 10 Companies with the most TVET vacancies in Pahang, 2025



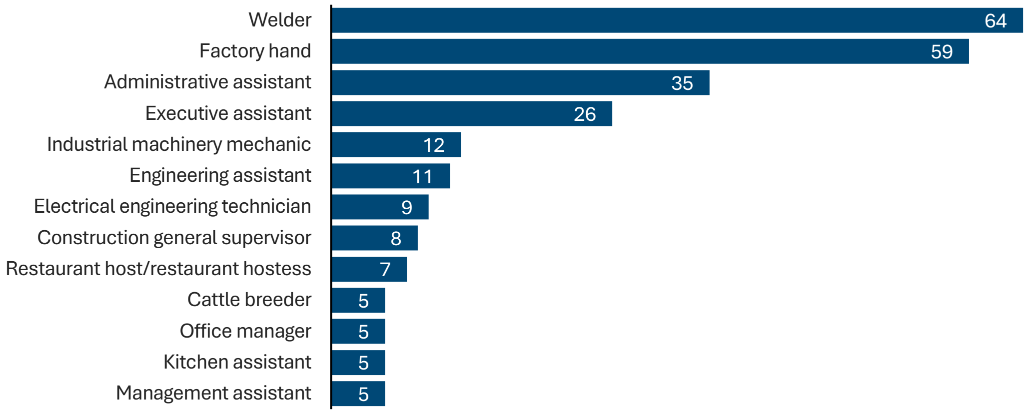
Source: TVET Madani,(n.d.), KRI calculations
Note: Data was extracted in May 2025

Given Kuantan's spatial strategies, such as its SEZ classification, designated industrial zones, and the vision of the regional authorities, along with the capacity and advantages of Alliance Steel's clustering in Kuantan, the area holds strong prospects for advanced industrial activities that require skilled T&T talents. However, further insights from TVET Madani and MyFutureJobs matching data show that Alliance Steel (M) Sdn Bhd offers mostly welder positions and industrial machinery mechanics, with only one electrical mechanic position. Meanwhile, Elektrisola (M) Sdn Bhd mostly hires factory workers. These are the TVET positions highly demanded in Pahang as well as shown in Figure 5.6. Although these roles are technical in nature and align with the trained skills of local TVET talents, they represent a narrow window into the region's full industrial potential and the untapped potential of TVET talents to gain industrial and business solution experience.

Also, Gebeng Industrial Park is expected to host petrochemical economic cluster which may have strong linkages with the neighbouring steel production cluster[170]. This proximity may signal a regional concentration of employment in steel-related industries, thus reinforcing that steel production is an economic backbone to the locality and region. Such clustering could, in theory, stimulate and strengthen spillovers to other linked sectors, at the same time, the industrial interdependence across the region.

[169] ECERDC (2020); Kamarul Azahar and Jose Barrock (2024)
[170] Srikumar Chakraborty (2024)

Figure 5.6: Top 10 TVET vacancy positions in Pahang, 2025



Source: TVET Madani (n.d.), KRI calculations
Note: Data was extracted in May 2025

However, the anticipation of jobs demanded from the economic cluster in GIP, i.e., jobs related to chemicals and petrochemicals, is yet to be realised into demand for TVET-trained talents. None of the companies in petrochemicals/chemicals-based activities in Gebeng are among the top 10 companies offering vacancies to TVET talents.

Moreover, not only do the global players present in Kuantan show limited demand for skilled T&T talents, but companies such as Alliance Steel and Elektrisola are also multinational firms operating in controlled environments, which restrict external interaction. This suggests that knowledge and technical spillovers remain largely confined within firm boundaries, with minimal diffusion to the broader local labour market ecosystem.

Such a situation restricts opportunities for TVET graduates as well as technology talents to benefit from on-the-job learning, collaborative innovation, or skill upgrading through inter-firm networks. As a result, the promise of the economic clusters in driving local human capital development and local innovations remains unfulfilled. These observations call into an important question of to what extent the current industrial configuration in GIP is aligned with inclusive regional development goals, especially in terms of integrating local TVET talents and spurring local technology and innovation within the growth trajectory of the local cluster.

5.6 Discussion and Policy Implications

Does proximity really matter?

Looking at earlier studies on the STP's proximity to talent institutions, it might give several benefits in terms of innovation and technology creation from clustering. While proximity matters, not all training institutions are fortunate enough to be in proximity to industry. Practical constraints such as land availability and campus size often shape campus locations, making the lack of colocation difficult to reverse. However, what truly drives innovation and job matching is the quality of interaction between agents of economics, particularly the training institutions and industries.

Many studies have emphasised the importance of social capital in shaping both regional and national innovation systems. Social capital influences how knowledge and technology immersed in agents of economics, such as individuals, firms and institutions. It is also a key enabler of successful collaboration between training institutions and industries.

Beyond government support (particularly in the form of funding), study showed that mutual trust, communication and commitment of individuals are among the critical factors for strategic collaboration between industry and training institutions[171]. These factors are collectively known as social capital, that often determine the effectiveness of such collaborations.

While proximity and dense geographic networks can facilitate interaction, it is the interdependence and active engagement among economic agents that make industrial agglomerations work[172]. As shown in the case of Silicon Valley, innovation thrives not just because of colocation, but also because of a dynamic ecosystem of collaboration. An earlier study on the biotechnology industry in the region showed that although in-house research and development (R&D) activities are important to large firms to retain their technological competencies, they slowly rely on collaboration with external smaller firms, universities and laboratories to stay competitive[173].

Even if clustering exists within a region, it does not guarantee that the phenomena will contribute to the regional innovation system and cannot promise that local innovation and technological advancement will take place at a satisfying pace. This also depends on the activities of economic actors in the region, particularly the firms and businesses.

For example, on the case of Cyberjaya as a technology hub has shown that despite being a location for global tech giants, the innovation impact is still lacking in the national multimedia corridor. Other than a lack of social capital infrastructures where talents can interact and create social capital[174], one of the main factors is that these firms in Cyberjaya primarily engage in support services or call centre operations that have minimal involvement in their R&D activities—the R&D remains concentrated in their parent firms' countries of origin[175].

Furthermore, as highlighted in NIMP 2030, the high prevalence of companies in Malaysia engaged in low value-added activities, coupled with low levels of complexity even within high-potential sectors, poses a major challenge to the country's industrial base. These conditions help explain current labour market outcomes, where graduates—including T&T talents—often struggle to secure jobs that match their skills and qualifications due to weak industry demand. Moreover, they also shed light on why a strong regional innovation system, which should have emerged from functioning economic clusters, remains invisible despite the spatial strategies already in place.

While spillovers of innovation and technology from the clustering of firms might exist in advanced economies, such a presumption still needs to be carefully examined in the case of less developed nations, especially in the era of globalisation, when only labour and land costs are the primary advantages for less developed nations. The creation of industry through clustering of economic activities must, in the end, contribute to the urbanisation process that can provide fulfilling work and life to the people or workers.

All of these would then return to the fundamental questions: What is the "quality" of foreign direct investment in Malaysia to establish the clusters that are the backbone of the regional economy? and are these investments truly contributing to regional innovation ecosystem and its economic upgrading? Or are they merely taking advantage of cost arbitrage?

[171] Seow Voon Yee (2010)
[172] Kunji Kushida (2024)
[173] Jane E Fountain (1998)
[174] Edgar and Yusof (2021)
[175] Nazim Baluch, Che Sobry Abdullah, and Rahimi Abidin (2015)

Even if our education system produces skilled and knowledgeable workers who can take high-value-added jobs, it still does not guarantee that Multinational Corporations (MNC) in Malaysia, particularly in high value sector would shift their functions to high value function such as R&D activities[176]. Therefore, firm-level-data is needed to ideally assess the impact of industrial parks or economic zones or benefits of agglomeration i.e. firms clustering[177].

Policy Recommendations

Tapping into agglomeration benefits has been a longstanding strategy in Malaysia's regional development and remains a commitment across multiple levels of government. The evolution of the Malaysia Plans reflects a shift from rural development and basic infrastructure provision to more urban and industrial-led growth.

To better translate national ambitions into local outcomes, **policy efforts should focus on strengthening coordination between training institutions, industries and state investment arm agencies (such as InvestPerak and MB Inc.), in order to align talent development with local economic priorities. This includes enhancing colocation and interaction of institutions and firms, designing localised matching programmes and fostering collaboration to align skills development with regional economic needs**.

While high-skilled technical and technology-based industries are largely concentrated in major urban regions like KL, Selangor, Johor and P. Pinang, there is strong potential for designated regional industrial hubs to drive innovation, particularly in sectors with existing resource advantages and industrial linkages like the Kuantan chemical cluster and Sarawak energy hub. To support these emerging clusters, **policies should promote the development of industrial cluster-specific training programmes. These programmes should incorporate real-time industry needs into their curricula and offer a range of short- to long-term training pathways tailored to the specific value chains in each region**. In addition to that, policy programmes should provide incentives to train and hire local talents.

Even with established economic clusters, a major challenge remains in forming a thick labour market for T&T talents. Many local workers are not matched effectively with available opportunities, which are often low-skilled and do not require professional recognition. Addressing this mismatch calls for policies that incentivise firms to hire and train local talent. Financial incentives, wage subsidies, or training grants could encourage employers to invest in the development of a more technically capable workforce that aligns with the aspirations of a knowledge-based economy.

The aspirations outlined in the National TVET Policy offer a pathway toward a more cohesive talent development ecosystem, but real progress requires more than zoning and infrastructure commitments as outlined in the NIMP 2030 and structure plans. To turn TVET into a strategic economic asset, there must be deliberate efforts to institutionalise partnerships between agencies responsible for TVET development with local and MNCs, government planning units and other agencies related to regional economic activities.

---

[176] Azfar Hanif Azizi and Yin Shao Loong (2024)
[177] Tham Siew Yean and Siwage Dharma Negara (2020)

Policy measures should include support for local SMEs and entrepreneurs, particularly those offering niche products and services within industrial supply chains, particularly in supporting technical and technology needs for firms in their future business plans (circular economy and net-zero). By strengthening these partnerships, Malaysia can enhance its regional innovation capacity while creating high-value job opportunities for TVET graduates.

5.7 Concluding Remarks

In the Malaysian context, the regional development strategy has been implemented as a long-term plan to achieve efficient and effective planning in terms of the optimal use of resources at the regional, state and inter-state levels, as well as between urban and rural areas. This is to ensure that the relationship between states is strengthened by minimising economic and structural disparities between regions.

Agglomeration has been a national development approach, particularly in regional development. Throughout the development phase, the focus of regional development has shifted from agricultural-focused strategies, basic infrastructure provisions, commodity and resource-based export activity, industrialisation based on firm clusters (localisation of economies), and urbanisation. The goal, however, remains the same: to achieve regional balance.

However, urbanisation could only work if there are income opportunities in a particular region that can provide people with not just higher income but also human capital development opportunities or even business opportunities. Economic activity i.e. the localisation of economies, is still an important element to attract population that can demand and give birth to diverse economic activities, leading towards urbanisation. One example to observe this phenomenon is Petaling Jaya Section 13 where vehicle service centres cluster in a street, leading to a colocation of automotive colleges within the same location, as a reflection of urbanisation economies and the presence of other facilities such as malls and healthcare centres as a reflection of a lively neighbourhood[178].

For that, based on potential clusters, the government has been ambitious to promote regional economic activities and propulsive sectors as regional economic engines, through various resources. If these localisation economies do not lead to greater urbanisation of a region, it would probably lead to greater regional disparity as people (including skilled workers) would still migrate to the dominant region (in Malaysian context, it is Klang Valley).

Today, the impact of disparity is no longer limited to the disparity in terms of basic infrastructure provision, but also the waste of our resources (including well-trained talents) and the absence of a thick labour market in the regional development agenda. Studies and research that show findings of our graduates are overqualified for their jobs, as well as premature deindustrialisation, reflect the waste of resources. Just imagine, a STEM graduate from the East Coast region would still need to find a job in Klang Valley and while on job search, they do gig work to sustain themselves. While the professional recognition of technology and technical jobs is expected to uplift the income of the talents and industrial practices, the reality still needs to be checked, as demand for labour may not necessarily require professional recognition due to low-value-added tasks that need to be completed.

[178] KRI (2022)

REFERENCES

Aero Dynamic Advisory. 2022. "Aerospace Competitive Economics Study 2022." https://choosewashingtonstate.com/wp-content/uploads/2023/02/Aerospace-Competitive-Economics-Study-2022.pdf.

Ali, Farah Shazwani. 2024. "TVET: More than Just a Job, It's Powering Malaysia's Future." Sinar Daily. 2024. https://shorturl.at/PkHaV.

Anuar Che Mi. n.d. "Sustainable Management of Rare Earth Element Extraction Imperative for Economic Growth, National Security." Twentytwo13. Accessed May 28, 2025. https://shorturl.at/Ig56D.

Ashman, Adam. 2021. "Higher Education Ministry Ropes in 21 Industry Leaders to Elevate Vocational Training, Education." 2021. https://www.malaymail.com/news/malaysia/2021/.../2016981?utm#google_vignette.

Asian Development Bank. 2022. *Special Economic Zones in the Indonesia–Malaysia–Thailand Growth Triangle: Opportunities for Collaboration*. Asian Development Bank. https://www.adb.org/publications/special-economic-zones-imt-growth-triangle.

Ayman Falak Medina. 2024. "Incentives in Malaysia's Special Economic Zones: A Guide for Businesses." ASEAN Business News. January 8, 2024. https://www.aseanbriefing.com/news/malaysia-special-economic-zones-incentives-available-investor-guide/.

Azfar Hanif Azizi and Yin Shao Loong. 2024. "Building a Sustainable Industrial Base: Malaysia's Green Transition." Kuala Lumpur: Khazanah Research Institute. https://www.krinstitute.org/assets/contentMS/img/template/editor/20241531%20Building%20a%20Sustainable%20Industrial%20Base_finalpub.pdf.

Chang Da Wan. 2025. "ISEAS Perspective - TVET in Malaysia's Human Resource Development: Plans, Realities and 'Game Changers.'" ISEAS. https://www.nysean.org/blog/tvet-in-malaysias-human-resource-development-plans-realities-and-game-changers.

ECERDC. 2018. "Pelan Induk ECER 2.0: Lonjakan Seterusnya 2018-2025." Putrajaya: East Coast Economic Region Development Council. https://www.ecerdc.com.my/wp-content/uploads/2020/03/Master-Plan-2.0_BM_rev055-low-res.pdf.

———. 2020. "Steel-Based Products - ECERDC." March 10, 2020. https://www.ecerdc.com.my/key-economic-clusters/manufacturing/steel-based-products/.

Edgar, Gerry, and Zatun Najahah Yusof. 2021. "Proximity, Collaborative Relationship and Entrepreneur's Knowledge Spill-Over Opportunity in a Malaysian Regional Innovation System." *Springer Books*. Springer, 37–57.

Edgington, David W. 2008. "The Kyoto Research Park and Innovation in Japanese Cities." *Urban Geography* 29 (5). Taylor & Francis:411–50.

EPU. 2006. "Ninth Malaysian Plan 2006-2010." Putrajaya: Economic Planning Unit. https://ekonomi.gov.my/sites/default/files/2020-03/RMK9.pdf.

———. 2010. "Tenth Malaysian Plan 2011-2015." Putrajaya: Economic Planning Unit. https://ekonomi.gov.my/sites/default/files/2021-09/RMK10.pdf.

———. 2021. "Twelfth Malaysia Plan." Putrajaya: Economic Planning Unit. https://ekonomi.gov.my/.../pdf.

Hawati Abdul Hamid. 2023. "Melonjak Potensi Graduan TVET Menjana Pendapatan Tinggi." Views 16/23. Kuala Lumpur: Khazanah Research Institute.

Hawati Abdul Hamid and Tan Mei Yi. 2023. "Unlocking the Earning Potential of TVET Graduates." Khazanah Research Institute. Creative Commons Attribution CC BY.

Jane E Fountain. 1998. "Social Capital: Its Relationship to Innovation in Science and Technology." *Science and Public Policy* 25 (2):103–15. https://doi.org/10.1093/spp/25.2.103.

Kamarul Azahar and Jose Barrock. 2024. "Cover Story: Kuantan Port to Benefit from Malaysia-China Bilateral Ties." The Edge Malaysia. July 25, 2024. https://theedgemalaysia.com/node/719141.

KRI. 2022. "Residential Settlements and Spatial Inequality: A Study of Greater Kuala Lumpur Neighbourhoods." Kuala Lumpur: Khazanah Research Institute.

Kunji Kushida. 2024. "The Silicon Valley Model and Technological Trajectories in Context." Carnegie: Endowment for International Peace. January 9, 2024. https://carnegieendowment.org/research/2024/01/...

Lin, Tien-Chu, Shiann-Far Kung, and Hei-Chia Wang. 2015. "Effects of Firm Size and Geographical Proximity on Different Models of Interaction between University and Firm: A Case Study." *Asia Pacific Management Review* 20 (2). Elsevier:90–99.

MAFS. 2021. "Study on the Development of the National Agrofood Policy 2.0." Ministry of Agriculture and Food Industries. https://shorturl.at/qj4ao.

MEA. 2019. "Shared Prosperity Vision 2030." Putrajaya: Ministry of Economic Affairs. https://www.epu.gov.my/sites/....202030.pdf.

MGTC. 2024. "Can Malaysians Ride the High-Paying Green Job Wave?" Malaysian Green Technology And Climate Change Corporation. 2024. https://www.mgtc.gov.my/2024/11/can-malaysians-ride-the-high-paying-green-job-wave/.

MIDA. 2024. "Malaysia's Economic Corridors." Malaysian Investment Development Authority. 2024. https://www.mida.gov.my/news-year/2024/.

———. n.d. "Fadillah: 62,000 Skilled Workers Needed to Achieve Renewable Energy Generation Goal." Malaysian Investment Development Authority. Accessed August 6, 2025. https://shorturl.at/0fEMd.

MITI. 2023. "New Industrial Master Plan 2030." Policy Document. Kuala Lumpur: Ministry of Investment, Trade and Industry Malaysia. https://www.nimp2030.gov.my/.

Nazim Baluch, Che Sobry Abdullah, and Rahimi Abidin. 2015. "Technology Parks of Indonesia, Malaysia, and Singapore: A Critical Discourse" 7 (27):41–50.

Noor Suzilawati Rabe, Mariana Mohammed Osman, and Syahriah Bachok. 2013. "The Evolution of Regional Planning and Regional Economic Development in Malaysia." *The Arab World Geographer* 16 (2):228–43. https://doi.org/10.5555/arwg.16.2.u846574271736337.

PlanMalaysia@Pahang. 2007. "Rancangan Struktur Negeri Pahang 2050." Kuantan. https://www.ecerdc.com.my/wp-content/uploads/2020/03/Master-Plan-2.0_BM_rev055-low-res.pdf.

PropertyGuru. n.d. "DataSense Maps." PropertyGuru For Business. https://pg4business.com/datasense/my/home.

Rossi, Federica, Muthu De Silva, Pasquale Pavone, Ainurul Rosli, and Nick K. T. Yip. 2024. "Proximity and Impact of University-Industry Collaborations. A Topic Detection Analysis of Impact Reports." *Technological Forecasting and Social Change* 205 (August):123473. https://doi.org/10.1016/j.techfore.2024.123473.

Sahimi, Fatin Hanani. 2025. "Malaysia Kekurangan 10,000 Jurutera, Pakar AI." Buletin TV3. May 5, 2025. https://www.buletintv3.my/nasional/malaysia-kekurangan-10000-jurutera-pakar-ai/.

Seow Voon Yee. 2010. "Critical Success Factors of Strategic University-Industry Collaborations in Malaysia: A Dyadic Approach." Phd, Universiti Utara Malaysia. http://lintas.uum.edu.my:8080/elmu/...

Shahrizal. 2024. "Malaysia Needs 62,000 Workforce In RE If Targets Are To Be Achieved." Business Today. August 26, 2024. https://www.businesstoday.com.my/2024/08/26/malaysia-sets-ambitious-target-for-renewable-energy-workforce-by-2050/.

Shi, Lili, and Li Wang. 2024. "Understanding University-Industry Collaboration from the Perspective of Proximity: Insights from a Case Study in China." *Technology Analysis & Strategic Management* 36 (12). Taylor & Francis:4380–92.

Srikumar Chakraborty. 2024. "The Role of Stainless Steel in the Petroleum Refining Industry." *Stainless Steel World* (blog). October 14, 2024. https://stainless-steel-world.net/...

Tham Siew Yean and Siwage Dharma Negara. 2020. "Chinese Investments in Industrial Parks: Indonesia and Malaysia Compared." Economic Working Paper. Singapore: ISEAS Yusof Ishak Institute. https://www.iseas.edu.sg/articles-commentaries/iseas-economics-working-papers/...

Truong, Thanh Hue, Bou-Wen Lin, and Ching-Pin Tung. 2025. "Strategic Legislation for the Promotion of University–Industry Collaborations: A Case Study of Taiwan." *The Journal of Technology Transfer* 50 (1). Springer:304–44.

TVET Madani. n.d. "Kursus TVET: Carian Kursus TVET." Accessed May 28, 2025a. https://www.tvet.gov.my/awam-kursus/carian.

———. n.d. "Kursus TVET Malaysia · Metabase." Accessed May 28, 2025b. https://bda.tvet.gov.my/public/dashboard/1a3499f3-5a3d-4200-832a-247418a7c527.

Yuko Aoyama, Susan Hanson, and James T. Murphy. 2010. "Key Concepts in Economic Geography." Sage, 1–288.

Zhu, Dong, and Jennifer Tann. 2005. "A Regional Innovation System in a Small-Sized Region: A Clustering Model in Zhongguancun Science Park." *Technology Analysis & Strategic Management* 17 (3):375–90. https://doi.org/10.1080/09537320500211789.

PART TWO

Badges of Progress

CHAPTER

06

REALISING BADGES OF PROGRESS: MBOT'S ROLE IN PROFESSIONAL RECOGNITION AND ACADEMIC ACCREDITATION

CHAPTER 6

REALISING BADGES OF PROGRESS: MBOT'S ROLE IN PROFESSIONAL RECOGNITION AND ACADEMIC ACCREDITATION

Dr Mohd Amirul Rafiq Abu Rahim, Wan Amirah Wan Usamah and Dr Umawathy Techanamurthy

Individuals typically access skills recognition for perceived immediate effects, such as getting a job, earning more, or career move. Skills recognition can help individuals to unleash their full potential and may motivate them to learn more; and it encourages them to take responsibility for their skills and career development—and, in doing so, it may enable them to escape the poverty trap, informality and social exclusion forever.

Jiří (2016)

6.1 Introduction

Malaysia's journey toward becoming a high-income and innovation-driven nation could not be separated from its ability to nurture, recognise and fully utilise its Technology and Technical (T&T) talent. Over the decades, the country has invested heavily in expanding access for education, reforming TVET systems and aligning workforce development with national industrial strategies. Yet, as Malaysia transitions toward more knowledge-intensive and future-oriented industries from engineering to digital manufacturing, an equally important task lies ahead: ensuring that T&T professionals are not only trained but also professionally recognised in ways that enhance their career mobility, market value and credibility in the eyes of employers.

The broader national context, as outlined in Chapter 1 of this report, demonstrates how structural transformation policies, from the Eleventh Malaysia Plan (11th MP) to New Industrial Master Plan (NIMP) 2030 and National TVET Policy 2030 have placed increasing emphasis on professional recognition as a tool for signalling skill credibility, boosting employability and closing the gap between training systems and labour market realities.

The preceding chapters of this report have laid the foundation by mapping the broader landscape of T&T talent ecosystem in Malaysia. Using macro-level data from multiple sources such as the Graduate Tracer Study (GTS), Labour Force Survey (LFS) and Malaysia Critical Occupation List (MyCOL), the first part of the study identified systemic mismatches in the labour market, sectoral gaps in talent absorption and spatial inequalities in job opportunities.

These findings highlight the structural challenges facing the T&T workforce surrounding the issue of underemployment, curriculum relevance and the spatial perspective of skilled-job concentration. While these insights offer a detail overview of the supply-demand dynamics shaping the T&T pipeline, they also raise deeper questions about the mechanisms that can enhance employability, wage progression and job quality for technical professionals.

It is within this context that the present chapter (the second part of this report) delves into the role of professional recognition through Malaysia Board of Technologists (MBOT). However, despite the policy momentum, a persistent question remains: To what extent do these recognition mechanisms translate into a meaningful career outcome for the T&T workforce?

Moving from a system-level diagnostic to an institutional case study, this chapter draws on primary data from the survey conducted under this project and focus group discussions to critically examine how certification and academic accreditation influence individual career outcomes and broader labour market signalling.

This chapter seeks to answer that question by zooming in on professional recognition and academic accreditation through MBOT, using it as a case study to understand both individual and institutional dynamics surrounding T&T professionalisation.

MBOT was established in 2015 as a statutory body to formalise the status of technologists and technicians in Malaysia. Unlike traditional professional bodies tied to licensing (such as Engineering or Medicine), MBOT plays a unique role in legitimising technical roles that have historically operated in informal or under-recognised capacities[179]. These include a wide spectrum of professionals in fields such as Automation, Cybersecurity, Manufacturing, Green Tech and beyond. Many of them have gained their expertise through diverse academic or TVET pathways. The case study approach adopted in this chapter is anchored in three guiding questions:

1. What role does MBOT play in professional recognition, enhancing trust and raising industry acceptance?
2. How do MBOT recognition mechanisms influence wage progression, job matching and career mobility for certified professionals?
3. How do key stakeholders perceive the value of MBOT accreditation towards graduate readiness and competence?

To address these, the analysis unfolds across three major pillars:

1. Professional recognition examines how MBOT's certification shapes the experiences and outcomes of individual members, including its impact on earnings, job alignment, confidence, and professional progression.
2. Academic accreditation assesses MBOT's role in setting quality benchmarks for academic programmes, particularly as a foundational entry point that influences early-career outcomes. Accreditation also functions as a signalling mechanism to employers and shapes perceptions of graduate readiness and competence.
3. Institutional mechanisms and service delivery evaluate the broader ecosystem that supports certification, including employer awareness, service responsiveness, policy alignment, and member satisfaction.

[179] EPU (2016)

The findings in this chapter draw from the survey conducted jointly by KRI and MBOT. The survey covers 2,041 MBOT members who responded via the online SurveyMonkey™ platform between March and April 2025. The survey captured respondents across recognition categories, gender and technology fields.

In addition to the survey, a qualitative data collection exercise was also undertaken to strengthen the findings of this study. The qualitative component aligns with MBOT's broader mandate not only to professional recognition and certification but also to assess the quality of academic accreditation in technology-based education programmes.

6.2 Sample Profile and Distribution

6.2.1. Online survey

The demographic and employment profiles of respondents provide a foundation for interpreting how certification and recognition interact with career progression. The sample is weighted and representative of MBOT's core recognition categories, across gender, age, qualification pathways and industry sectors. This would allow for a meaningful insight into wage mobility, job alignment and the institutional value of academic accreditation that is grounded in the lived experiences of certified technical professionals. To support findings from the survey, a series of focus group discussions (FGDs) were conducted to further contextualise MBOT's role in academic accreditation and member experiences, particularly in relation to challenges in recognition uptake, wage outcomes and employer perspectives.

Thus, this chapter offers an analysis of how professional recognition is unfolding on the ground and whether it lives up to its promise of transforming the careers of Malaysia's T&T talent[180]. The following sections unpack these dimensions in detail, starting first with individual experiences and outcomes, before moving into the institutional mechanisms and satisfaction levels that shape the value and impact of MBOT as a recognition body. See Appendix A for detail information about the survey methodology.

The survey draws on responses from 2,041 certified professionals under MBOT, weighted to reflect a total population of 62,535 individuals across four recognition categories: Professional Technologist (Ts.), Graduate Technologist (GT), Certified Technician (Tc.), and Qualified Technician (QT). Table 6.1 presented a weighted sample of 62,535 certified professionals under MBOT, the majority of respondents (73.5%) are male, with most falling within the 31 to 49-year age range. This indicates that certification is often pursued mid-career; either as a tool for upward mobility or to legitimise existing technical roles within increasingly formalised sectors.

The data also reveal a high proportion of Malay/Bumiputera professionals, accounting for 86.2% of the total, followed by Chinese (8.7%) and Indian (4.1%) respondents. The majority of Graduate Technologists and Professional Technologists hold tertiary qualifications, primarily bachelor's and master's degrees, while Certified and Qualified Technicians tend to hold diplomas or *Sijil Kemahiran Malaysia* (SKM) Level 3 certifications.

[180] EPU (2016)

Notably, 63.8% of Certified Technicians reported *SKM* as their highest qualification, featuring MBOT's function in formalising and recognising technical expertise acquired through vocational routes. Local institutions play an important role in producing these talents, with more than 70% of respondents having graduated from local public higher education institutions (HEI) and a further 20% from local polytechnics or community colleges.

In terms of gender, the sample included both male and female professionals, enabling gender-based analysis of wage outcomes, recognition value and satisfaction levels. Age and work experience were also well distributed, with participants ranging from fresh graduates to senior professionals with more than 20 years in the workforce. This allowed for an assessment of how professional recognition impacts individuals at different career stages.

Table 6.1: Respondents demographic information

Characteristics	Ts.	GT	Tc.	QT	Total
Total (unweighted)[181]	**898**	**434**	**468**	**241**	**2,041**
Total (weighted)[182]	**23,877**	**30,200**	**3,160**	**8,116**	**62,353**
Total (%)	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Sex					
Male	74.6	67.6	92.3	85.0	73.5
Female	25.4	32.4	7.7	15.0	26.5
Age group					
20-30 years	6.3	23.6	14.0	24.6	16.9
31-39 years	34.9	41.6	40.4	37.1	38.5
40-49 years	46.6	30.7	37.2	31.1	36.9
50-59 years	8.8	3.2	6.3	5.6	5.7
60 years and above	3.4	1.0	2.1	1.6	2.0
Mean	41.6	36.8	39.0	36.9	38.7
Median	41.0	36.0	39.0	36.0	38.0
Ethnic group					
Malay/ Bumiputera	77.8	89.8	93.8	94.3	86.2
Chinese	15	6.5	2.5	0.5	8.7
Indian	5.2	3.4	3	3.7	4.1
Other	1.9	0.3	0.7	1.6	1.1
Highest qualification level					
PhD or equivalent	19.3	8.5	0.6	0.0	11
Master's Degree	37.4	26.7	7.1	0.7	26.4
Professional certificate	1.8	0.3	2.1	2.1	1.2
Bachelor's Degree or equiv.	40.0	64	7.0	12.3	46.0
Advanced Diploma/equiv.	0.9	0.0	9.3	9.0	1.9
Diploma/equiv.	0.6	0.2	63.8	64.9	11.4
SKM Level 3	0.0	0.3	10.1	11.0	2.0
Institution of highest qualification					
TVET	23.7	34.3	51.7	53.2	38.5
Non-TVET	76.3	65.7	48.3	46.9	61.5
Type of institution of highest qualification level					
Local Public Higher Education Institution	68.5	72.4	79	74.3	71.5
Local Private Higher Education Institution	20.6	19.9	19.3	24.7	20.7
Foreign Education Institution (local branch)	1.1	0.3	1.6	0.6	0.7
Foreign Education Institution (overseas)	9.9	7.4	0.1	0.5	7.1

[181] Unweighted counts refer to the actual number of respondents who participated in the survey.
[182] Weighted figures adjust the survey data to represent the estimated population of certified professionals in each recognition status, based on the sampling weights derived from latest MBOT's membership database.

From a labour market standpoint (Table 6.2), the majority of respondents demonstrated strong attachment to the workforce, with 92.8% currently employed as wage earners. This trend was particularly prominent among Graduate Technologists (94.3%) and Certified Technicians (93.8%), indicating high absorption into formal employment. Only a small proportion reported being self-employed, either as freelancers (2.3%) or business owners (2.4%), with business ownership most notable among Professional Technologists (5.1%). Meanwhile, unemployment and retirement accounted for a mere 2.5% of the total, though slightly higher among Certified and Qualified Technicians (4.1%).

In terms of occupation category, more than half of all respondents (58.3%) were engaged in professional-level roles, highlighting a significant level of skill utilisation and task complexity. Professional and Graduate Technologists were particularly concentrated in these roles, at 74.7% and 71.5% respectively, while Certified and Qualified Technicians predominantly occupied associate professional or technician-level positions (53.1% and 54.3%). Managerial roles were most prevalent among Professional Technologists (14.5%), reflecting career advancement opportunities post-certification. Conversely, lower-skilled roles such as plant and machine operators or elementary occupations were minimal overall but slightly more visible among Qualified Technicians.

According to technology field, a large proportion (71.9%) of respondents were certified in industrial-based fields, with the highest concentrations among Certified (86.4%) and Qualified Technicians (85.4%). IT-based certifications accounted for 15.8% overall, especially among Graduate and Professional Technologists (both at 16.9%), indicating growing relevance of digital skills. Fields aligned with Sustainable & Critical Technologies (SCT) themes were still nascent, comprising only 4.5% of the overall sample.

Monthly income data further highlighted stratification across recognition categories. Professional Technologists reported the highest average salary (RM9,886) and median income (RM8,800), with more than quarter earnings above RM10,000. This contrasts with Graduate Technologists (mean: RM6,820; median: RM6,150), Certified Technicians (mean: RM5,194; median: RM4,809) and Qualified Technicians (mean: RM4,538; median: RM4,426), reflecting disparities in earning power that align with occupational status and recognition level. Overall, the findings suggest a clear relationship between professional certification, occupational outcomes and wage returns, underscoring the value of formal recognition in advancing careers within the technology and technical workforce.

These patterns hint at a potentially meaningful relationship between professional certification, occupational outcomes and wage levels—raising the possibility that formal recognition may play a role in shaping career advancement within the technology and technical workforce. While this observation is compelling, the subsequent section will explore this dynamic in greater depth, examining how career trajectories unfold across different recognition categories.

Table 6.2: Respondents employment information

Characteristics	Ts.	GT	Tc.	QT	Total
Total (unweighted)[183]	**898**	**434**	**468**	**241**	**2,041**
Total (weighted)[184]	**23,877**	**30,200**	**3,160**	**8,116**	**62,353**
Total (%)	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Current employment status					
Employed/Wage earner	91.8	94.3	93.8	90.3	92.8
Self-employed (Freelance)	1.6	2.3	1.6	5.0	2.3
Self-employed (Business owner)	5.1	1.0	0.6	0.6	2.4
Unemployed/Retired	1.6	2.6	4.1	4.1	2.5
Occupation type					
Managers	14.5	11.2	9.4	3.3	9.7
Professionals	74.7	71.5	24.6	30.8	58.3
Technicians & Assoc. Professionals	9.0	16.1	53.1	54.3	27.1
Clerical Support Workers	0.0	0.0	0.9	0.6	0.2
Service & Sales Workers	0.4	0.2	0.8	1.6	0.6
Skilled Agriculture, Forestry, Livestock & Fishery	0.1	0.1	0.3	0.0	0.1
Craft & Related Trades Workers	0.0	0.0	0.1	0.0	0.0
Plant & Machine Operators	0.4	0.1	3.5	4.7	1.6
Elementary Occupations	0.0	0.9	2.4	4.7	1.8
Armed Forces	0.8	0.0	5.1	0.1	0.6
Technology field[185]					
Applied Science	8.6	9.4	2.6	1.7	7.8
IT-based	16.9	16.9	9.2	11.4	15.8
Industrial-based	68.9	69.0	86.4	85.4	71.9
SCT	5.6	4.8	1.7	1.4	4.5
Monthly salary					
Below RM2,000	0.1	0.1	3.1	1.4	0.4
RM2,001 - RM2,999	1.1	5.4	8.3	20.0	5.7
RM3,000 - RM3,999	1.9	13.2	18.4	23.4	10.6
RM4,000 - RM4,999	8.9	16.5	23.4	11.3	13.5
RM5,000 - RM7,499	24.0	25.6	33.3	26.7	25.5
RM7,500 - RM9,999	25.7	25.3	7.0	11.9	22.9
RM10,000 and above	38.3	14.0	6.5	5.3	21.4
Mean	RM9,886	RM6,820	RM5,194	RM4,538	RM7,542
Median	RM8,800	RM6,150	RM4,809	RM4,426	RM7,000

6.2.2. Focus Group Discussions (FGD)

A series of five FGDs were conducted between March and April 2025. The FGD were designed to explore perceptions of professional recognition and academic accreditation, challenges faced by members and suggestions for improvement. FGDs are suitable for exploring collective views, generating rich dialogue and uncovering shared experiences and tensions among participants. A total of 45 participants took part in the FGDs.

These sessions were organised to ensure representation across key stakeholders:

1. Industry professionals (*n* = 12)
2. Academicians from both TVET and non-TVET institutions (*n* = 20)
3. Graduate Technologists from MBOT-accredited programmes (*n* = 5)
4. MBOT management and leadership (*n* = 5)
5. Policymakers from Ministries (n=3)

183 Unweighted counts refer to the actual number of respondents who participated in the survey.
184 Weighted figures adjust the survey data to represent the estimated population of certified professionals in each recognition status, based on the sampling weights derived from MBOT's membership database.
185 Refer to Box 1.1 for technology fields classification.

The FGDs were conducted both in-person and online (Zoom platform), with group sizes ranging between six and 14 participants per session, to ensure diverse yet manageable discussions. Each diverse sample enabled a wide range of viewpoints to be captured, from professional pathways to those involved in programme delivery and professional recognition, ensuring a broad spectrum of views. Each session was facilitated by a trained moderator using a semi-structured discussion guide aligned with the study's research questions. The discussions lasted between 90 – 120 minutes.

The structure of FGD covers two key domains: professional recognition and academic accreditation. Across professional recognition domain, discussions centred on participants' awareness and understanding of MBOT certification, its perceived value in supporting career progression, challenges faced in obtaining or leveraging recognition, as well as perspectives from employers and higher education institutions regarding its relevance and impact.

For the accreditation domain, participants explored the level of awareness surrounding MBOT's accreditation processes, the institutional and operational barriers faced by training providers and potential improvements to enhance its effectiveness and alignment with industry needs. Across both domains, participants were also encouraged to share future directions and recommendations to strengthen MBOT's role within the broader professional development ecosystem.

All FGDs were audio-recorded with participant consent and transcribed verbatim. Field notes were also taken to capture non-verbal cues and contextual insights. Thematic analysis was employed following Braun & Clarke's (2021)[186] framework, involving familiarisation, coding, theme development and interpretation. ATLAS.ti was used to manage and code the data systematically. All participants provided informed consent. Anonymity and confidentiality were maintained throughout the process.

6.3 How Badges of Recognition Shape Labour Market Outcomes

To understand the impact of professional recognition, the study examines how certification is experienced both by individuals who hold it and by employers who engage with certified talent. This section delves into how professional recognition is experienced and utilised in the labour market. Anchored in both survey and FGDs, the analysis draws from two key perspectives (i) the individuals who hold recognition and (ii) the employers who engage with certified talent.

From individual perspectives, the section explores how recognition intersects with labour market mobility, wage progression, job formality, self-confidence and career aspirations. It examines not only the tangible shifts in employment outcomes but also how workers perceive the signalling value of certification in the competitive job markets.

To investigate how professional recognition supports career development among the T&T talent, the study employed a 6-point Likert scale questions to gauge respondents' perceptions on the value of MBOT's recognition. For ease of interpretation, scores were normalised on a 100-point scale to allow clearer comparison across recognition categories and respondent groups.

The analysis then shifts to the employer's lens unpacking how recognition influences recruitment efficiency, performance assessment, workforce development and human resource decision-making. This includes how employers use certification in their hiring processes, the value they attribute to it and their support for providing professional recognition to employees.

[186] Braun and Clarke (2021)

Thus, these perspectives offer a grounded view of the labour market value of recognition, in the sense of how it is applied, validated and leveraged across the T&T talent pipeline. The discussion is structured around three dimensions: recognition status (Professional Technologist, Graduate Technologist, Certified Technician, Qualified Technician), broad technology fields (Applied Science, IT-based, Industrial-based, and SCT) and where relevant, gender.

6.3.1. Career Progression: Evidence from Job Histories

Professional recognition drives upward career mobility over time

Career mobility is a defining feature of the MBOT's certified members, with the majority of them reporting multiple occupational transitions since receiving their professional recognition (Figure 6.1). For instance, 71% of Graduate Technologists and 66.4% of Certified Technicians have held at least two or more jobs post-recognition. This high degree of labour movement signals an active engagement with the labour market and may suggests that certification may function as a catalyst for re-entry, transition, or upward mobility within technical roles.

The analysis of occupational status by job stage further supports this pattern of progression (Figure 6.2). While most individuals initially entered the workforce in semi- or low-skilled roles, particularly among Graduate Technologists and Qualified Technicians, a clear shift towards professional roles is observed in their current employment. For example, the share of professionals among Graduate Technologists rose from 44.0% in their first job to 62.0% currently, while the proportion of Qualified Technicians in semi-skilled jobs declined evidently.

Figure 6.1: Total occupation held since receiving recognition, by recognition status

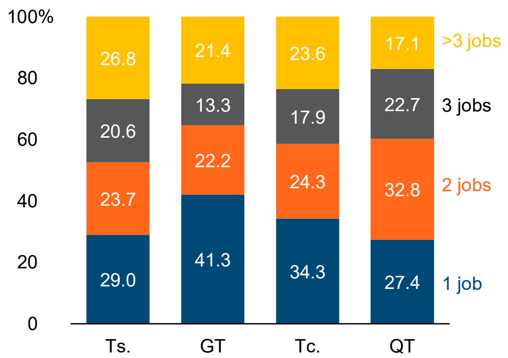
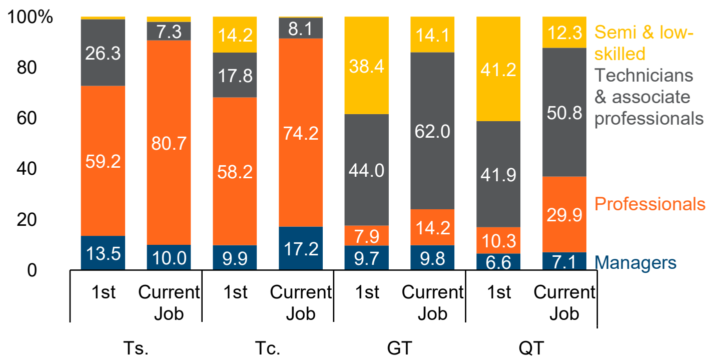


Figure 6.2: Occupation status for the first and current job, by recognition status



A consistent pattern emerges when the information is matched with the Graduate Tracer data, as discussed in Chapter 3. A large majority of T&T graduates are absorbed into high-skilled occupations at entry level and that align well from the survey data. This consistency across both datasets signals a strong labour market demand for T&T talent in skilled roles, in contrast to non-T&T fields. The survey further adds a longitudinal perspective, showing that many who started as technicians progressed into professional and managerial roles over time. This upward occupational movement post-recognition may suggest a delayed but real impact of professional recognition. Furthermore, it highlights role of professional recognition play in facilitating long-term career mobility even if initial roles may not fully reflect one's qualification or potential.

Earnings rise with mobility, yet field mismatches persist

KRI Shifting Tides[187] highlighted that many T&T graduates, especially those from TVET streams, face limited upward mobility throughout their careers. They were also found to remains in low- to mid-skill roles with limited wage gains. Figure 6.3 and Figure 6.4 deepen the understanding by examining changes in job roles across income groups and the total number of jobs held. From Figure 6.3, an upward transition is observed among individuals initially in lower-paying occupations. For instance, in the "Technicians & Associate Professionals" and "Semi & Low-Skilled Occupations" groups, a significant share of individuals moved from lower-income categories (below RM2,000) to middle-income brackets (RM2,000–RM5,000) in their current jobs. Among those who started in semi-skilled occupations, the proportion earning below RM2,000 dropped sharply from 64.7% to 28.0%, while the proportion earning above RM2,000 more than doubled.

This earning mobility pattern points to income progression within technical tracks, an outcome that aligns with the aspirations of national policies aiming to bridge the wage gap across occupational tiers. For professionals, there is also a visible movement into higher salary brackets, with 26.6% now earning above RM5,000 compared to just 10.2% at their first job; signals the growing value of certified expertise over time.

When segmented by total jobs held (Figure 6.4), respondents with more than three job demonstrate the strongest evidence of occupational upgrading. The proportion working in professional roles increases consistently with each additional job held, reaching 65.3% among those with more than three job transitions. Conversely, the share in semi-skilled roles diminishes with each career move, suggesting that labour mobility is strongly correlated with upward occupational mobility. These patterns support the idea that professional recognition, coupled with job histories, may enable certified individuals to break through early-career stagnation and ascend into roles with greater responsibility, recognition and pay. Hence, job mobility acts as a vehicle for professional growth and open doors to diverse roles across sectors and specialisations.

Figure 6.3: Income distribution between current job and first job, by occupation type

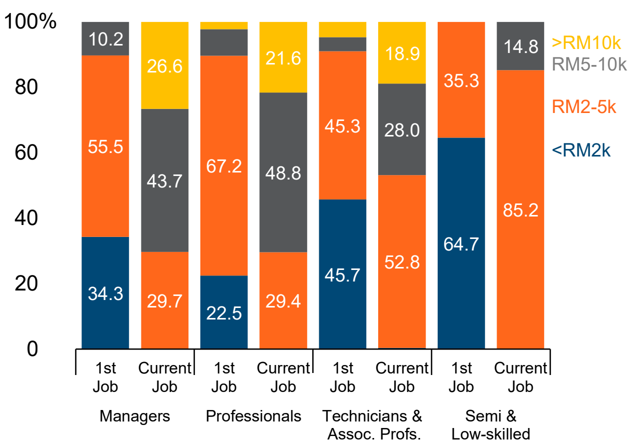
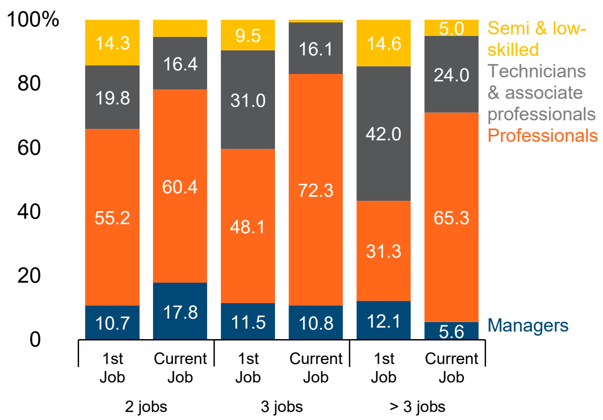


Figure 6.4: Occupation type between first job and current job, by total jobs previously held



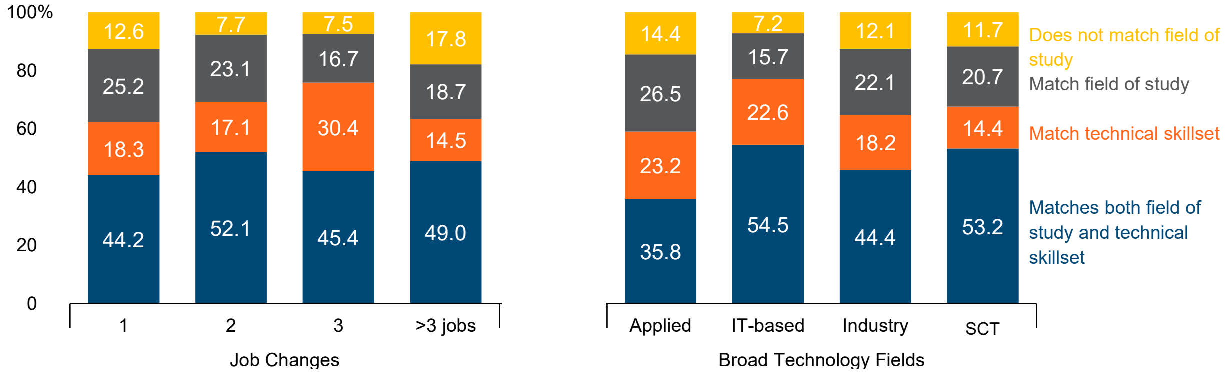
The alignment between current jobs and the certified individuals' field of study and technical skillset presents meaningful insights into their career development post-recognition. As job changes increase, the likelihood of finding a job that matches both field of study and technical skills improves (Figure 6.5, left panel).

[187] KRI (2024)

Among those who experienced more than three job changes, nearly half (49%) are now in roles aligned with both their academic background and skillset, compared to 44.2% among those with only one job change. However, this group also shows a higher share (17.8%) reporting a complete mismatch, which signals that while mobility facilitates better matching for some, it may also lead others into unrelated roles. It might be due to external constraints such as market saturation or geographic limitations.

There is also a strong alignment between training and job demand as shown in both SCT and IT-based fields. The proportion of respondents in well-matched roles is highest among these two fields, i.e. SCT (53.2%) and IT-based fields (54.5%), as shown in 5 (right panel). In contrast, Applied Science fields reflect a more fragmented picture: only 35.8% report a strong match, while another 23.2% are employed in roles unrelated to their technical skillset. This suggests that some fields may face structural mismatches between training pathways and occupational opportunities, possibly pointing to a need for re-alignment of curricula or career guidance strategies.

Figure 6.5: Assessment of current job match field of study or technical skillset, by total job change and technology fields

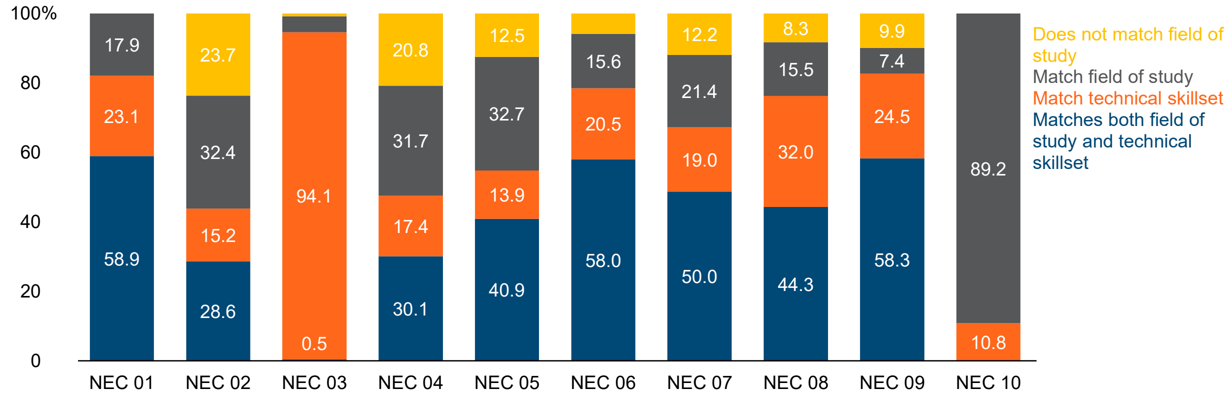


Breakdown by field of study according to the National Education Code (NEC) shows substantial divergence. NEC 03 (Social Sciences, Journalism & Information fields) stands out for its extremely poor alignment stands out for its extremely poor alignment, with 94.1% of respondents indicating a mismatch with their technical skillset, while almost none are in fully aligned jobs. On the other hand, NEC 09 (Health & Welfare) and NEC 10 (Services) show promising outcomes: over 58% and 89.2%, respectively, report full alignment.

Across the T&T-related fields of NEC 05 to NEC 08, the alignment between field of study, technical skillset and current job reveals varying degrees of labour market integration. NEC 06 (Natural Sciences, Mathematics and Statistics) shows the strongest alignment, with 58% of respondents in jobs that match both their academic and technical background, while NEC 07 (Engineering, Manufacturing and Construction) follows closely, though a notable share only matches by field, suggesting gaps in skill application or limited sectoral openings.

In NEC 08 (Agriculture, Forestry, Fisheries and Veterinary), the full match rate drops to 44.3%, with a high proportion (32%) matching only by skillset, which might indicate occupational spillover into related fields. NEC 09 (Health and Welfare) mirrors this duality: although 58.3% are fully matched, a substantial 24.5% report a complete mismatch, reflecting both the dynamic opportunities and barriers within the rapidly evolving tech sector. These patterns highlight the uneven transition from study to work across technical fields, underscoring uneven return on education-job alignment and investment, raising concerns about oversupply in some areas and underutilised potential in others.

Figure 6.6: Assessment of current job match field of study or technical skillset, by field of study



Note: NEC Code 01 – Education; NEC Code 02 – Arts & Humanities; NEC Code 03 – Social Sciences, Journalism & Information; NEC Code 04 – Business, Administration & Law; NEC Code 05 – Natural Sciences, Mathematics & Statistics; NEC Code 06 – Information & Communication Technologies; NEC Code 07 – Engineering, Manufacturing & Construction; NEC Code 08 – Agriculture, Forestry, Fisheries & Veterinary; NEC Code 09 – Health & Welfare; and NEC Code 10 – Services

6.3.2. Professional Recognition Boosts Individual Confidence and Motivation

Some individuals may opt to pursue professional recognition for intrinsic reasons such as internal motivation, building individual confidence, or personal satisfaction tied to the title. The relationship between professional recognition and individual confidence is well documented in the literature. Professional recognition serves to influence individual's professional identity in their field or organisation[188]. This recognition, particularly when seen as merit-based, can contribute to feelings of competence and confidence within their profession, thereby enhance motivation[189].

In the case of MBOT's professional recognition, both Professional Technologists and Certified Technicians generally agreed that certification helped boost their technical confidence (75.8 and 77.7, respectively) (Table 6.3). Similarly, confidence in technical ability was high among Graduate Technologists and Qualified Technicians, at 75.4 and 81.0, respectively (Table 6.4). Respondents also reported strong improvements in professional networking (around 70 across all groups).

Table 6.3: Perceived impact of professional recognition on technical ability and networking, by recognition status

Perception	Ts.	Tc.	Total
I feel more confident in my technical skills.	75.8	77.7	76.2
I have built a stronger and wider professional network.	70.2	70.3	70.2
I am more confident to apply in more demanding, higher-skilled jobs.	71.0	75.0	71.7

Table 6.4: Perceived impact of professional recognition on technical ability and career motivation, by recognition status

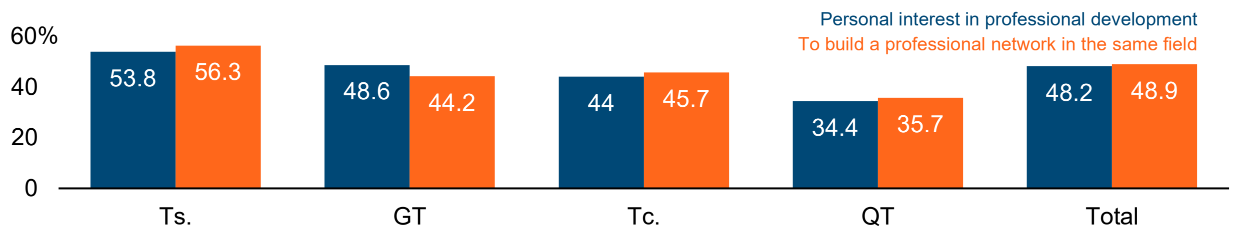
Perception	GT	QT	Total
My professional network has expanded as a result of holding an MBOT-recognised qualification.	69.1	72.1	69.7
I became more confident in my technical abilities.	75.4	81.0	76.6
I am motivated to apply in more demanding, higher-skilled jobs.	75.4	81.7	76.8

188 Ashforth, B. E., & Mael, F. (1989). Social Identity Theory and the Organization. Academy of Management Review, 14(1), 20–39
189 Ryan, R. M., & Deci, E. L. (2000). Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being. American Psychologist, 55(1), 68–78.

The confidence in their technical skills and expansion of professional networks through professional recognition is also reflected in their perception of what jobs they are confident to apply for. Among the Professional Technologists and Certified Technicians, they highly perceived that professional recognition encouraged them to apply for more demanding roles (71.0 and 75.0, respectively). This association is even stronger among the Graduate Technologists and Qualified Technicians, whereby over 75% in both groups said they were more motivated to pursue higher-skilled roles. This suggests that recognition not only validates technical capabilities but also cultivates forward-looking career aspiration.

However, the positive association between confidence in technical abilities and professional recognition is less reflected in their motivations for pursuing recognition. Among the different MBOT members (Figure 6.7), only the Professional Technologists were the ones who majority stated that personal interest in professional development (53.8%) and building networking opportunities (56.3%) were among their motivations in attaining recognition. Meanwhile, Qualified Technicians showed the lowest motivation, with 34.4% choosing interest in personal development and 35.7% selecting professional network as reasons for recognition.

Figure 6.7Motivations for seeking professional recognition, by recognition status

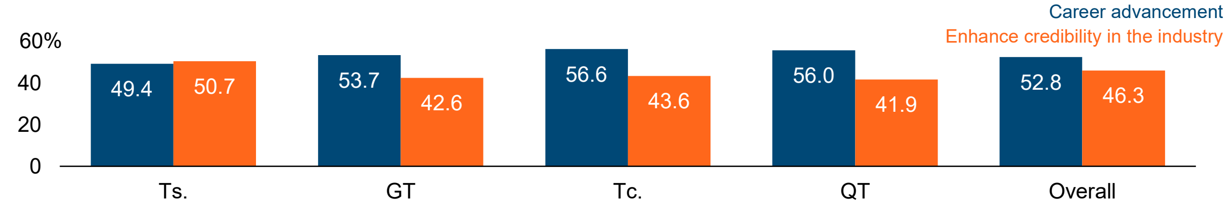


6.3.3. Positive Perception of Professional Recognition on Career Mobility

Professional recognition not only boosts individual's morale and confidence in their technical capabilities but can also act as a signal of value and competence to others, particularly to potential employers, clients and peers[190]. Hence, professional recognition can act as a credentialing mechanism due to these individuals being recognised as already fulfilling a certain set of achievements; provides them credibility not just in their organisation, but in their industry[191].

The motivation to pursue professional recognition reflects the relationship between professional recognition and career mobility. Overall, the majority (52.8%) were driven by career advancement, with the highest motivation being among Certified Technicians at 56.6%. Meanwhile, for Professional Technologists, there was more emphasis on enhancing credibility within the industry (at 50.7%) over career advancement (49.4%).

Figure 6.8: Motivation to pursue professional recognition, by recognition status

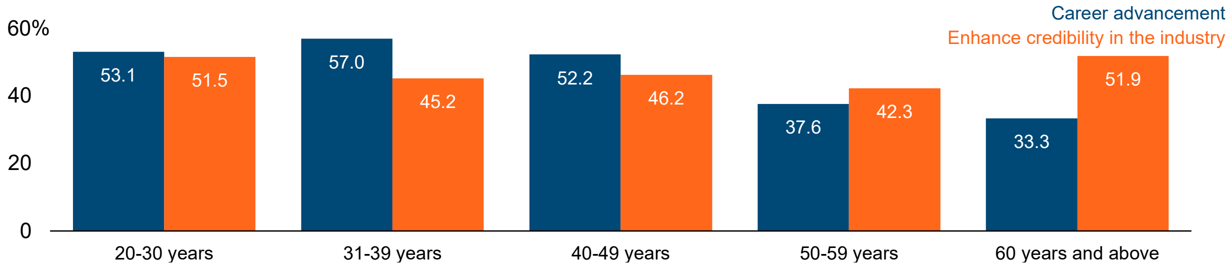


[190] Spence (1973)
[191] Abbott (2014)

Additionally, the age of the respondents can also influence their motivation in pursuing professional recognition (Figure 6.9). For those below the age of 50, the majority cited career advancement as their main reason – highest being among the 31-39 years age group at 57.0%. Unsurprisingly, career advancement is less of a driver among higher age groups as they are considerably mature within the labour market and are likely in more advanced positions.

Interestingly, both the youngest cohort (20-30 years) and oldest cohort (60 years above) had similar shares of selecting enhancing credibility as one of their main motivations in pursuing professional recognition at 51.5% and 51.9% respectively. However, their reasons behind seeking credibility may differ between the cohorts as they are at opposite stages of their career development.

Figure 6.9: Motivation to pursue professional recognition, by age



Aside from motivation, the analysis examines how respondents perceive the value of MBOT professional recognition in shaping their career outcomes. Table 6.5 captures the perceptions among the Professional Technologists and Certified Technicians, while Table 6.6 adds a comparative layer between early-career recognition holders, the Graduate Technologists and Qualified Technicians. Generally, Professional Technologists and Certified Technicians perceived moderately positive effects on employment opportunities and career progression. Still, a majority believed their career progression would have been slower without MBOT recognition. Meanwhile, Graduate Technologists and Certified Technicians, showed higher positive associations between their professional recognition and career development.

Table 6.5: Perceived value of professional recognition among the Professional Technologists and Certified Technicians

Perception	Ts.	Tc.	Total
My credibility within my organisation has significantly improved.	66.1	67.8	66.4
I have had better career progression as higher-level positions require MBOT recognitions.	57.1	60.0	57.7
I was able to get jobs that allow me to take advantage of my gained/recognised skills.	62.1	67.2	62.4
I have received more job offers or inquiries from potential employers.	53.8	57.7	54.5
If I did not have MBOT certification, my career progression would have been slower.	54.8	58.7	55.3

For the Professional Technologists and Certified Technicians, among the different perceived values tied to their professional recognitions, the highest was reflected in their improved credibility within their organisation (Professional Technologists: 66.1; Certified Technicians: 67.8). Certified Technicians also showed higher belief (at 67.2) that their professional recognition allowed them access to jobs that takes advantage of their skills comparted to only 62.1 of Professional Technologists. Both Graduate Technologists and Qualified Technicians acknowledged that MBOT-accredited programmes helped them expand their professional network (69.1 and 72.1, respectively) and played an important role in career advancement (72.0 overall) (Table 6.6). Additionally, when asked to compare with their peers from non-MBOT accredited programmes, they reported easier employment opportunities (Graduate Technologists: 66.5; Qualified Technicians: 68.2) and better career progression (Graduate Technologists: 68.1; Qualified Technicians: 72.1).

Table 6.6: Perceived value of professional recognition among the Graduate Technologists and Qualified Technicians

Perception	GT	QT	Total
Enabled me to find employment opportunities more easily compared to my peers with non-MBOT accredited programmes.	66.5	68.2	66.9
Was an essential requirement for career advancement in my field.	70.2	78.7	72.0
Provided me with better career progression compared to my peers with non-MBOT accredited programmes.	68.1	72.1	68.9
My professional network has expanded as a result of holding an MBOT-recognised qualification.	69.1	72.1	69.7

6.3.4. Returns on Career Mobility as Motivators for Higher Professional Recognition

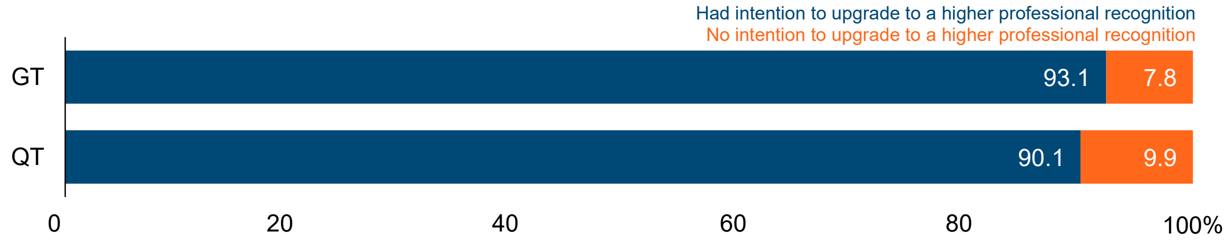
Importantly, there is a high positive perception of the impact of higher professional recognition onto career mobility (Table 6.7). Higher level of agreement among Graduate Technologists (73.7) and Qualified Technicians (77.5) who believed that obtaining higher recognition would enhance their career development and nearly equal numbers expected to receive more job offers as a result.

Table 6.7: Impact of higher professional recognition onto career mobility among Graduate Technologists and Qualified Technicians

Perception	GT	QT	Total
My employer or potential employers have expressed a preference for candidates with higher levels of MBOT professional recognition such as Professional Technologists or Certified Technicians.	65.3	67.5	65.8
I believe I would be able to enhance my career development by obtaining a higher MBOT professional recognition.	73.7	77.4	74.5
After obtaining a higher MBOT professional recognition, I expect to receive more job offers or job interviews.	73.4	74.0	73.5

The perceived career returns of higher professional recognition are reflected in their intention to pursue them, where a significant share of Graduate Technologists (93.1%) and Qualified Technicians (90.1%) expressed clear intention to upgrade to a higher level of professional recognition (Figure 6.10). This situates strong buy-in for MBOT's recognition ladder and indicates that certified individuals view higher recognition as a valuable tool for advancing their careers. Only a small proportion (under 10%) in each group said they had no intention to upgrade, suggesting minimal resistance to progression within the system.

Figure 6.10: Intention to upgrade to a higher professional recognition among Graduate Technologists and Qualified Technicians



6.3.5. Professional Recognition Positively Impacts Wages, but Gains are Uneven

Improvements in wages, or wage premiums after professional recognition are often reflective of the perceived above-average ability of the recognised employee[192]. However, despite recognition boosting the members' technical confidence and career mobility, wage gains seem to fall behind. This is seen by both Professional Technologists and Certified Technicians reporting low perceived improvement in earnings, scoring in at 51.8 and 57.2, respectively (Table 6.8).

Table 6.8: Perceived improvement in earnings among Professional Technologists and Certified Technicians

Perceived improvement in earnings	Ts.	Tc.	Total
Overall	51.8	57.2	52.5
Technology Fields			
Applied science	47.7	50.3	47.8
IT-based	51.0	52.9	51.3
Industrial-based	52.6	57.8	53.3
SCT	51.1	58.7	52.1
Gender			
Male	50.0	58.1	53.4
Female	45.2	53.4	49.3

While the attainment of higher professional recognitions may lead to improvements in wages, it is not the only determinant. Factors such as years of experience as well as competition within the market can often influence the level of compensation employees receive. To examine further the impact of professional recognition on wages, we look at the mean and median wages by the field classification, for the age groups 30-39 years (Figure 6.10) and 40-49 years old (Figure 6.11), which makes up most of the respondents' ages.

Figure 6.11: Mean and median salaries by technology field among Professional Technologists and Graduate Technologists, aged 30-39

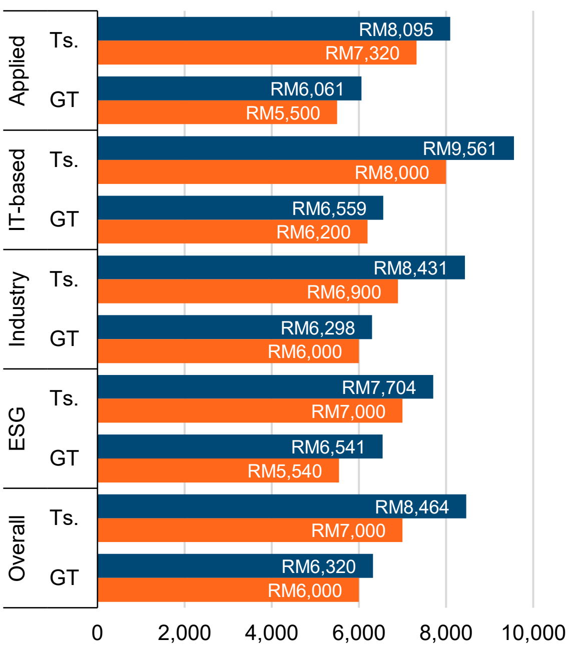
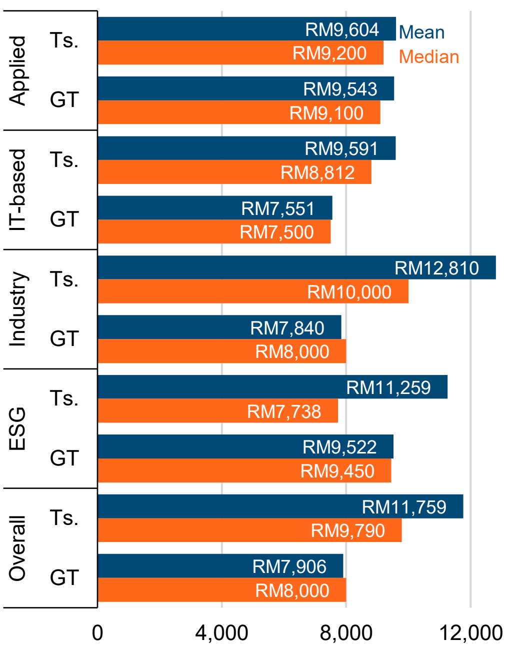


Figure 6.12: Mean and median salaries by technology field among Professional Technologists and Graduate Technologists, aged 40-49



[192] Spence (1973)

Overall, technologists with higher professional recognition reported greater earning averages (Figure 6.10). The difference in wages between Professional Technologists and Graduate Technologists is even more apparent in the higher age group, 40-49 age, (Mean Ts.: RM11,759; Mean GT: RM7,906). This may indicate that higher occupational positions show greater appreciation for higher recognition.

Respondents from industrial-based technology fields reported the highest perception scores when asked whether their earnings have improved after attaining higher professional recognition. This is also reflected in Figure 6.11, where the mean and median income of Professional Technologists and Graduate Technologists is consistently higher within the industrial-based field. Similarly, this wage difference is greater in the 40-49 age group, where the difference in the median income is RM2,000, with a noticeable difference in mean income (Mean Ts.: RM12,810; Mean GT: RM7,840).

Meanwhile, among the 40-49 age group respondents in the Applied Technology fields there was very minimal difference in wages between the Professional Technologists and Graduate Technologists (difference, mean: RM61, median: RM100) – indicating less appreciation for the higher professional recognition among the senior professionals. This is also in line with the low agreement (47.7) that their earnings have improved among the Professional Technologists in Applied Technology fields. However, there is a higher difference in wages among the younger cohort (30-39 years), which points to a larger impact of higher professional recognition in mid-tier positions in the Applied Technology fields.

The perception that their wages have improved among the Professional Technologists' respondents from the IT-based technology fields is moderate (51.0). Closer examination of their average wages, however, shows an interesting pattern. While the younger cohort (30-39 age group) has a considerable average wage difference between the technologists' recognition (Difference, mean: RM3,000; median: RM1,800), this gap diminishes among the older cohort (40-49 age group). Particularly, even though the average wage of Graduate Technologists improves among the older cohort, the average wage of Professional Technologists has very minimal gains.

While Certified Technicians reported a higher perception score that their wages have improved, (GT: 57.2; Ts.: 51.8) as can be observed in Table 6.8, their wage gains are much lower than those observed among the Professional Technologists. Interestingly, unlike technologists, the appreciation of higher professional recognition among technicians is more pronounced among the younger cohort (30-39 years) (Figure 6.13).

The overall difference in mean and median income between Certified Technicians and Qualified Technicians is RM359 (difference in mean) and RM765 (difference in median) respectively. Comparatively, there is no noticeable difference in the mean income of the older cohort of technicians, while the median income of Qualified Technicians is higher than that of Certified Technicians.

Across the different fields of technology, appreciation for higher professional recognition among the Technicians is relatively low, represented by minimal wage differences between the Certified and Qualified Technicians (Figure 6.14). However, the only exception is in the Applied Technology field, which showed greater average wages among the Certified Technicians. Similarly, the wage premium from the higher professional recognition is higher among the younger cohort, whereby the median and mean wages of Certified Technicians are higher by RM1,083 (difference in median) and RM2,633 (difference in mean) respectively in the 30-39 age group. This wage gap shrinks among the 40-49 age group, where the difference between the mean and median wages of the technicians is RM1,296 and RM549, respectively. The lower average wages among the older technician cohort may be tied to the limitations of career mobility for diploma-level graduates.

Figure 6.13: Mean and median salaries by technology field among Certified Technicians and Qualified Technicians, aged 30-39

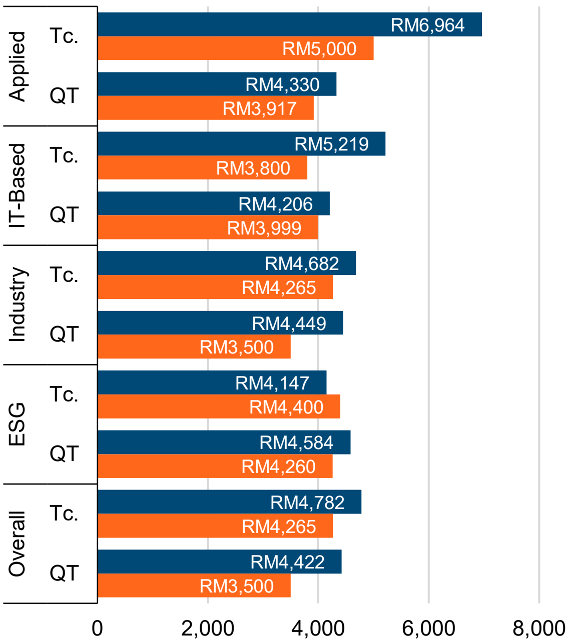
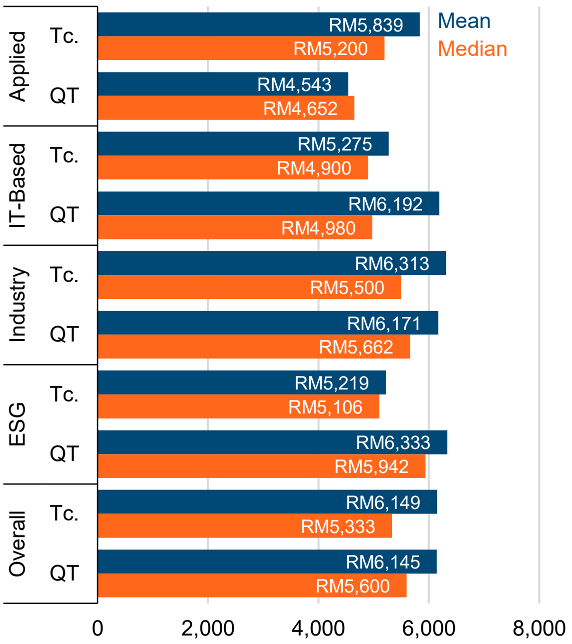


Figure 6.14: Mean and median salaries by technology field among Certified Technicians and Qualified Technicians, aged 40-49



Wage gain from higher professional recognition varies by gender

Comparing between genders, women reported lower perceptions that their wages have improved after attaining higher professional recognition when compared to their male peers. This is shown in Table 6.8, where among the Professional Technologists, the perception score was 45.2 for females, and 50.1 for males. Meanwhile, despite higher perception scores among Certified Technicians, the difference persists with scores of 53.4 among females and 58.1 among males.

The lower perception scores among women are reflected by the overall lower wage gains after attaining a higher professional recognition among women when compared to men (Figure 6.14). The only exception is in the case of median wages among the technologists in the 30-39 years age group: where the median wage of women Professional Technologists is RM1,108 higher than the women graduate technologists, compared to the RM850 in the case of male technologists. Despite this, the mean and median wages of men are persistently higher than those of women.

The difference in wage gains between genders, after a higher professional recognition, is most noticeable in the case of technologists in the older cohort – particularly, male professional technologists show greater income improvements compared to female professional technologists The mean and median monthly income between female Professional and Graduate Technologists is RM1,737 and RM904, respectively. In comparison, male Professional and Graduate Technologists showed a difference of RM4,904 in mean monthly income and RM2,300 in median monthly income.

Figure 6.15: Mean and median salaries among Professional Technologists and Graduate Technologists, by gender and age group

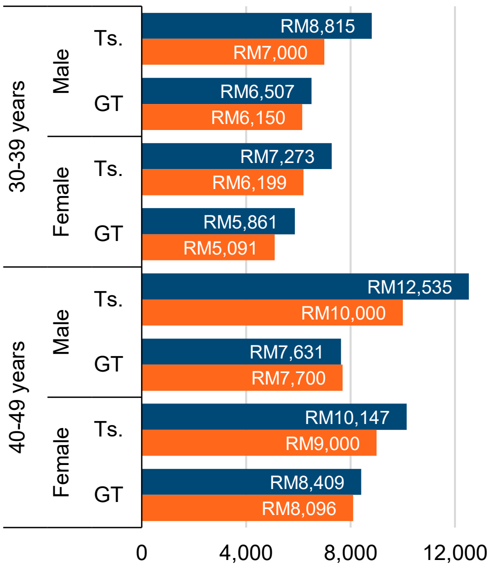
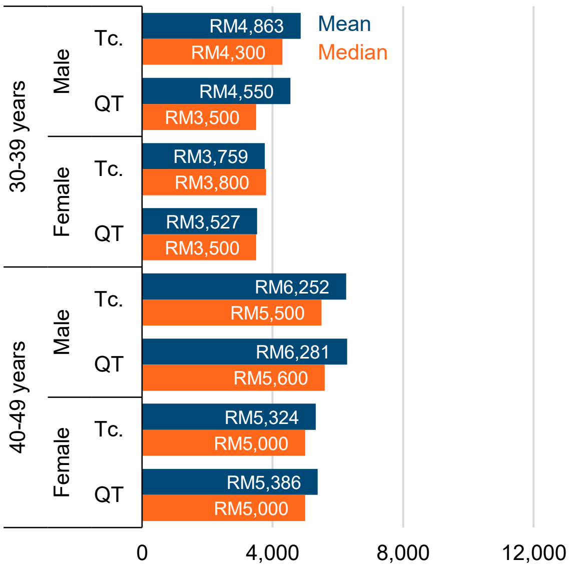


Figure 6.16: Mean and median salaries among Certified Technicians and Qualified Technicians, by gender and age group



In a similar pattern to the technologist group, gendered disparities in wage outcomes are also evident among Certified and Qualified Technicians. Figure 6.16 shows that men consistently earn more than women across both age groups and recognition levels. Among those aged 30–39 years, the mean monthly income for male Certified Technicians stands at RM4,863, compared to only RM3,759 for their female counterparts. This trend continues into the 40–49 age group, where male Certified Technicians earn RM6,252 on average, while female Certified Technicians earn RM5,324.

Although the mean wage gap narrows slightly with age, women still trail behind, with differences of RM929 at age 40–49, compared to RM1,104 among those aged 30–39. The median wage gap is also persistent, highlighting that the distribution of income is skewed towards higher earnings for men even when outliers are removed.

For Qualified Technicians, the disparity is less pronounced, but still observable. At age 40–49, male Qualified Technicians earn a mean income of RM6,281, whereas females earn RM5,386, reflecting a gap of RM895. While the median wages are equal at RM5,000 for both genders in this group, the consistently lower mean wages among women suggest a ceiling effect that limits upward mobility for women within the technician track.

6.3.6. Perception, Acceptance and Utilisation of Professional Recognition among Employers

Employer utilisation of professional recognition in recruitment and growth remains limited

To further understand the labour market value of MBOT's professional recognition, this analysis then shifts to the employer's response and utilisation of this recognition on hiring, performance assessment, and other human-resource decision-making processes. Past literature highlights that among employers, professional recognition can act as a proxy to assess a potential candidate's unobservable qualities, such as productivity and competence[193].

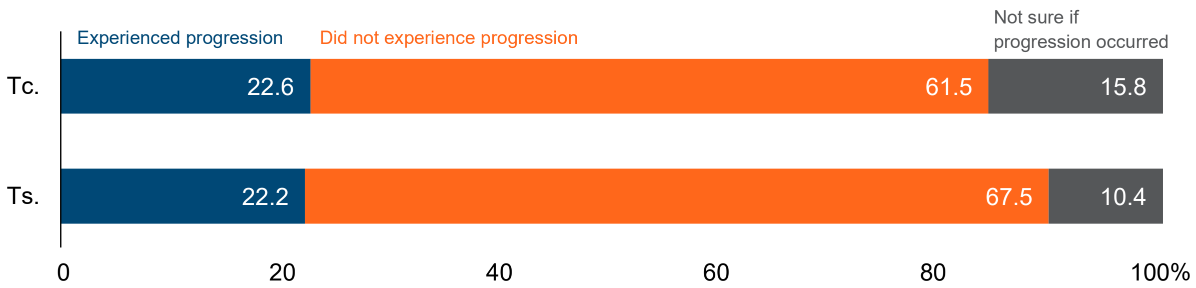
The existence of professional recognition can act as an external validation towards technical and professional capabilities, as the process of attaining the recognition is often rigorous, further enhancing their credibility. This is in turn may build employer preference for candidates with higher professional recognition. This is exemplified in Table 6.9, where among the Graduate Technologists and Qualified Technicians, they perceive that employers' show a preference towards higher levels of professional recognition (65.3 and 65.8, respectively).

Table 6.9: Perceived employer preference for higher levels of MBOT recognition among Graduate Technologists and Qualified Technician

Perception	GT	QT	Total
My employer or potential employers have expressed a preference for candidates with higher levels of MBOT professional recognition such as Professional Technologists or Certified Technicians	65.3	67.5	65.8

However, despite this perception, very few of those with high MBOT recognition (Professional Technologists and Certified Technicians) experienced positive appreciation from employers after receiving higher recognition. Only one-fifth of the Professional Technologists (22.2%) and Certified Technicians (22.6%) had some form of career progression, either through promotions or salary increment, after receiving their recognition (Figure 6.17). This highlights the gap between the expected returns of professional recognition and its actual use in the employer's human resource decision-making process, whereby employers may place greater importance on other selection criteria such as past work experiences.

Figure 6.17: Career progression status after receiving higher recognition among the Certified Technicians and Professional Technicians



[193] Rivera (2012)

FGD Findings 6.1: Low association between professional recognition and career benefits

Despite growing numbers of certified professionals, misconceptions persist. A frequent misunderstanding is the perception that professional titles are equivalent to honorary titles. Another common perception is that professional recognition does not translate into concrete career benefits, particularly when compared to more established titles such as Ir. or Dr. This sentiment is fuelled by the lack of visible institutional incentives such as salary increments, promotion points, or legal privileges.

"Those with Ts. do not get promotion points or allowances... those with Ir. and Dr. titles, do — Idris

Moreover, the absence of regulatory mandates requiring professional recognition for job functions further dilutes its perceived value.

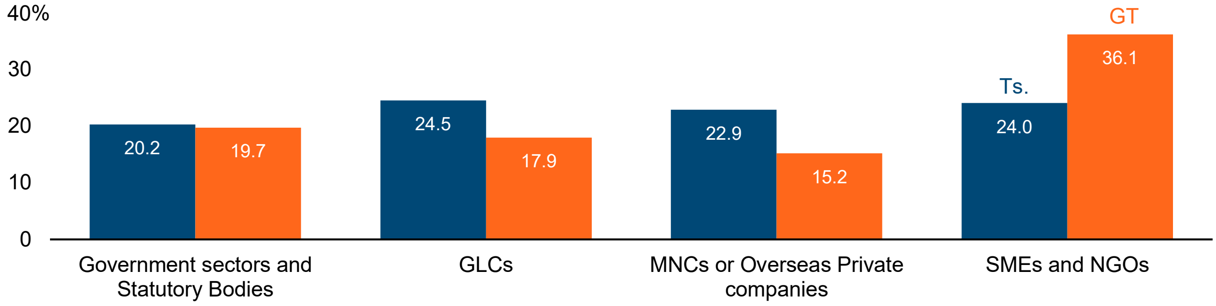
"Without enforcement or incentives, employers ask why register?" — Abu

While some professionals understand the credibility boost offered by recognition, the broader workforce remains sceptical about its utility, particularly when tangible benefits are not immediately apparent. These persistent misconceptions highlight a fundamental weakness in the current professional recognition framework: without stronger policy backing, structured incentives and public education efforts, recognition risks being seen as optional rather than essential. This not only undermines the recognition system itself but also hampers the larger goal of uplifting professional standards in the country's technology and technical sectors.

Professional recognition is underutilised, which may be due to limited employer awareness

Figure 6.18 shows the share of Professional Technologists and Certified Technicians who experienced some form of career progression attaining a higher professional recognition. Among them, technicians in the Small and Medium Enterprises (SMEs) and Non-Governmental Organisations (NGOs) sector reported the highest share, whereby 36.1% of Certified Technicians in this sector received benefits such as a salary increment or promotion. Conversely, technicians in Multinational Corporations (MNCs) experienced the lowest gain, with only 15.2% of Certified Technicians seeing benefits after their professional recognition. This may point to lower awareness or appreciation of the recognition in international companies.

Figure 6.18: Share of Professional Technologists and Certified Technicians who experienced some form of career progression attaining a higher professional recognition



Meanwhile, career progression benefits among technologists are fairly similar across the different sectors, with 20-25% of Professional Technologists experiencing benefits after getting higher recognition. The highest among them are among technologists in Government-Linked Companies (GLCs), with 24.5% of Professional Technologists in that sector reporting some form of career progression after their recognition.

Employer awareness and appreciation for professional recognition are important in establishing that recognition's labour market value. Inconsistencies in the employer's awareness of the recognition can result in varying benefits across the different employer sectors. This is particularly noticeable among the Certified Technicians where their reported career progression varies greatly between the sectors. The underutilisation and awareness of this professional recognition between the sectors can impact the overall career mobility of these technical and technological talent.

FGD Findings 6.2: Employer perception and acceptance for MBOT recognition is limited

The recognition of professional titles by employers significantly impacts an individual's market value. In industries with well-established recognition systems, such as engineering and technology, professional titles like Ts. or Tc. are increasingly viewed as markers of competence, enhancing an individual's professional standing in the eyes of both current employers and potential recruiters. However, employer perception remains inconsistent. Many HR departments are still unfamiliar with the MBOT titles, either mistaking them for honorifics or associating them with less tangible benefits. This lack of understanding reduces the immediate value of professional recognition in recruitment and promotion decisions. In sectors with less formal recognition, such as some SMEs, the value of these titles may be underappreciated, thereby limiting their immediate effect on compensation or career advancement.

"My HR doesn't know what Ts. is for. Even in my company, they just acknowledge Ir." — Ziha

There is a noticeable sectoral disparity in how MBOT-recognized professionals are valued. In public sector organizations, especially those dealing with technical infrastructure or policy, professional recognition plays a substantial role in project approvals, recruitment and even professional development.

"In government, Ts. is recognised for promotion in some agencies." — Khairol

A few institutions, particularly in universities, recognize and reward MBOT titles internally. Participants shared that the professional recognition carries performance points in their university's appraisal system. However, these cases seem to be limited to Malaysian Technical University Network (MTUN) and not yet institutionalised nationwide.

"At my university, we get awarded some points for getting Ts." — Addin

Moreover, the absence of regulatory mandates requiring professional recognition for job functions further dilutes its perceived value.

"Other boards give critical allowance. MBOT doesn't. So people ask, 'What's the point?'" — Najwan

"Unless it's made compulsory, they don't see the value." — Idris

This gap contributes to the perception that professional recognition is an extra, rather than an essential qualification.

Employers show support for certification, but practical incentives vary

Over half (50.7%) of the employed respondents shared that their employer provides subsidies for their professional bodies' membership fees (Figure 6.19). Among the employers that provide these incentives, the majority recognise and provide subsidies for the respondents' MBOT membership (68.1%), with 44.4% being fully subsidised and 23.7% being partial (Figure 6.20). However, despite their employer providing incentives for other professional bodies, 31.9% of respondents reported that they do not subsidise for MBOT's professional recognition.

Figure 6.19: Employer support for professional membership fees

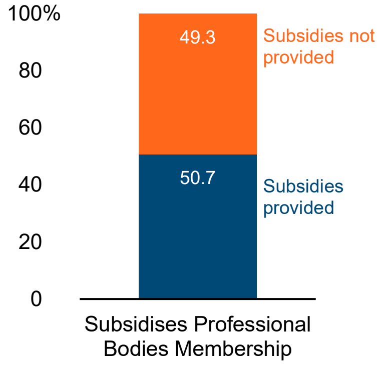
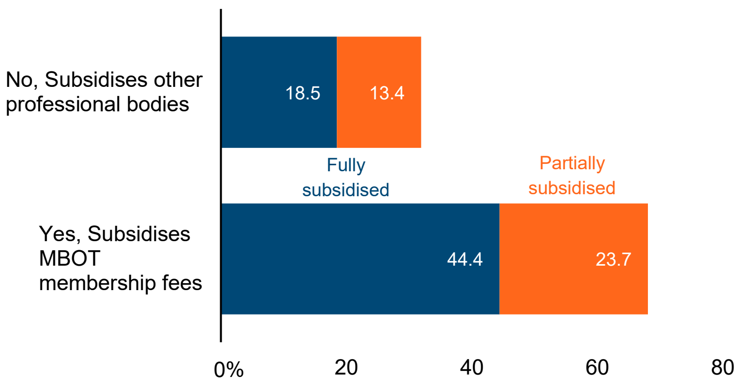


Figure 6.20: Employer subsidies for MBOT membership



Support for professional recognition among the employees is generally similar when cutting across the different technical fields. However, the Applied technology field and the SCT field reported a larger share of employees having the benefit of subsidised membership fees for their professional recognition. Recognition for MBOT membership is also higher, with 37.3% among Applied (24.4% full, 12.8% partial) and 37.3% among SCT (23.6% full, 13.7% partial) reported that their employer subsidised their MBOT membership (Table 6.10).

Table 6.10: Employer subsidisation of professional membership fees by technology field

Subsidisation of professional membership fees	Applied science	IT-based	Industrial -based	SCT
Fully subsidised MBOT membership	24.4	21.3	21.7	23.6
Partially subsidised MBOT membership	12.8	11.5	11	13.7
MBOT not subsidised, but other bodies fully subsidised	9.6	7.7	9.5	11.4
MBOT not subsidised, but other bodies partially subsidised	8.1	5.3	6.3	8.5
No subsidy for any professional body	45.1	54.2	51.4	42.7

The share of employers providing subsidies for their professional bodies' membership fees can also vary by employer type. GLCs showed the highest support for professional recognition, with 72.3% of employees in GLCs reported that they are entitled to receive subsidies for their professional recognition (Table 6.11). Support for MBOT's professional recognition is also the highest for GLCs amongst the different types of employers at 56.1% (40.3% full subsidies, 15.8% partial subsidies).

Table 6.11: Fee subsidisation by organisation

Subsidisation of professional membership fees	Government and Statutory Bodies	GLCs	MNCs or Overseas Private Companies	SMEs and NGOs
Fully subsidised MBOT membership	19.6	40.3	10.9	21.3
Partially subsidised MBOT membership	12.9	15.8	2.2	11.4
MBOT not subsidised, but other bodies fully subsidised	10.6	8.7	12.0	6.1
MBOT not subsidised, but other bodies partially subsidised	7.7	7.4	7.1	4.4
No subsidy for any professional body	49.1	27.7	67.9	56.8

Government bodies as well as SMEs and NGOs showed moderate support for MBOT professional recognition, with 32.6% and 32.7%, respectively, of their employees having either full or partial subsidies for their membership fees. Surprisingly, MNCs and Overseas Private Companies employers showed the lowest support for professional recognition, whereby the large majority (67.9%) of MNC and Overseas Private Companies employers do not provide any form of incentives for professional recognition.

6.4 How Badges of Accreditation Shape Graduate Pathways and Readiness

This section analyses the impact of MBOT's academic accreditation from multiple perspectives, drawing on all available data to present as complete a picture as possible. Ideally, this analysis would compare graduate outcomes between MBOT-accredited institutions and those without accreditation. However, due to data limitations, particularly the absence of comparable data from non-accredited institutions and the scope of our survey, which did not explicitly distinguish institutional accreditation status, such a direct comparison was not feasible.

To address these constraints, the study adopts a triangulation approach, combining the Ministry of Higher Education (MOHE) GTS data, our survey, complemented with qualitative insights from FGDs. While not exhaustive, this approach provides a baseline for assessing the academic accreditation impact and offers a benchmark for future studies on MBOT's role in shaping the T&T talent pipeline in Malaysia.

Academic accreditation is another important aspect in workforce development by ensuring that graduates possess the competencies, standards and values required to contribute meaningfully to their sectors, with the right skillset offers in meeting employer's expectation. MBOT's academic accreditation framework is positioned not only to support quality assurance and lifelong learning but also to align academic programmes with evolving industry demands.

The analysis in this section places emphasis on the early career phase, immediately following graduation, where the stepping stone effect can be most clearly observed. This focus is grounded in evidence from our recent report that highlights how the quality of initial job placement has a strong influence on long-term career progressions. A well-matched and well-remunerated first job significantly increases the likelihood of upward mobility, while a poor start, particularly one marked by skills mismatch or underemployment, can have lasting negative effects[194].

[194] KRI (2024)

This is particularly critical for T&T graduates from TVET pathways, who face persistent structural challenges, including high job mismatch rates and relatively low starting pay[195]. MBOT's academic accreditation has the potential to address these issues by raising institutional quality, strengthening programme-industry alignment and increasing employer recognition of certified graduates[196]. Hence, understanding how MBOT's accreditation influences early job outcomes is key to diagnosing whether it is fulfilling its intended function in improving employability and career readiness.

This section explores how MBOT's academic accreditation influences individual career progression at the start, institutional recognition by employers and broader sectoral alignment. Through both quantitative and qualitative narratives, it highlights not only the positive effects of academic accreditation but also the barriers and blind spots that still limit its full potential. Our analysis also draws from the FGD analysis that examines both the positive outcomes and the barriers to MBOT accreditation.

6.4.1. Academic Accreditation Framework

Under Section 6 (2) (g) of Act 768, the MBOT Board of Directors is empowered to establish a council to evaluate the quality assurance of academic programmes in the 24 fields of technology under the purview of MBOT[197]. To ensure that academic programmes meet the needs of stakeholders, especially industries, MBOT established the Technology and Technical Accreditation Council (TTAC) on October 13th, 2016, to evaluate academic programmes from education providers. In addition, the TTAC acts as a Joint Technical Committee between the Malaysian Qualifications Agency (MQA) and relevant professional bodies to comply with the requirements of professional programmes and professional qualifications stipulated under Act 679, the MQA Act 2007, Sections 50–55. TTAC members consists of:

1. Chairperson;
2. Representative from the MQA;
3. Representative from the MBOT Board of Directors;
4. Representative from related Ministry;
5. Representative from a learned society;
6. Representative from industries;
7. Representative from academicians; and
8. Any representative to be appointed by the MBOT Board of Directors.

To attain accreditation from MBOT, interested educational providers must submit the necessary educational documents, with the consent of MQA to the TTAC. Subject matter experts will be appointed by TTAC from an approved accreditation panel in the relevant MBOT technology fields. Additionally, the Technology Expert Panel (TEP)[198] plays a crucial role in the accreditation process include, advising the TTAC on technology and technical aspects such as facilities and curriculum relevance. Each accreditation evaluates a different aspect of the programme.

[195] Further reading: Mohd Amirul Rafiq Abu Rahim and Shazrul Ariff Suhaimi (2022); Hawati Abdul Hamid (2022); (2023a); (2023b)
[196] Arifpin, Rohaya, and Mansor (2024)
[197] See https://www.ttasmbot.org.my/about-us.php
[198] MBOT's TEP act as a strategic alliance between 3 sectors from the government agency, industry and academia. This strategic alliance will act as an advisor to oversee the respective Technology and Technical Fields which are recognised by MBOT. See https://www.mbot.org.my/technology-fields/technology-expert-panel-tep. Source: MBOT (n.d.)

Provisional Accreditation (PA) focuses on the planning quality and curriculum design of the academic programme requesting accreditation, based on the documents provided for the programme. However, if needed, physical visits may be conducted should officials from the TTAC find it necessary to do so. The TTAC will inform the education provider of any findings and offered the opportunity to rebut their findings. Final recommendations from the TTAC will be officially submitted to MQA for approval, with MQA responsible for notifying the education provider of the outcome.

Full Accreditation (FA) focuses on verifying the actual delivery outcomes from the programme in question through an evidence-based approach. Besides documentary evidence, the accreditation process is normally conducted through an accreditation visit to the education provider. Similar to provisional accreditation, education providers will be informed of the TTAC findings and their opportunity to contest them. Recommendations will be submitted to the MBOT Board, before proceeding with informing MQA of the outcome. Results will be registered on the Malaysian Qualifications Register and listed it on the TTAC MBOT website, with those successful granted Full Accreditation for a maximum of six years. As a result of its accreditation standards, MBOT has accredited programmes in more than 200 educational providers in a diverse array of technology fields (Table 6.12).

Table 6.12: Educational institutions with programmes accredited by MBOT

Institution	Total accredited programmes
Public HEIs (include MTUN and UiTM branches)	23
Other Public HEIs	8
Private HEIs (include UniKL branches)	42
Community Colleges	57
Vocational Colleges	73
Polytechnics	11

Source: MBOT, n.d.

To ensure standards are maintained by education providers, the TTAC monitors the quality of accredited programmes through a combination of compliance audits and curriculum reviews. The compliance audits themselves are divided into Extending (EA) and Continuing Accreditations (CA)[199]. Both are required to apply six months prior to the expiry of the approved FA period. Programmes audited by TTAC are required to make improvements based on results of the audit. The degree of compliance determines the accreditation period awarded to the education provider, subject to Board approval. Failure to meet MBOT standards may be granted a Deferment Accreditation to reapply for accreditation subject to TTAC approval, with documents directly submitted to the TTAC. Should the TTAC decide that accreditation is to be revoked, educational providers may appeal to the Appeal Committee, who will propose recommendations to the Board for a final decision.

However, EA merely extends the initial accreditation period by another year for programmes with five years of accreditation. CA instead awards successful education providers a full FA period, with the length determined by the quality of academic programme being evaluated. Alongside the compliance accreditations, MBOT has implemented curriculum reviews that are conducted periodically to enhance academic programme standards among MBOT accredited programmes. Education providers are required to submit documents of their programme's compliance standards to MBOT, whereupon MBOT appoints an accreditation panel to assess the programme.

[199] MBOT, n.d.

Once feedback from the education provider has been received, both the assessment report and feedback will be submitted to MBOT. The Accreditation Technical Committee will review the results, with recommendations by TTAC submitted to the Board for a final decision.

Other than accreditation under MBOT, higher education providers offering T&T programmes must also undergo programme accreditation by the Malaysian Qualifications Agency, which operates a separate system known as Single Quality Assurance (SWA)[200]. Instead, SWA is a national initiative coordinated by MQA to streamline the quality assurance processes across all higher education institutions in Malaysia. It serves to consolidate multiple accreditation requirements—academic, professional and regulatory—into a single, harmonised process.

While MBOT focuses on the professional recognition and standards specific to T&T fields, SWA accreditation primarily ensures that academic programmes meet national higher education standards and learning outcomes. Education providers participating in SWA are required to submit their programme documentation through the SWA Portal[201], where MQA coordinates the evaluation process and engages with relevant professional bodies, including MBOT, when professional input is needed. In essence, SWA does not replace MBOT's accreditation for professional recognition. Instead, both systems run in parallel:

1. SWA ensures national academic quality assurance,
2. MBOT ensures professional recognition for the T&T workforce.

For full compliance, programmes may need to obtain both MQA accreditation (via SWA) and MBOT accreditation, especially if they intend to offer graduates a pathway towards MBOT professional titles such as Graduate Technologist or Certified Technician. For higher education providers who have been awarded Self Accreditation MQA by MBOT, the accreditation assessment process is as current but subject to periodic assessments of the Malaysian Qualifications Agency and MBOT.

This dual-pathway accreditation model reinforces the integrity of Malaysia's talent pipeline and uphold academic standards while also align with the demands of industry and professional practice. MQA has published the Code of Practice for Institutional Audit (COPIA)[202] as a guide to institutional audits in general as well as for the purpose awarding the self-accreditation status. Section 2 of the COPIA outlines the standards and criteria used to evaluate (audit) an institution based on the nine areas of evaluation for quality assurance. For the award of self-accreditation status, an important criterion is the existence of a robust internal quality assurance system in the Higher Education Provider (HEP).

[200] MQA, n.d.
[201] See https://www2.mqa.gov.my/portal_swa/
[202] See https://www2.mqa.gov.my/qad/v2/copnew.cfm

Figure 6.21: Quality assurance standards and criteria used to evaluate institution with self-accreditation status

Self-Accreditation	
"For the award of self-accreditation status, an important criterion is the presence of a robust internal quality assurance system guided by relevant standards and policies of MQA and the MOHE"	*"The self-accreditation status entitles a provider (HEP) to accredit its own programmes guided by the MQF and all applicable policies and standards. This priviledge does not cover professional programmes which requires accreditation professional bodies. All self-accredited programmes must be registered in the*

Source: MQA, n.d.

6.4.2. The Impact of Academic Accreditation

Delayed realisation of accreditation limits its impact on early-career technology and technical talent

Earlier analysis (Table 6.4) from the survey conducted showed how the value of MBOT accreditation extends beyond credentialing. Particularly among the Graduate Technologists and Qualified Technicians, whose professional recognition is tied to the accreditation status of their course and institute, many reported positive impacts in their career mobility and confidence in their technical capabilities.

When looking at those in the early stages of their professional journey (those aged 20-29), the impact of accreditation is even more pronounced in shaping their employability and career mobility (Table 6.13). Respondents rated the perceived impact of accreditation positively across multiple dimensions, with scores nearing or exceeding 70; affirmed that graduating from MBOT-accredited programmes helped them secure employment more easily and advance faster in their careers compared to peers from non-accredited pathways. Meanwhile, Qualified Technicians had high perceptions (87.6) that graduating from an MBOT-accredited course is required for further career progression in their field.

Table 6.13: Perceived impact of MBOT accreditation among Graduate Technologists and Qualified Technicians, aged 20-29 years

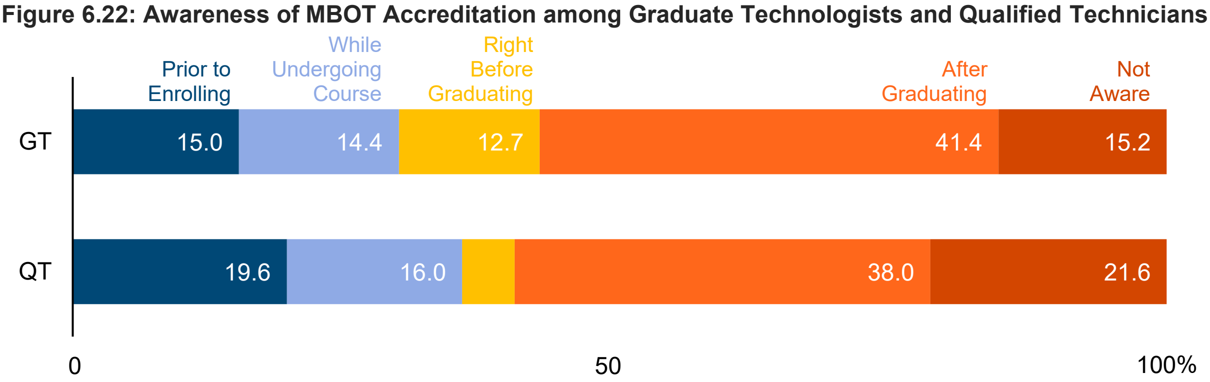
Perception	GT	QT
Easier employment compared to peers from non-accredited programmes.	64.2	71.3
Essential requirement for career advancement in the field.	68.5	84.7
Enabled better career progression compared to peers with non-MBOT accredited programmes.	66.1	74.1
Expanded professional network due to MBOT-recognised qualification.	69.5	76.5
Increased confidence in technical abilities.	77.3	83.1
Motivated to pursue higher-skilled jobs.	78.5	87.6

This effect is not limited to job access, where our findings reported that respondents saw it contributed to a broader professional benefit. Both Graduate Technologists and Qualified Technicians reported high agreement that MBOT recognition expanded their professional networks (69.5 and 76.5, respectively) and even higher scores were recorded for increased confidence in technical abilities and motivation to pursue more demanding roles (above 75). These perceptions suggest that MBOT accreditation acts as a positive labour market signal, reinforcing employability, unlocking mobility and supporting confidence to pursue more demanding roles. Although recognition alone may not fully resolve systemic job mismatches, the evidence points to its critical enabling role in improving education-to-employment alignment, particularly when layered with supportive institutional and industry ecosystems.

While the perception of accreditation is positive, awareness of their accreditation is low. Figure 6.8 showed that personal development as one of the main reasons to pursue their recognition is low. The lower intrinsic motivation among Qualified Technicians may be due to their low or late awareness that their academic programme was accredited by MBOT. 21.6% of the Qualified Technicians were not aware at all that their programme was accredited (Figure 6.22). Fewer than 30% of all respondents were informed before or during the course, while 41.4% of Graduate Technologists and 38.0% of Qualified Technicians only became aware after graduating.

This implies that for a majority, certification and its related recognition only came as a post hoc realisation rather than a proactive career strategy. This disconnect weakens the full potential of recognition frameworks to guide intentional career planning from the outset.

Figure 6.22: Awareness of MBOT Accreditation among Graduate Technologists and Qualified Technicians



FGD Findings 6.3: Students from MBOT accredited programmes are not aware that their programme is accredited

Another concern raised was that graduates from MBOT accredited programmes themselves are often unaware that their programmes are MBOT-accredited. Participants suggested more explicit inclusion of MBOT recognition in orientation modules, curriculum overviews and graduate briefings and the value of being MBOT accredited.

"Even when the programme is MBOT accredited, students are not aware" — Sakinah

Without this awareness, accreditation risks becoming a formality rather than a value-added credential from the student's perspective. In addition, FGD participants cited that the discovery of MBOT accreditation pathways was predominantly through workplace responsibilities.

However, those in non-academic settings, still do not recognize the value or implications of MBOT professional titles. Participants noted that school counsellors and career officers were often unaware of MBOT pathways, contributing to the information gap at the pre-university level.

"Even school counsellors do not know what MBOT is... [school counsellors] are usually sought for advice first by students" — Abu

Participants recommended that raising MBOT visibility needs to begin early, not just at the university level, but also in secondary schools, TVET institutions and among career development stakeholders like school counsellors. Several participants suggested the inclusion of MBOT recognition pathways into university induction modules, career fairs and co-curricular programmes at primary schools, such as those currently used to promote medicinal field or engineering.

"If there are "Kelab Doktor Muda" at schools, we should have programme "Teknologis Muda" to increase the awareness on MBOT" — Dharshini

Next, participants with exposure to both MBOT and Board of Engineers Malaysia (BEM) remarked that MBOT accreditation is still perceived as inferior or "second-tier" when compared to traditional bodies like BEM. This perception is reinforced by the absence of clear value propositions for MBOT titles, such as salary premiums, professional privileges, or legal authority equivalent to "Ir." titles.

However, while MBOT's employability advantages from MBOT accredited programmes were clear within certain technical fields, industry recognition was still uneven. Some employers, particularly in SMEs and non-technical sectors, did not fully appreciate the value of employing graduates from MBOT's accredited programmes, viewing them as optional rather than essential.

"Some employers still prefer traditional academic qualifications over MBOT titles like Ir. and Dr., leading to mismatched expectations." — Idham

6.4.3. How MBOT Academic Accreditation Aligns with Graduate Employment Outcomes Over Time

This section utilises granular information from the Graduate Tracer Study, sourced from the Ministry of Higher Education, to examine employment outcomes among graduates from MBOT-accredited institutions. The analysis is drawn from institution-level information for both MBOT-accredited institutions under the purview of MOHE and the Ministry of Education (MOE).

It is important to note that the purpose of this analysis is not to compare the performance of one institution against another. Instead, it aims to explore how MBOT accreditation may be associated with shifts in graduate employment outcomes over time at the institutional level. While various factors beyond accreditation can influence employment outcomes, such as field of study, the dynamic of economic conditions and structure and institutional reputation, this section focuses specifically on the possible contribution of MBOT's accreditation framework to those outcomes.

The distribution of MBOT-accredited programmes across different institutions under MOHE discloses structural patterns within the national talent pipeline. As shown in Table 6.15 there are a total of 655 MBOT-accredited programmes offered by eight categories of institutions nationwide as of 2024. Institutions under MOE (mainly vocational colleges) lead significantly with 370 accredited programmes, all of which are active and primarily concentrated in industrial-based fields (NEC 07-Engineering, Manufacturing and Construction); contributing to 90% out of total accredited programmes. Thus, it undeniably emphasises the role of vocational institutions as the backbone of technical education, especially at MQF Level 4 (diplomas).

Public HEIs while fewer in programme count, contribute significantly to the higher-qualification tier, with 51 MBOT-accredited programmes at MQF Level 4 and 6 (diploma and degree level). Private HEIs contribute 84 programmes, primarily focused on MQF Level 4 and Level 6 and are notably strong in NEC 06 (ICT) and NEC 07 (Engineering, Manufacturing and Construction).

While smaller in number, community colleges contribute significantly to TVET program memes. It offers 88 programmes, nearly all at MQF Level 3. Their offerings are heavily focused on engineering-related fields (NEC 07). polytechnics, although few in number (17 programmes), contribute across several study fields.

Across qualification levels, MQF Level 4 (Diploma) dominates the MBOT-accredited landscape with 457 programmes (69.8%), followed by MQF Level 6 (Degree) at 205 and MQF Level 3 (Certificate) at 119 (18.2%). This indicates that while diploma-level qualifications remain the backbone of accredited technical education, the system is gradually expanding towards higher-level credentials. In terms of governance, the MBOT-accredited programmes under the MOE are 100% through vocational colleges.

The trend in programme approvals under MBOT accreditation from 2018 to 2025 reflects an initial expansion phase followed by a period of stabilisation. In the early years of MBOT's establishment, there was a strong push to formalise and recognise technical and technological programmes. This is evident from the sharp increase in approved programmes between 2018 and 2020. Starting with just 3 approvals in 2018, the number surged to 89 in 2019 and further to 141 in 2020.

This upward momentum likely stemmed from MBOT's active engagement with institutions and strong backing from relevant ministries that influence swift response from higher education providers seeking for accreditation for their programmes.

Table 6.14: MBOT-accredited programmes, by type of institutions, 2024

Information		MOE	MOHR	Public HEI	MTUN	Private HEI	Community college	Poly	MARA	Total
	Total Programmes	**370**	**4**	**51**	**37**	**84**	**88**	**17**	**4**	**655**
Accreditation Status	Active	361	2	40	37	74	88	17	4	623
	Inactive		9	2	11		10			
MQF	MQF Level 3 / Certificate						78			78
	MQF Level 4 / Diploma	369	4	16	2	36	10	16	4	457
	MQF Level 5 / Advanced Diploma					1				1
	MQF Level 6 / Degree	1		35	35	47		1		119
Approval Year	2018					3				3
	2019	2	2			2				6
	2020							1		1
	2021	15	1	1		9	1	7		34
	2022	10		4	5	21	67	1		108
	2023	9		26	16	21	7	4	4	87
	2024	288	1	18	14	20	8	2		351
	2025	46		2	2	8	5	2		65
Technology Field	**Applied Science**									
	Agro-Based			3			4	4		11
	Biotechnology	1		2	1	2		1		7
	Chemical Technology			2	2	4		1		9
	Food Technology				1	2	8	3		14
	Material Science			2	1					3
	Nanotechnology									
	IT-based									
	Art Design & Creative Multimedia	4		1	1	6	1	3		16
	Cyber Security					2				2
	ICT	32		29	6	34			3	104
	Industrial-based									
	Aerospace & Aviation					2				2
	Automotive	54			3	2	18			77
	Building & Construction	47		4	2	2	14	2		71
	Electrical & Electronic	91	2	1	8	5	31	1		139
	Health & Medical									
	Manufacturing & Industrial	141	2	2	11	19	12	2	1	190
	Maritime			1		1				2
	Oil & Gas Technology				1					1
	Telecommunication & Broadcasting					1				1
	Transportation & Logistic					2				2
	Sustainable & Critical Technologies (SCT)									
	Atmospheric Science & Environment			1						1
	Green Technology									
	Marine			1						1
	Nuclear & Radiological									
	Resource Based, Survey & Geomatics			2						

Source: MBOT, MOHE, and MOE (2025)

However, beginning in 2021, the pace of new accreditations slowed considerably. Only 38 programmes were approved in 2021, followed by a modest increase to 76 in 2022. This decline may reflect the natural progression of the accreditation cycle, where most mainstream programmes had already been accredited during the initial wave. Additionally, the pandemic-related disruptions during this period may have caused some delays or shifts in institutional priorities, affecting the flow of new applications.

The trend continued into 2023 and 2024, with approvals dropping further to 27 and 19 programmes respectively. This decline, however, should not be interpreted as a weakening of MBOT's role. Rather, it may suggest that the accreditation landscape is becoming saturated, with fewer new programmes being introduced or requiring recognition.

It also indicates a potential shift in focus, from expanding the number of accredited programmes to strengthening quality assurance mechanisms, programme-relevance reviews and ensuring inclusivity across institutions and disciplines.

Interestingly, the data for 2025 shows a slight rebound, with 65 programmes approved so far. This may signal renewed activity, potentially driven by the introduction of new academic offerings or refreshed institutional strategies aligned with evolving industry demands. The increase could also result from MBOT's ongoing efforts to promote accreditation among less represented institutions or fields.

The distribution of MBOT-accredited programmes by field of Technology reflects a strong emphasis on Industrial and Technology-driven disciplines. The largest concentration is in Manufacturing & Industrial (190 programmes), followed by Electrical & Electronic (139) and ICT (104). Other notable fields include Building & Construction (71) and Automotive (77), which underline the demand for infrastructure and mobility-related skills. Fields like Food Technology (14), Health & Medical (10) and Biotechnology (7), while smaller in number, reflect growing relevance in applied sciences and future-facing sectors like Biotech and Healthcare. Emerging areas such as Cybersecurity, Green Technology and Sustainable & Critical Technologies remain underrepresented, suggesting potential growth opportunities for MBOT to promote more programmes in line with green and digital transition agendas.

Graduate output trends from MBOT-accredited programmes in institutions under MOHE and MOE

The graduate profile from MBOT-accredited programmes under MOHE shows a steady and growth between 2017 and 2023. The total number of graduates rose from 7,681 in 2017 to 12,450 in 2023, almost doubling in size within six years. This expansion reflects both the increasing supply of technical and technology-based talent and the expanding institutional participation in MBOT accreditation. The share of graduates from active MBOT-accredited programmes has also improved, rising from 82.3% in 2017 to 85.1% in 2023, despite some institutions shifting their programmes to MQA. This upward trend indicates improved compliance and recognition within the accreditation framework.

In terms of field of study, graduates remain highly concentrated in Engineering, Manufacturing and Construction (NEC 07) and ICT (NEC 06). They account for over 75% of total graduates in 2023. NEC 05 (Natural Sciences) and NEC 08 (Health-related fields) contribute smaller but steady shares, while fields like NEC 02 (Arts and Humanities) and NEC 04 (Business) remain marginal. This continued dominance of Engineering and ICT aligns with Industrial and Digital Economy priorities but also suggests the need to diversify T&T talent development into emerging and cross-cutting fields such as Green Technologies, Creative Industries and Data Sciences. Qualification levels show a clear shift toward higher-level qualifications. The proportion of MQF Level 6 (degree) graduates increased from 35.4% in 2017 to 44.9% in 2023, while MQF Level 4 (diploma) holders declined from 41.4% to 35.3%. This trend signals an encouraging higher-level qualification among T&T graduates, though it also calls for the industry to better align job roles and salary expectations with qualification levels, particularly in addressing the issue of overqualification.

Institutionally, public universities remain the main engine of graduate output, consistently contributing over 50% of graduates by 2023. In contrast, the share of graduates from private institutions and community colleges has gradually declined, despite their historical importance in TVET provision.

Table 6.15: Distributions of graduate among MBOT's accredited programmes in institutions under MOHE, 2017-2023

Information	Category	2017	2018	2019	2020	2021	2022	2023
Convocation year	Total (N)	7,681	9,298	9,527	9,830	12,555	11,551	12,450
Accreditation status	Active	82.3	82.3	86.8	85.4	83.7	80.9	85.1
	Not Active/Others*	17.7	17.7	13.3	14.7	16.1	19.1	14.9
NEC	NEC 02	7.2	8.1	6.6	5.3	4.6	5.3	6.1
	NEC 03	0.0	0.0	0.0	0.0	0.0	1.7	0.0
	NEC 04	0.0	0.0	0.0	0.0	0.0	0.0	3.5
	NEC 05	47.7	44.3	39.5	44.6	48.6	4.1	5.4
	NEC 06	0.0	0.0	0.0	0.0	0.0	47.2	43.2
	NEC 07	36.4	37.3	41.1	41.5	36.2	34.6	33.8
	NEC 08	7.2	9.0	10.4	7.7	8.4	7.1	7.9
	NEC 09	0.0	0.0	0.0	0.4	0.4	0.0	0.0
	NEC 10	1.6	1.3	2.4	0.4	1.8	0.0	0.2
MQF	MQF Level 3	23.2	24.9	27.1	26.5	24.9	23.1	19.5
	MQF Level 4	41.4	41.2	36.8	35.7	39.2	38.4	35.3
	MQF Level 5	0.0	0.0	0.0	0.0	0.0	0.0	0.3
	MQF Level 6	35.4	33.9	36.1	37.8	35.9	38.5	44.9
Institution location	Johor	7.1	6.7	7.5	7.3	6.7	5.5	10.0
	Kedah	3.0	2.5	3.4	4.0	3.7	4.5	3.2
	Kelantan	11.1	12.5	10.7	7.9	7.6	7.7	8.2
	Melaka	16.0	13.7	12.3	14.5	17.0	13.6	12.2
	N.Sembilan	4.6	3.7	3.8	4.1	3.9	3.7	3.3
	Pahang	11.3	11.9	11.5	10.6	12.8	13.8	13.4
	Perak	8.3	7.3	10.0	11.9	10.4	10.3	10.7
	Perlis	7.5	6.7	5.4	4.0	4.9	6.3	6.2
	P. Pinang	1.4	1.9	2.4	2.7	1.8	2.0	1.6
	Sabah	4.7	5.8	6.1	5.6	5.4	3.9	5.0
	Sarawak	1.5	2.0	2.5	2.4	2.7	2.9	2.9
	Selangor	12.6	13.1	15.6	13.8	14.1	16.0	14.5
	Terengganu	1.9	4.9	3.8	7.5	5.4	5.4	3.5
	Kuala Lumpur	8.9	7.2	4.9	3.9	3.6	4.4	5.1
Institution type	Community college	23.5	25.3	27.4	26.8	24.9	23.5	19.9
	Polytechnic	9.3	11.6	16.2	12.8	12.6	10.3	12.3
	Public HEI	33.6	32.4	25.4	33.2	28.8	31.6	29.8
	MTUN	6.9	7.2	6.1	5.0	6.6	8.4	11.3
	Private HEI	26.7	23.4	24.7	22.0	26.9	25.7	26.6

Source: MBOT, MOHE, and MOE (2025)

Table 6.16 presents the profile of graduates from MBOT-accredited institutions under MOE, primarily from vocational colleges. Between 2018 and 2023, the total number of graduates declined substantially, from 7,132 in 2018 to just 2,865 in 2023. Nonetheless, the active accreditation rate remained consistently high, with over 97% of graduates from active MBOT-accredited programmes throughout the years.

Across field of study, vocational college graduates are heavily concentrated in engineering-related fields (NEC 07), accounting for over 80% in 2023, although this share has gradually declined from 96.4% in 2018. This has been partially offset by a notable increase in ICT-related fields (NEC 06), which grew from 2.7% in 2018 to 17.8% in 2023, signalling a structural shift toward digital skills development within vocational pathways. These graduates hold MQF Level 4 diplomas, highlighting the unique role of vocational colleges in producing mid-level technical talent. However, this standardisation also implies that opportunities for vertical mobility may be constrained without clear progression pathways or upskilling frameworks.

Table 6.16: Graduates information of MBOT's accredited programmes in vocational colleges under MOE

Information	Category	2018	2019	2020	2021	2022	2023
	Total (N)	7,132	6,959	6,444	6,042	5,423	2,865
Accreditation status	Active (%)	97.9	98.3	98.6	97.8	99.7	99.6
	Inactive	2.1	1.7	1.4	2.2	0.3	0.4
NEC	02	0.9	1.9	0.7	1.2	0.8	0.0
	06	2.7	3.1	2.9	8.0	9.6	17.8
	07	96.4	95.0	96.4	90.8	89.7	82.2
MQF	MQF Level 4 / Diploma	100.0	100.0	100.0	100.0	100.0	100.0
Institution location	Johor	12.2	10.7	11.7	11.6	13.3	11.1
	Kedah	6.5	6.9	5.6	5.7	6.8	7.8
	Kelantan	6.3	5.6	5.9	6.0	5.8	2.9
	Melaka	4.1	4.0	4.6	5.1	4.6	4.4
	N.Sembilan	6.3	6.1	5.8	6.1	6.6	7.0
	Pahang	8.7	8.8	8.6	7.0	8.0	9.3
	P. Pinang	11.5	12.1	12.6	11.9	8.1	9.2
	Perak	3.7	3.6	3.4	3.3	3.2	3.7
	Perlis	5.4	6.0	5.5	5.3	5.8	7.9
	Sabah	8.2	6.9	7.4	8.5	9.8	8.1
	Sarawak	8.5	8.5	9.0	8.9	8.9	7.8
	Selangor	8.5	11.1	9.7	11.9	10.7	16.2
	Terengganu	5.8	6.0	6.5	4.8	4.9	3.8
	KL	2.4	2.3	2.2	2.4	2.8	0.9
	Labuan	1.8	1.5	1.5	1.5	0.7	0.0

Source: MBOT, MOHE, and MOE (2025)

Employment outcome trends among graduates from MBOT-accredited institutions under MOHE and MOE

Subsequently, the analysis delved into employment outcome across the MBOT-accredited institutions. Figure 6.23 and Figure 6.24 provide a snapshot of graduate employment outcomes, covering employment status, job-field alignment, occupation type, and salary by institution. Graduates with working status are highest among the institutions under MOE, predominantly vocational colleges (85.5%), followed by polytechnics (77.7%) and community colleges (73.7%), while public HEIs (49%) and private HEIs (56.6%) lag behind. However, when examining field-of-study alignment (Figure 6.24), private HEIs stand out, with 73.2% of graduates working in jobs related to their field, compared to just 55.9% for public HEIs and the lowest recorded by polytechnics (39.8%).

Figure 6.23: Graduates with working status (overall)[203], by institution

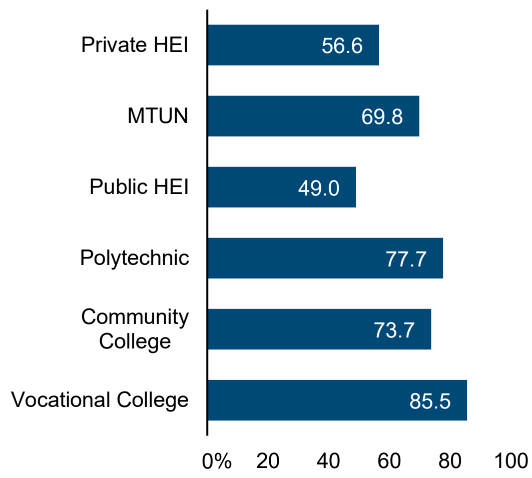
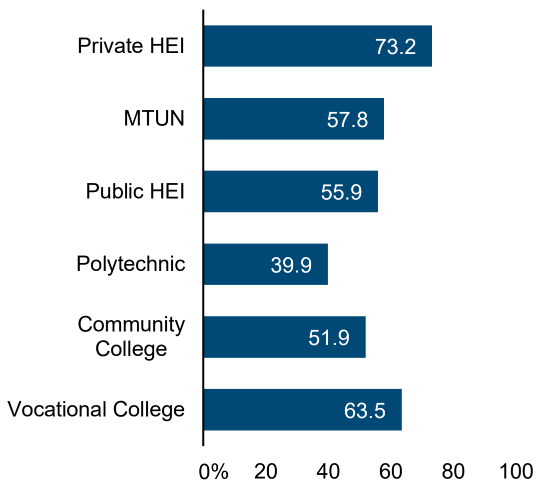


Figure 6.24: Graduates work in job related to field (overall), by institution



Source: MBOT, MOHE, and MOE (2025)
Note: Institutions under MOHR is excluded from the analysis

[203] Overall represents cumulative graduate data aggregated from the 2017 to 2023 cohorts, based on available records.

Occupational outcomes (Figure 6.25) further reveal that a significant share of graduates from public HEIs and private HEIs are in professional roles, while technical and semi-skilled roles dominate among vocational, community college and polytechnic graduates. Yet, this does not necessarily translate to better earnings for them.

As shown in Figure 6.26, a large proportion of graduates from vocational college, community college and polytechnic institutions earn below RM2,000, almost 90%, compared to only 33.8% among private HEIs graduates, 53.9 from MTUN and 54.6% from public HEIs. This persistent low wage, particularly in TVET institutions highlights structural issues in wage returns despite higher employment rates.

Figure 6.25: Working graduates by type of occupation (overall), by institution, 2017-2023

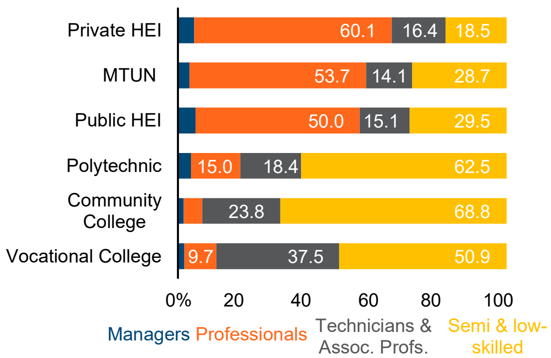
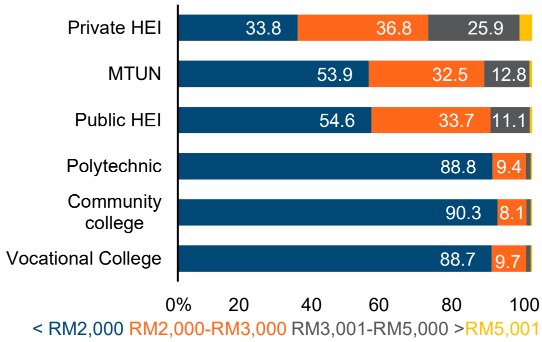


Figure 6.26: Working graduates by salary range (overall), by institution, 2017-2023



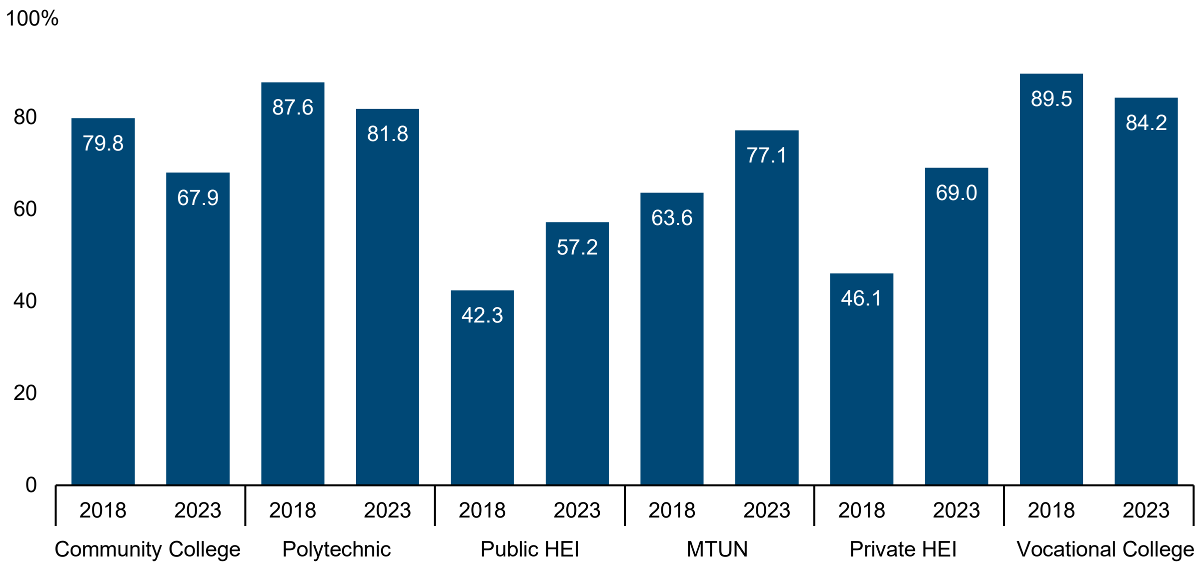
Source: MBOT, MOHE, and MOE (2025)
Note: Institutions under MOHR is excluded from the analysis

Progress of graduate employment outcomes from MBOT-accredited institutions under MOHE and MOE

Figure 6.27 presents the employment outcomes of graduates from MBOT-accredited institutions between 2018 and 2023. It revealed mixed progress across different institution types. Overall, the graduate working rate from vocational colleges declined slightly from 89.5% in 2018 to 84.2% in 2023, though it remained the highest among all institution types. Notably, polytechnics and community colleges experienced a decline in graduate employment, from 87.6% to 81.8% and from 79.8% to 67.9%, respectively. These trends may suggest growing challenges in job placement despite their vocational orientation.

Conversely, public HEIs saw an improvement in employment rates, rising from 42.3% in 2018 to 57.2% in 2023, while MTUN institutions recorded a similar increase from 63.6% to 77.1%. These gains may reflect improved curriculum relevance and stronger graduate support mechanisms. Strikingly, private HEIs figures show the highest growth from 46.1% to 69.0%.

Figure 6.27: Graduate with working status by MBOT-accredited institution type from MOHE and MOE, 2018 and 2023

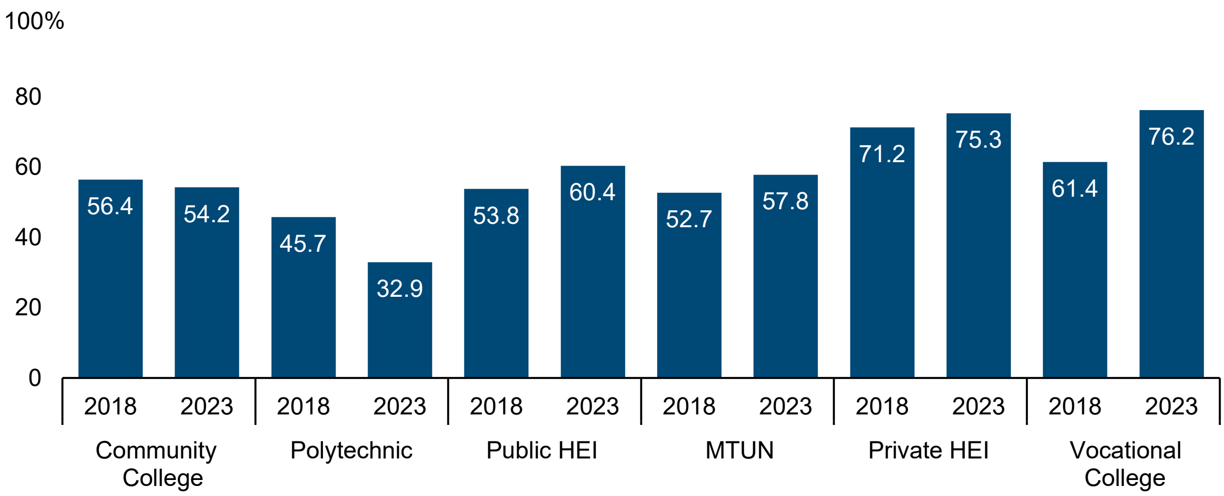


Source: MBOT, MOHE, and MOE (2025)
Note: Institutions under MOHR is excluded from the analysis

Between 2018 and 2023, the share of working graduates in jobs related to their field of study across MBOT-accredited institutions showed varied trends (Figure 6.28). Graduates from MOE institutions remained the most aligned, increasing from 61.4% in 2018 to 76.2% in 2023. Similarly, public HEIs and MTUN institutions recorded improvements, with public HEIs rising from 53.8% to 60.4%, and MTUN from 52.7% to 57.8%. These trends may reflect growing responsiveness to industry needs.

On the other hand, polytechnics and community colleges experienced a decline. The proportion of polytechnic graduates working in their field dropped significantly from 45.7% to 32.9%, while community colleges declined modestly from 56.4% to 54.2%. Private HEIs maintained the highest field-related employment rates, increasing from 71.2% in 2018 to 75.3% in 2023, showing an effective alignment between their offerings and market needs.

Figure 6.28: Working graduates with job related to field of study by MBOT-accredited institution type from MOHE and MOE, 2018 and 2023

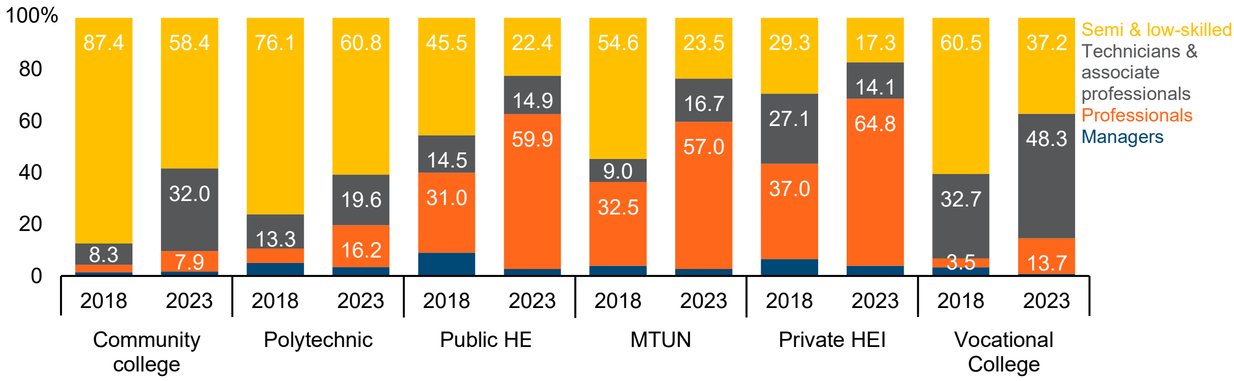


Source: MBOT, MOHE, and MOE (2025)
Note: Institutions under MOHR is excluded from the analysis

Figure 6.29 highlights the occupational profile of working graduates from MBOT-accredited institutions between 2018 and 2023. It reveals a significant shift towards more skilled employment, particularly in technician-level roles. Across most institution types, there was a marked decline in semi- and low-skilled employment. For example, graduates from community colleges in this category dropped sharply from 87.4% in 2018 to 58.4% in 2023, while polytechnic graduates saw a reduction from 76.1% to 60.8%. This trend suggests movement away from lower-skilled jobs, likely due to improved qualifications and better job matching.

At the same time, the share of graduates working as technicians and associate professionals increased substantially across community college, MTUN and Vocational College. However, the share of graduates entering professional and managerial roles remains modest. While there was some growth in polytechnics (professionals rose from 13.3% to 19.0%), managerial roles are still under 2% for most providers, suggesting limited upward mobility into higher occupational tiers which likely due to qualification ceilings.

Figure 6.29: Working graduates by type of occupation among MBOT-accredited institution type from MOHE and MOE, 2018 and 2023



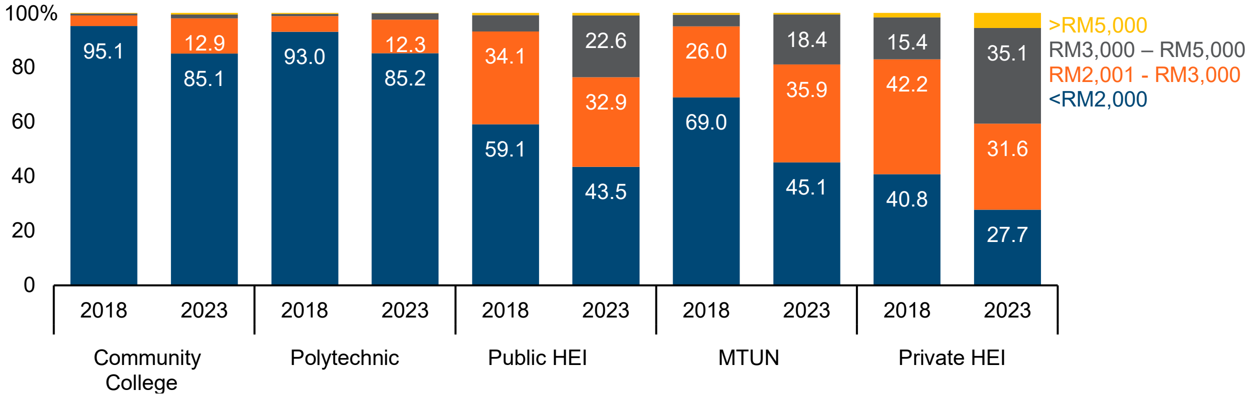
Source: MBOT, MOHE, and MOE (2025)
Note: Institutions under MOHR is excluded from the analysis

Between 2018 and 2023, salary outcomes for working graduates from MBOT-accredited institutions showed a clear upward shift, though the degree of improvement varied by institution type (Figure 6.30). Among public institutions, public HEI and MTUN saw the most notable improvements. For public HEI graduates, those earning above RM3,000 rose from 7% in 2018 to one-fourth in 2023, while those earning below RM2,000 dropped significantly from 59.1% to 43.5%. Similarly, MTUN graduates earning above RM3,000 increased from 1% to one-fifth, with a concurrent drop in low earners from 69.0% to 45.1%.

Private HEI graduates showed strong gains as well, with the share earnings above RM3,000 rising from 15% in 2018 to one-third in 2023. In contrast, community colleges and polytechnics showed only marginal improvement. The majority of their graduates still earn below RM2,000, with community colleges at 85.1% and polytechnics at 85.2% in 2023, only slightly improved from 2018 levels. This may reflect wage ceilings in vocational entry-level jobs or slower recognition of vocational qualifications in the labour market.

These findings arrive at a fundamental moment when the government, through the National TVET Council, has introduced a salary premium benchmark of RM2,500–RM4,000 for TVET graduates. This push is seen as a bold and commendable step to elevate the standing of technical and vocational talents. After years of substantial investments, reforms and rebranding efforts to position TVET as a viable alternative to academic pathways, this policy push signals serious intent to close the wage gap and boost TVET attractiveness. However, the data serve as a sobering reality check: the majority of TVET graduates, especially those from community colleges and polytechnics, remain trapped in low-wage segments. To make this salary premium push meaningful, it is important to avoid a one-size-fits-all approach and instead ensure that wage uplift mechanisms are inclusive of the diverse spectrum of TVET graduates, particularly those in mid- and low-skilled occupations and diploma holders. Without deliberate efforts to raise the wage floor for these groups, the promise of TVET as a pathway to upward mobility risks being confined to a privileged few.

Figure 6.30: Working graduates by salary range among MBOT-accredited institution type from MOHE and MOE, 2018 and 2023



Source: MBOT, MOHE, and MOE (2025)
Note: Institutions under MOHR is excluded from the analysis

FGD Findings 6.4: The role of academic accreditation in graduate employment outcomes

MBOT accreditation was seen as a quality assurance system for technical and vocational education, ensuring that programmes meet minimum standards and align with industry needs. The practical, hands-on nature of MBOT's approach was highlighted as a significant strength, especially for TVET programmes, which are more focused on application and industry-readiness. Besides, MBOT accreditation was widely seen as a pathway to increased employability especially due to MBOT's focus on practical competencies ensures that professionals are more industry-ready, especially in sectors requiring specialized knowledge.

"MBOT's hands-on approach makes it more relevant for technical courses compared to traditional academic routes." — Eli

However, this has also introduced documentation burdens for institutions, especially those unfamiliar with MBOT's evolving requirements.

"Challenge is in the documentation aspect… because MBOT accreditation is evidence-based. But, there is a checklist now, it is easier now." — Azura

Participants appreciated the introduction of tools such as checklists and clearer guidelines, which have made recent accreditation cycles more manageable. Nevertheless, they emphasized the importance of gradual implementation to allow institutions to adapt, particularly in light of recent policy shifts. A point of strong concern was the abrupt enforcement of new accreditation requirements in 2024, particularly the mandatory presence of Ts.-recognised lecturers in programmes. Institutions that had long-standing programmes were caught off guard by this change, leading to stalled accreditations and potential negative impacts on student progression.

"Should give grace period of at least a year when any updates to the accreditation criteria is made." — Aneetha

Participants strongly advocated for MBOT to work more closely with ministries, particularly the Ministry of Higher Education, Ministry of Human Resources and public service bodies like the Public Service Department (JPA). By integrating MBOT recognition into civil service job grading, academic hiring criteria and national training schemes, MBOT's relevance can be significantly enhanced.

In addition, many participants highlighted that MBOT provides a more structured and clearer framework for programme accreditation. They appreciated the well-defined instruments and guidelines offered by MBOT through TTAC, which made it easier for institutions to prepare evidence and fulfil requirements for emerging technologies and engineering technology programmes, offering broader accreditation beyond conventional engineering degrees.

"MBOT has given opportunities to all, technology-based programmes and also engineering technology programmes" — Rama

"MBOT's hands-on approach makes it more relevant for technical courses compared to traditional academic routes." — Eli

"MBOT accredited graduates are more aligned with industry requirements, especially in terms of practical skills." — Azhar

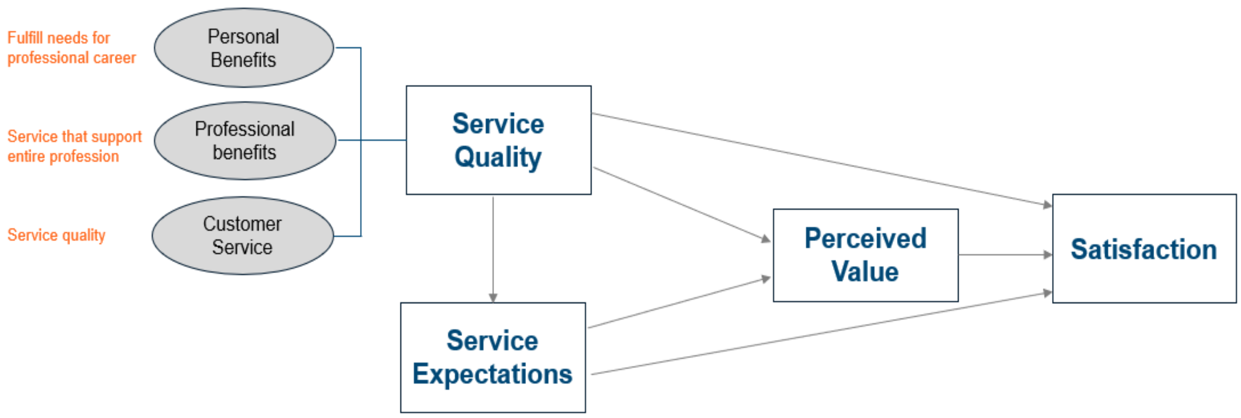
"Because of MBOT accreditation, MBOT has guided us at vocational colleges to meet the standards that we should be at." — Azura

6.5 Members' Perception of MBOT through a Satisfaction-Based Evaluation

Building on the preceding section's on examining career pathways and labour market outcomes of MBOT's members, the next part of the analysis shifts focuses to a structured assessment of how members perceive the value and performance of the recognition they receive. This segment adopts a member-centric approach, exploring into their experiences with MBOT's services, expectations alignment and overall satisfaction.

To systematically evaluate satisfaction, the study developed a Member Satisfaction Index (MSI) adapted from the internationally recognised American Customer Satisfaction Index (ACSI) model[204]. This adaptation is to reflect MBOT's unique institutional role as a professional certifying and accrediting body. The modified model captures three dimensions of assessing member experience: Service Quality (cover personal, professional and customer support benefits), Service Expectations, and Perceived Value. The framework (Figure 6.31) demonstrated the influence of independent elements on satisfaction score.

Figure 6.31: MSI framework



The analytical approach applied in this section integrates a psychometric modelling using Partial Least Squares Structural Equation Modelling (PLS-SEM)[205]. Survey data were collected through a 6-point Likert scale, intentionally chosen to avoid neutral responses and encourage definitive opinions. SEM accounts for latent constructs and the complex interrelations between them, while also generating self-weighted satisfaction scores based on the empirical strength of relationships observed in the data. Through this design, the analysis would go beyond surface-level satisfaction ratings and provide a statistically valid measure of how MBOT is performing in the eyes of its members. This evidence-based perspective provides a foundation for assessing not just individual perceptions, but the institutional effectiveness that focus on services and recognition mechanisms. Detail of the methodology utilised can be found in Appendix B.

[204] Fornell et al. (1996)
[205] PLS-SEM is a statistical technique used to estimate complex cause-effect relationships between latent variables. It is useful when the research focuses on prediction, theory development and when the data is non-normal or sample size is limited. In the context of this study, the PLS is utilised to estimate the strength and significance of relationships between multi-dimensional satisfaction constructs. In addition, the method allows for predictive insights and weighting procedure in the satisfaction index despite the complex model structure and diverse respondent background.

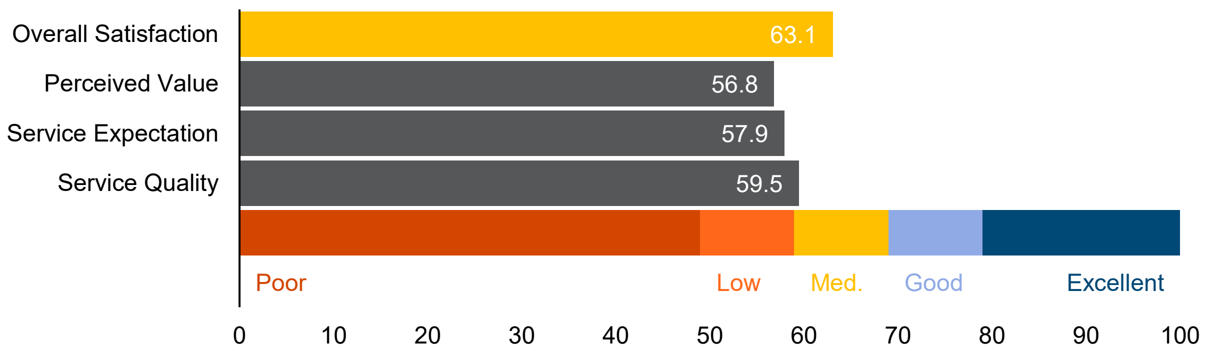
6.5.1. Benchmarking Member Satisfaction Across Key Service Dimensions

Our evaluation begins with member's satisfaction score for all the four dimensions as discussed in our satisfaction framework in Figure 6.31 above. Each score from the four dimensions derived from weighted average items for each dimension. This score provides a consolidated benchmark of how members perceive MBOT's services and recognition framework.

The overall satisfaction index reveals a moderately strong satisfaction score of 63.1 out of 100, where the index is within the "medium" to "good" performance band. The score indicates that while members generally view MBOT's services and recognition mechanisms positively, there remains some area for improvement.

The scores for Service Expectations (57.9), Service Quality (59.5) and Perceived Value (58.8) show consist of score but remain below the overall satisfaction threshold. Hence, while MBOT's recognition is acknowledged, there is room to enhance its member proposition through more personalised support, professional benefits and clearer signalling to employers—areas that will be examined in detail in the following section.

Figure 6.32: Member's satisfaction score



The next analysis unpacks the overall satisfaction index and tracing how that headline figure shifts across member demographics. Afterward, the analysis probe variations by detailed technology fields. For every subsequent satisfaction dimension—Service Expectations, Service Quality and Perceived Value—we keep the spotlight on recognition status because that credential is MBOT's primary lever for member value creation.

Overall satisfaction scores vary across career stages and demographics

When disaggregated by recognition status, satisfaction scores show moderate variation across groups (Table 6.17). Professional Technologists and Certified Technicians reported the highest satisfaction levels at 64.9, followed closely by Qualified Technicians at 63.5. In contrast, Graduate Technologists recorded a comparatively lower satisfaction score of 61.4. This suggest that early-career members may experience uncertainty or have unmet expectations in their engagement with MBOT. These patterns raise important questions about how recognition translates into perceived value at different stages of professional development. These elements will be unpacked in the next subsection.

Table 6.17: Satisfaction scores by demographic characteristics

Demographic	Detail	Ts.	GT	Tc.	QT
Overall		64.7	61.0	65.1	62.7
Gender	Male	64.5	60.9	65.0	62.2
	Female	65.2	61.2	65.4	65.7
Ethnicity	Malay/Bumiputera	65.6	61.3	65.2	62.8
	Chinese	62.0	54.1	74.1	58.3
	Indian	62.7	67.5	60.2	51.1
	Other	52.2	55.5	43.5	83.3
Highest education qualification	Postgraduate Qualification	64.7	62.4	67.9	62.5
	Undergraduate & Advanced Diploma	64.7	60.2	59.7	62.1
	Diploma & SKM Level 3	62.5	61.1	65.9	62.9
Education institution	Public HEI	65.6	60.9	65.1	62.4
	Private HEI	65.0	63.7	66.0	63.7
	Foreign Education Institution (Local Branch)	70.5	63.8	52.3	68.8
	Foreign Education Institution (Overseas)	57.6	54.3	65.7	41.6
Employment status	Full-time Permanent	65.1	61.3	65.3	63.6
	Full-time Contract	63.3	59.2	66.0	54.6
	Part-time Permanent	55.3	73.6	53.0	-
	Part-time Contract	52.4	50.0	51.5	83.3
Occupation	Managers	62.1	64.3	57.2	74.1
	Professionals	64.9	59.8	66.1	60.8
	Technicians & Assoc. Professional	66.8	65.5	66.5	61.0
	Semi-skilled & Low-skilled Occupations	65.7	40.4	63.2	72.1
Technology field	Applied	62.6	60.8	65.2	63.7
	IT-based	62.8	63.1	65.9	65.9
	Industrial-based	65.4	60.6	64.9	62.3
	SCT	66.0	60.4	68.3	61.0
Monthly salary	Below RM3,000	51.7	72.6	65.4	61.6
	RM3,000 - RM4,999	65.7	59.8	64.3	62.4
	RM5,000 - RM9,999	65.5	60.5	65.6	62.8
	RM10,000 and above	63.8	60.7	65.8	68.5

Beyond recognition categories, satisfaction levels highlight meaningful variation across demographic and employment profiles. This variation could offer insight into where MBOT's recognition resonates most and where it falls short. Gender-wise, male members generally reported higher satisfaction than females across all categories, with the gap most visible among Professional Technologists (64.5 for males vs. 62.5 for females). This points to possible differences in how male and female professionals experience support or value recognition in their career pathways.

Ethnicity also shapes perceptions. Malay/Bumiputera, the largest demographic group, satisfaction scores are consistently stable across all recognition categories, ranging from 61.3 (Graduate Technologists) to 65.6 (Professional Technologists). Interestingly, Chinese members report the highest satisfaction score: 74.1 among Certified Technicians, which may indicate a strong perceived value of recognition in that segment. However, their satisfaction drops significantly in other categories, especially among Graduate Technologists (54.1) and Qualified Technicians (58.3), which may point to weaker recognition payoff at earlier or lower rungs of the professional ladder. Indian members show a more mixed pattern. While Graduate Technologists reported a relatively high satisfaction score (67.5), Qualified Technicians recorded one of the lowest scores overall (51.1), which also raises questions about perceived recognition value in more junior or technician-level roles.

Members with postgraduate qualifications reported consistently high satisfaction, especially among Certified Technicians (67.9), suggesting that recognition may be more valued by those with advanced credentials. Those with Diploma or SKM Level 3 qualifications also reported strong satisfaction in the Certified Technician category (65.9), though their scores were more moderate in other groups. Meanwhile, members holding undergraduate or advanced diploma qualifications displayed more variability, with notably lower satisfaction among Certified Technicians (59.7), possibly due to a perceived gap between expectations and the actual career benefits derived from recognition.

By type of educational institution, the findings indicate relatively stable satisfaction score among members from public HEI and private HEI, within the range of 63 to 66 across most recognition categories. This trend potentially suggests that MBOT recognition is better aligned with local institutional credentials. Interestingly, respondents from local branches of foreign institutions recorded the highest satisfaction among Professional Technologists (70.5), but significantly lower satisfaction among Certified Technicians (52.3), pointing to inconsistencies in how recognition translates across fields. In contrast, members who graduated from overseas institutions displayed consistently lower satisfaction, especially among Qualified Technicians (41.6), likely reflecting a weaker fit between MBOT's recognition framework and foreign qualifications.

Across member's employment status, the full-time permanent employees reported the highest and most consistent satisfaction scores across all recognition categories, with a peak of 65.3 among Certified Technicians. Contract workers, both full-time and part-time, reported more varied scores, with full-time contract workers showing slightly lower satisfaction overall. Remarkably, part-time permanent employees recorded an unusually high score of 73.6 among Graduate Technologists, possibly reflecting the flexibility and career development value associated with their recognition. In contrast, part-time contract workers showed one of the most extreme patterns, where it records the highest single score across (83.3 among Qualified Technicians), but much lower satisfaction in other categories, indicating that their experiences with recognition are likely shaped by niche contexts or exceptional cases.

In terms of occupational roles, the technicians and associate professionals, the MBOT's core constituency, show a consistent high satisfaction across all recognition categories, especially among Professional Technologists (66.8) and Certified Technicians (66.5). This trend may suggest strong alignment between certification and professional identity. Managers and professionals displayed more mixed perceptions, with relatively lower scores among Certified Technicians (57.2) and Graduate Technologists (59.8). Interestingly, semi-skilled and low-skilled workers recorded the lowest satisfaction among Graduate Technologists (40.4), yet a surprisingly high score of 72.1 among Qualified Technicians, indicating potential mismatches in recognition value for underutilised talent in non-core roles.

Across the four broad technology fields, SCT-related fields recorded the highest overall satisfaction, peaking at 68.3 among Certified Technicians, which may reflect growing recognition of green and socially responsible sectors. Industrial-based and IT-based fields also showed moderately high scores, with most are clustering between 60 and 66. Applied Technology fields, however, reported slightly lower scores, particularly among Graduate Technologists (60.8), which may suggest either under-recognition or weaker linkages to career progression in these segments.

Satisfaction generally rises with income, though not always linearly. Members earning RM5,000–RM9,999 consistently reported the most balanced satisfaction levels across categories (e.g. 66.2 for Qualified Technicians), highlighting the idea that MBOT recognition aligns well with mid-level career stages. Those earning below RM3,000, by contrast, report lower satisfaction (e.g. 51.7 among Professional Technologists), pointing to unmet expectations or weak wage returns from certification. Interestingly, even the highest earners (RM10,000 and above) express relatively high satisfaction, particularly among Qualified Technicians (68.5). These scores may suggest that at senior levels, recognition may complement (rather than drive) professional success.

The satisfaction landscape across MBOT members is far from uniform. It reveals how recognition is experienced differently depending on one's career stage, education background, institution type, employment status, occupation and income level. While mid-career professionals and those in core technical roles report high alignment with MBOT's certification value, others (particularly early-career graduates, overseas-trained individuals and those in less secure or lower-tier roles) show more inconsistency or even disconnection. These early findings highlight the importance of tailoring recognition strategies to member realities, not just in terms of services provided but in how recognition is positioned, supported and linked to actual labour market mobility. More interestingly, they raise deeper questions about whether recognition leads to different employment pathways or outcomes across groups.

To further unpack the overall satisfaction patterns observed across broad technology fields, the analysis extends into the 24 detailed technology fields that form the basis of MBOT's recognition categories (Figure 6.33). This disaggregated view allows us to explore how satisfaction scores vary within and across the four broad clusters, i.e. Applied, IT-based, Industrial-based and SCT. For instance, fields such as Information and Communication Technology, Building and Construction and Green Technology represent substantial proportions of MBOT may contribute meaningful insights into how recognition translates into value within their respective fields.

The largest represented fields of MBOT's members, among the Information and Communication Technology (IT), shows consistently high satisfaction among Professional and Certified Technicians, affirming its strong alignment between recognition and real-world career mobility. This trend highlights MBOT's traction in digital-related sectors that aligned with broader national agendas[206]. Similarly, fields like Chemical Technology and Green Technology demonstrate above-average satisfaction among Certified Technicians, with Green Technology peaking at 68.3.

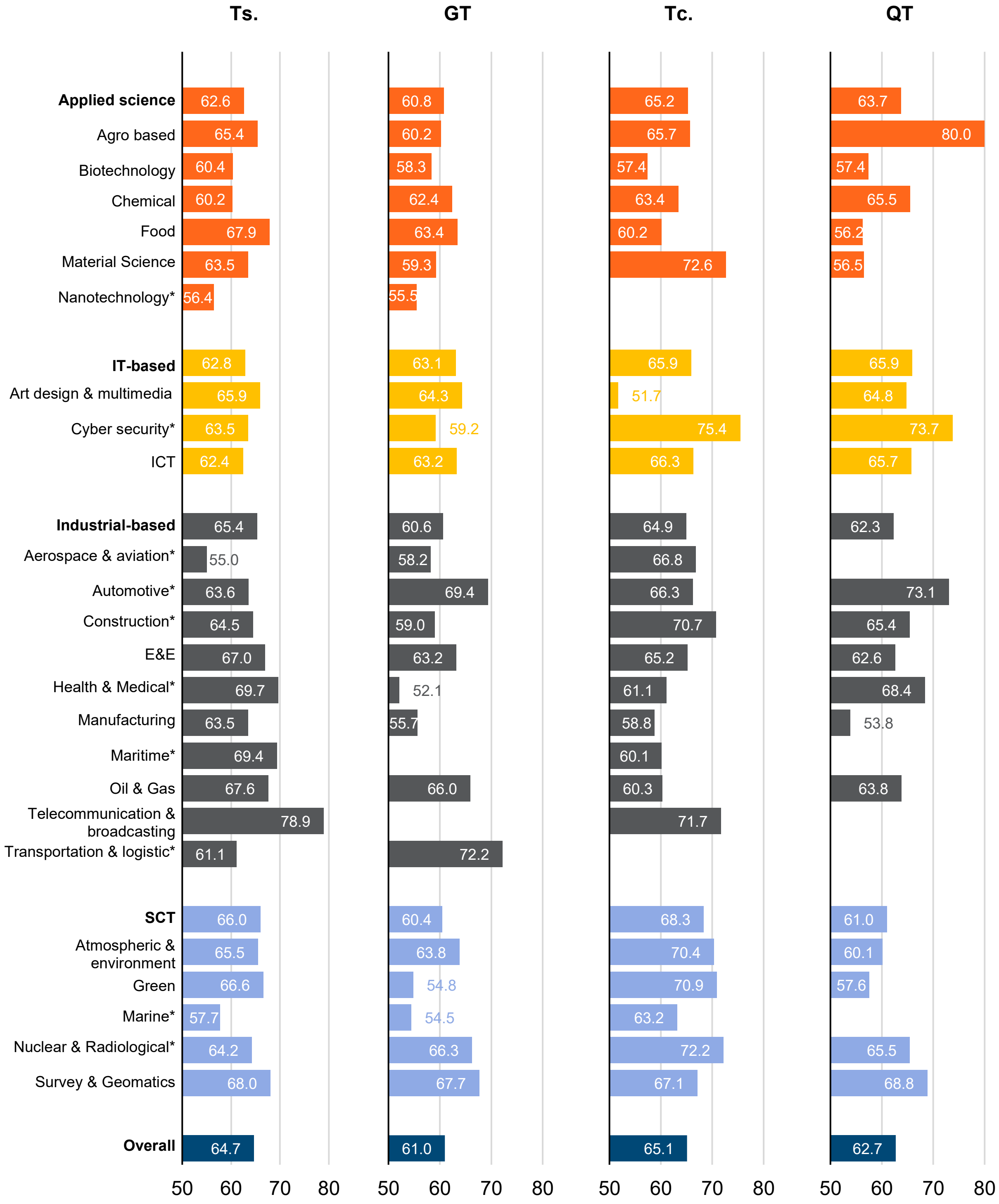
In contrast, several engineering-related fields such as Electrical & Electronics and Automotive Technology report relatively low satisfaction among Graduate Technologists, where it potentially points to mismatches between early-career certification and industry uptake. This trend suggests that in traditionally employer-driven fields, recognition may not yet function as a strong hiring or advancement signal, one area where MBOT may need to improve articulation of certification value within existing industry frameworks.

[206] For example, the MyDIGITAL initiative, introduced in 2021, outlines Malaysia's aspiration to become a digitally driven, high-income nation by 2030. It aims to create 500,000 new jobs, attract RM70 billion in digital investment, and ensure that the rakyat and businesses alike can thrive in a digital economy. Central to MyDIGITAL is the development of a future-ready digital workforce, which resonates strongly with the emphasis on professional mobility, skills recognition and certification as tools for navigating industrial transitions. In addition, the Malaysia Digital (MD) initiative, launched in 2022 by MDEC, serves as the successor to the Multimedia Super Corridor (MSC) and reflects a more agile approach to growing the digital ecosystem. MD focuses on sector-based catalytic projects, digital trade and talent development via DE Rantau (digital nomad programme), Digital Tech Apprenticeships and targeted reskilling. These are efforts that reinforce the need for professional recognition in digitally intensive roles.

Meanwhile, in more specialised or underdeveloped fields like Marine Technology, Transportation & Logistics, and Nuclear & Radiological Technology, overall satisfaction is fragmented. While small sample sizes may contribute, the low-to-moderate ratings (especially at the Graduate and Qualified Technicians levels) signal the need for targeted industry engagement, clearer certification-to-career pathways, or even re-evaluation of relevance in these segments.

These findings reaffirm that the impact of professional recognition is not one-size-fits-all. It varies by industry, career stage and how well certification aligns with actual hiring and advancement norms in the labour market. To stay relevant and impactful, MBOT must strengthen its value proposition in fast-growing sectors like digital and green technology, while also working to close the recognition gap in more traditional or specialised fields where certification is still peripheral to industry practices.

Figure 6.33: Satisfaction levels by technology field[207]



[207] Field category marked * consists of fewer than 30 respondents. Results should therefore be interpreted with caution, as smaller sample sizes are subject to greater sampling variability and may limit broader generalisation. Nonetheless, the findings remain reflective of the views expressed by respondents within this group

Each item under the overall satisfaction score captures an interrelated aspect of members' experience with MBOT. In addition, the items offer a balanced lens into both the experiential and outcome dimensions that shape overall satisfaction. First, Overall Experience measures the quality and professionalism of interactions across services, reflecting how well MBOT delivers its functions from the user's perspective. Second, Overall Expectations gauges whether the benefits members anticipated, such as career progression, industry recognition, or service support—align with what they actually received. Third, Membership Renewal serves as a proxy for members' willingness to maintain their affiliation based on expected future benefits. Fourth, Objectives Fulfilment assesses whether MBOT recognition has helped members achieve professional goals, such as job mobility, wage improvement, or skill enhancement. Lastly, Membership Recognition captures how strongly members feel that their status with MBOT enhances their professional identity and credibility in the labour market.

Figure 6.34 presents that all five items fall within the medium range (60–70), indicating stable but suboptimal performance. Membership Renewal (65.8) and Recognition (63.7) score highest, suggesting strong retention and moderate signalling value, while Overall Experience (63.0) and Expectations (62.0) reflect adequate but unexceptional service alignment. The lowest, Objectives Fulfilment (61.0), raises concern that highlight weak perceived returns on certification. The implication is clear: while the system is stable, it is not yet fully optimised. A sharpened focus on outcomes (particularly for career and wage impact) will be an important aspect if MBOT is to transition from maintaining members to meaningfully uplifting them.

Table 6.18 reveals important variation in satisfaction sub-scores across recognition categories. While overall satisfaction scores are similar for Professional Technologist and Certified Technicians (64.9), Graduate Technologist members consistently trail behind across all dimensions, suggesting a structural gap in the recognition journey for early-career members. The most pronounced divergence appears in Membership Renewal, with Professional Technologist scoring 69.8, just shy of the good standing, compared to 62.8 for Graduate Technologist. This highlights a mid-career professionals are more likely to perceive tangible value in sustaining their MBOT status, while entry-level members may struggle to justify ongoing affiliation. Thus, it raises questions about whether the early-stage recognition experience adequately communicates long-term professional returns to members of MBOT.

Figure 6.34: Item scores under the Overall Satisfaction dimension

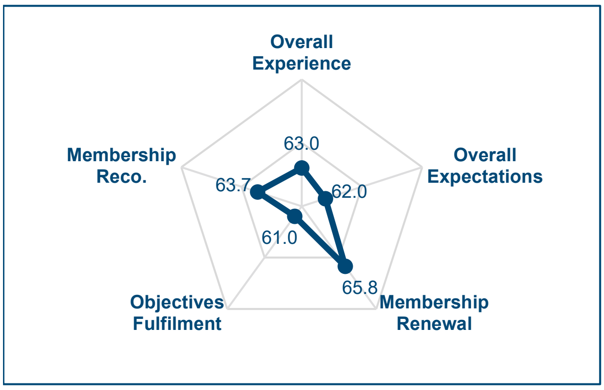


Table 6.18: Item scores under the Overall Satisfaction dimension, by recognition status

Item	Ts.	GT	Tc.	QT
Satisfaction	64.9	61.4	64.9	63.5
Overall experience	64.7	61.7	64.9	62.4
Overall expectations	62.7	60.8	63.8	63.4
Membership renewal	69.8	62.8	67.3	64.7
Objectives fulfilment	61.5	60.1	63.3	61.6
Membership recognition	65.5	61.6	65.4	65.1

FGD Findings 6.5: Uneven satisfaction score that reflects awareness and early-career disengagement

The member satisfaction paints a clear picture: Graduate Technologists, who represent the entry point into MBOT's professional pathway, consistently reported the lowest satisfaction across all dimensions. Their scores in areas such as Perceived Value, Service Expectations and Personal Benefits were notably lower than those of Certified or Professional Technologists.

The FGD reveals why this might happen. A systemic gap in formal entry pathways, fragmented awareness efforts and insufficient institutional signalling leave these members feeling adrift in the recognition journey.

The entry point into professional recognition pathways, notably MBOT's Professional Technologist and Certified Technician titles, is largely informal and decentralised. Rather than being introduced through structured national campaigns or employer-led initiatives, most individuals learn about professional recognition via peer networks, word-of-mouth recommendations, or workplace mentors. This highlights both the strength and weakness of the current system: while personal endorsements provide credibility and trust, the lack of formal channels limits reach and consistency. In academic institutions and government-linked agencies, the uptake is slightly more structured, supported by internal advocates and accreditation needs. Early adopters who visibly use professional titles also play a role in normalising recognition within their ecosystems.

"I saw a lecturer with the Ts. title and searched the background of MBOT." — Solomon

In contrast, digital platforms such as LinkedIn are emerging as alternative awareness sources, particularly among younger professionals and those outside traditional academic pathways.

"I found out through LinkedIn." — Ziha

However, reliance on organic and incidental discovery has resulted in a fragmented awareness landscape, where knowledge about the process, requirements and benefits of professional recognition remains shallow and unevenly distributed.

The FGD also reveals that awareness of professional recognition varies significantly across sectors. Within academia and certain government-linked institutions, professional titles are more familiar, often due to their role in fulfilling accreditation or promotion requirements. In contrast, in many private sector companies—especially SMEs and non-technical industries—awareness remains low. Many employers and HR departments are unfamiliar with titles like "Ts." and "Tc.," sometimes mistaking them for unrelated honorifics.

This sectoral disparity highlights a critical need for broader industry engagement and targeted awareness campaigns to promote professional recognition as a standard benchmark for technical and technology-based roles.

6.5.2. Members' Perceived Value: How Members Weigh Benefits Against Costs

Perceived value captures how members assess the returns they receive from MBOT membership in relation to the fees paid and the professional opportunities provided. The average composite score for this dimension is modest at 56.8, reflecting mixed sentiments across its four constituent items: Overall Value Compared to Fees, Value for Money, Opportunities Provided by MBOT and Impact on Professional Prospects (Figure 6.35).

Among these items, members gave the highest average rating to Opportunities Provided by MBOT (58.5), closely followed by Impact on Professional Prospects (57.6). These two items point to the link between stronger role in access to career-enabling platforms and in signalling professional recognition. However, perceptions were less favourable on cost-related aspects: Value for Money scored lowest at 55.4 and Overall Value Compared to Fees slightly higher at 55.9. These findings point to concerns over whether the benefits of membership are sufficiently visible or tangible relative to financial commitments.

Differences by recognition status offer further insight (Table 6.19). Certified Technicians and Qualified Technicians (reported higher levels of perceived value (59.1 and 59.2, respectively), especially in terms of the professional impact and opportunities gained—both scoring above 60. In contrast, Graduate Technologists and Professional Technologists scored consistently lower across all items, particularly on Value for Money (54.8 and 55.1, respectively). These patterns may suggest a segmentation in perceived returns, where more senior or vocationally integrated members tend to experience greater alignment between MBOT's offerings and their career stage or needs.

Such divergence implies a need to refine value communication strategies and possibly tailor services more explicitly across recognition categories, especially for early-career or transitioning technologists. Making the link between membership fees and practical, career-relevant benefits clearer may be critical in building sustained engagement.

Figure 6.35: Item scores under the Perceived Value dimension

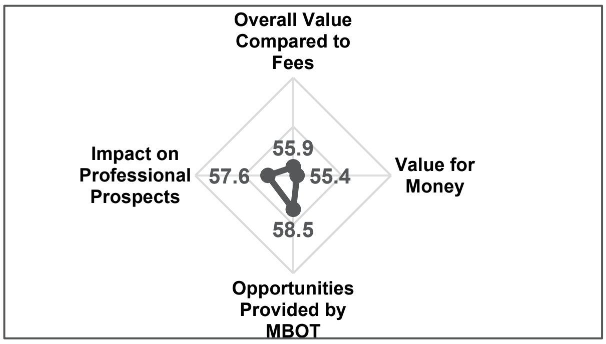


Table 6.19: Item scores under the Perceived value dimension, by recognition status

Item	Ts.	GT	Tc.	QT
Perceived Value	56.7	56.0	59.1	59.2
Overall Value Compared to Fees	56.2	54.9	58.6	57.3
Value for Money	55.1	54.8	56.4	57.9
Opportunities Provided by MBOT	58.3	57.9	60.9	60.2
Impact on Professional Prospects	57.4	56.4	60.3	61.4

FGD Findings 6.6: Disparities in recognition and value perception

Recognition through professional titles has a demonstrable impact on career progression, though the benefits are uneven across sectors. Certified professionals report enhanced mobility, increased visibility in promotion exercises and greater access to leadership roles.

"Whoever has Ts. or Tc., we increase their salary because it adds market value." — Kahirol

In academia and certain government-linked institutions, professional certification is increasingly tied to staff development pathways and accreditation requirements.

"Universities require 30% of staff to be professionally registered. MBOT can help achieve that." — Eli

For private sector professionals, particularly in industries with less structured human capital frameworks, the benefits are less systematic but still evident during recruitment and promotion processes.

"If you interview candidates and someone has Ts. or Tc., we tend to choose them." — Izzat

Despite these positive outcomes, the lack of universal policy mandates results in inconsistent returns on investment for professionals. Without broader adoption and formal employer incentives, the career advancement value of professional recognition remains largely dependent on organizational culture and sectoral norms.

6.5.3. Gaps Between Member Expectations, Service Delivery and Communication

The Service Expectation dimension captures how well MBOT deliver its service promises, communicates its benefits and responds to members' needs. With an average score of 57.4, this dimension reflects moderate satisfaction, with members offering differentiated views on specific service areas (Figure 6.36).

Among the four items assessed, Efforts to Improve Services received the highest average score (58.9), followed closely by Communicating Services and Benefits (58.6). These findings suggest members are starting to recognise MBOT's proactive steps in enhancing its offerings and ensuring information is shared more effectively. However, concerns remain on two fronts: Addressing Needs and Concerns (56.7) and Fulfilling Commitments and Services (57.4) where both scoring on the lower end of the scale. This reflects a perceived shortfall in how MBOT responds to feedback and follow through on service promises, which may undermine trust and long-term engagement.

Differences by recognition status is depicted in Table 6.20. Qualified Technicians and Certified Technicians reported the highest overall expectations score (60.8 and 60.2, respectively), particularly on communication effectiveness and service improvements—where scores consistently exceeded 61. In contrast, Graduate Technologists reported the lowest average score at 56.6, hinted potential disengagement or unmet expectations among early-career members.

Lower scores in responsiveness-related items, particularly among Graduate and Professional Technologists indicate the need to establish stronger two-way communication mechanisms and timely service delivery benchmarks. Better alignment between member expectations and institutional responsiveness could serve as a basis for building credibility and long-term membership value.

Figure 6.36: Item scores under the Service Expectation dimension

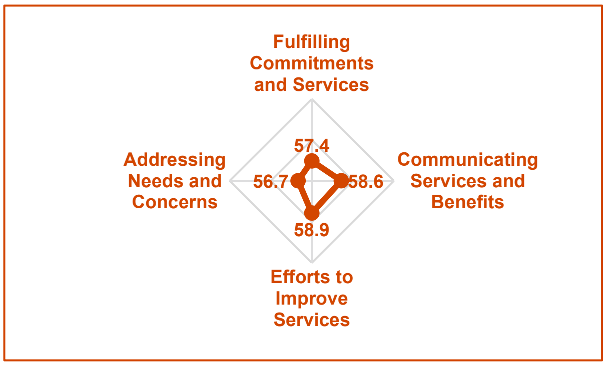


Table 6.20: Item scores under the Service Expectation dimension, by recognition status

Item	Ts.	GT	Tc.	QT
Expectations	**58.3**	**56.6**	**60.2**	**60.8**
Fulfilling commitments and services	57.7	56.2	59.2	60.7
Communicating services and benefits	58.5	57.5	61.2	61.8
Efforts to improve services	59.9	57.1	61.6	61.7
Addressing needs and concerns	57.0	55.5	58.9	59.0

6.5.4. Service Quality Assessment Reveals Uneven Member Experiences

Service quality is a key aspect in measuring member satisfaction as it reflects how well MBOT delivers its core functions and interacts with members. Rather than treating it as a single and broad construct, this study adopts a more granular approach by disaggregating service quality into three distinct but interrelated subdimensions: Personal Benefits, Professional Benefits and Customer Service Satisfaction[208]. This breakdown recognises that members experience MBOT's services in diverse ways, which are not only through administrative support and communication, but also in how recognition impacts their individual development and the broader standing of their profession. Each subdimension captures a specific facet of service delivery:

1. **Personal Benefits** refer to the tangible and intangible gains received for growth such as certification credibility, career mobility and access to professional opportunities.
2. **Professional Benefits** reflect MBOT's role in shaping and uplifting the wider professional ecosystem through standard-setting, influence in policymaking and support for the education-to-career pipeline.
3. **Customer Service** Satisfaction captures the day-to-day service experience, including responsiveness, staff competency and ease of interaction with MBOT's support channels.

[208] The construction of the three subcomponents under Service Quality (Personal Benefits, Professional Benefits and Customer Service Satisfaction) draws on conceptual elements from both membership value literature, including symbolic and tangible benefits and association performance frameworks relating to member support and organisational service delivery as discussed by Markova et al. (2013) and Ki and Wang (2016)

Personal benefits gain beyond recognition

All items under this subdimension fall within the low satisfaction range (50–60), with Networking Opportunities (59.5) and Professional Development Offerings (58.7) scoring the highest (Figure 6.37). However, no item crosses the medium threshold, indicating that individual-level value delivery is not yet meeting member expectations at scale. The most critical areas include access to updated industry information (57.4) and certification relevance (57.5), which both are fundamental pillars of MBOT's membership promise. Table 6.21 shows that Certified Technicians and Qualified Technicians perceived stronger benefits (60.2 and 60.8, respectively), especially around Credentialing, Leadership Experience and Networking. On the other hand, Graduate Technologists scored below 58 across most items. This finding may suggest that a more targeted interventions may be required to address their early-career development needs.

In addition, the low scores across personal benefit items highlight a disconnect between the current recognition experience and members' expectations for timely support in career advancement. This signals an opportunity for MBOT to reposition its value proposition, not only as a certifying body, but as a proactive enabler of individual growth through active credentialing, structured career pathways and more personalised member engagement.

Figure 6.37: Item scores under the Personal Benefit dimension

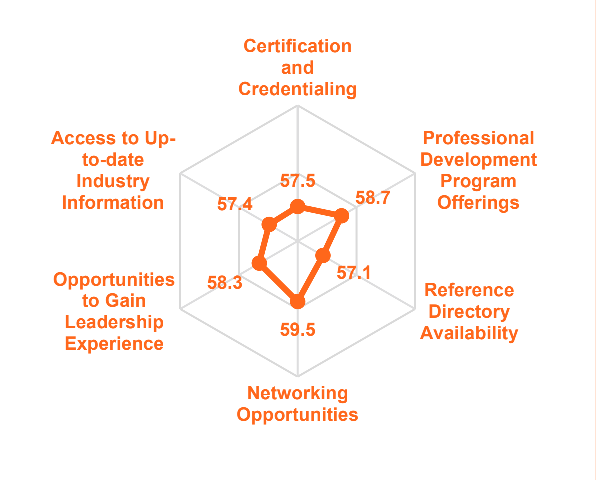


Table 6.21: Item scores under the Personal Benefit dimension, by recognition status

Item	Ts.	GT	Tc.	QT
Personal Benefit	**58.0**	**57.2**	**60.2**	**60.8**
Certification and credentialing	57.2	56.7	59.9	60.8
Professional development programme offerings	59.2	57.9	60.0	60.2
Reference directory availability	57.1	56.2	59.0	60.0
Networking opportunities	59.2	58.9	62.0	61.4
Opportunities to gain leadership experience	57.9	57.6	60.1	61.4
Access to up-to-date industry information	57.4	56.3	59.9	60.9

Professional benefits: Supporting the ecosystem

The Professional Benefits subdimension is presented in Figure 6.38. The most valued components were Defining Field Standards (61.1), Promoting Awareness of the Field (60.0), and Supporting Student Education (60.1), which all reflects to MBOT's wider ecosystem-building mandate. This dimension highlights that members do see the institution playing a credible role in shaping the profession and influencing education and public discourse.

Again, Certified and Qualified Technicians rated these items most favourably, often above 61, particularly for Certification, Policy Influence, and Promoting Awareness. In contrast, Graduate Technologists gave lower scores (mostly below 59), implying a gap between MBOT's broader professional efforts and the experiences or expectations of newer members (Table 6.22).

Figure 6.38: Item scores under the Professional Benefit dimension

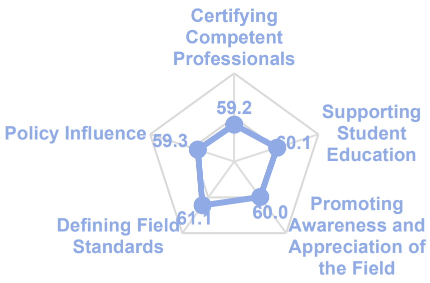


Table 6.22: Item scores under the Professional Benefit dimension, by recognition status

Item	Ts.	GT	Tc.	QT
Professional Benefit	59.8	58.4	61.4	61.9
Certifying competent professionals	59.1	58.3	61.5	62.0
Supporting student education	60.5	59.1	62.3	61.8
Promoting awareness and appreciation of the field	60.8	58.4	62.0	62.2
Defining field standards	61.4	59.9	62.9	64.1
Policy influence	59.4	58.5	60.7	61.7

FGD Findings 6.7: Disparities in recognition and value perception

Satisfaction scores varied significantly by sector, with full-time employees in academia and government-linked agencies generally reporting higher satisfaction compared to those in private-sector or contract roles. This variation is echoed in the FGDs where common misconceptions on professional recognition persist.

A frequent misunderstanding is the perception that professional titles are equivalent to honorary titles. Another common perception is that professional recognition does not translate into concrete career benefits, particularly when compared to more established titles such as Ir. or Dr. This sentiment is fuelled by the lack of visible institutional incentives such as salary increments, promotion points, or legal privileges.

"Only [those with] Ir., Sr., or Dr. are usually acknowledged, [those with] Ts. are still underappreciated" — Solomon

"Only when [recognition is] enforced or linked to benefits, will employers support it." — Eli

While some professionals understand the credibility boost offered by recognition, the broader workforce remains sceptical about its utility, particularly when tangible benefits are not immediately apparent. These persistent misconceptions highlight a fundamental weakness in the current professional recognition framework: without stronger policy backing, structured incentives and public education efforts, recognition risks being seen as optional rather than essential.

This not only undermines the recognition system itself but also hampers the larger goal of uplifting professional standards in the country's technology and technical sectors. This illustrates the need for MBOT to intensify its engagement with industry, especially to articulate the return on investment (ROI) for employers who support certification.

In terms of professional image and credibility, our FGD found that professional recognition serves not only as an individual credential but also as a symbol of competency and commitment to professional standards. Titles such as Professional Technologist enhance the perceived credibility of the individual, signalling a baseline of verified knowledge, ethical conduct and technical ability to employers, clients and peers.

"When someone got their Ts, basically it boosts their confidence... it is like being respected in the field." — Sheikh

In highly technical industries, the use of professional titles reinforces trust in an individual's capabilities, particularly in client-facing roles and project-based engagements.

"[When] we put the Ts. in front of our name, [it is] to enhance our credibility... during tenders we stamp using Ts... there are not many questions (asked). It gives confidence to our users, customers and providers." — Kahirol

Nonetheless, these cases remain the exception rather than the norm and participants called for MBOT to more clearly define the value and practical privileges associated with its professional recognition system. The symbolic weight of a professional title is particularly significant in project procurement processes, where technical validation is critical. However, the extent to which this enhanced credibility translates into career advantages depends largely on the sector's recognition and the institutional weight behind the title. In short, while the professional title elevates individual standing, its broader value remains contingent on external validation from industries and regulatory bodies.

Customer service satisfaction: The human touch still matters

Customer service remains a key interface for how MBOT's quality is perceived day-to-day. The average score for this subdimension stands at 60.0, slightly higher than personal benefits but lower than professional benefits (Figure 6.39). Members were most satisfied with Courtesy and Friendliness (62.5) and Responsiveness to Inquiries (62.2), showing appreciation for MBOT staff's demeanour and engagement. However, Usefulness of Suggestions (58.4) lagged behind, which may suggest a gap between frontline interaction and actionable solutions.

Notably, Professional Technologists gave the highest scores in this area (62.9 overall), particularly for Responsiveness and Courtesy (both at 64.8), while Graduate Technologists remained the least satisfied (58.4 overall), particularly on Usefulness and Knowledge of Operations (Table 6.23).

Figure 6.39: Item scores under the Customer Service dimension

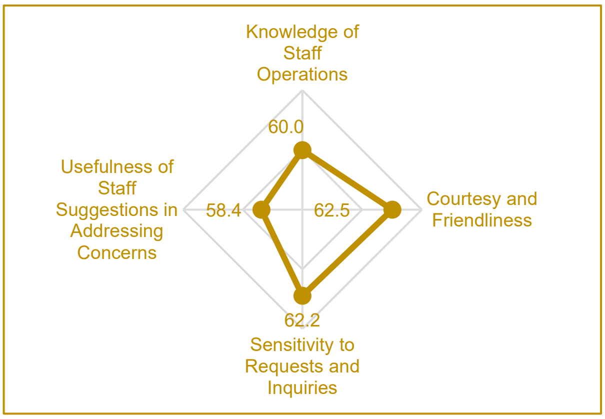


Table 6.23: Item scores under the Customer Service dimension, by recognition status

Item	Ts.	GT	Tc.	QT
Customer Service	**62.9**	**58.4**	**62.6**	**62.6**
Knowledge of MBOT Staff Operations	61.8	57.9	62.3	61.5
Courtesy and Friendliness	64.8	60.3	64.4	63.4
Responsiveness of MBOT Requests and Inquiries	64.8	59.5	63.1	64.3
Usefulness of MBOT Staff Suggestions in Addressing Concerns	60.2	56.1	60.6	61.4

The service quality dimension reveals differentiated experiences across MBOT's value propositions. While members generally acknowledge the institution's role in advancing the profession and upholding service standards, the translation of these efforts into individual-level value remains uneven.

Personal Benefits show that while networking and development opportunities are appreciated, younger or early-career members perceive limited returns in information services and credential utility. This calls for greater personalisation of benefits and clearer pathways linking recognition to tangible individual gains.

Professional Benefits reflect MBOT's relative strength in shaping field standards and policy influence. However, lower scores among Graduate Technologists suggest a disconnect between institutional initiatives and younger members' awareness or access to these ecosystem-level efforts. Strengthening communication and inclusion in such efforts could enhance legitimacy and relevance.

Customer Service performance is bolstered by courteous and responsive staff interactions, yet there is a noted gap in the usefulness of guidance provided. Closing this gap requires not just service orientation but also equipping frontline staff with the tools and authority to deliver meaningful resolutions.

Finally, finding for Service Quality dimension point to a dual need: MBOT must deepen its member-centric design, particularly for early-career cohorts, while maintaining strong system-level signalling through its professional and public roles. Targeted service differentiation, enhanced onboarding and improved issue resolution protocols may be key aspect in reinforcing both trust and perceived value.

Suggestions and areas for improvement

To complement the satisfaction analysis, members were also asked to identify priority areas for improvement. As illustrated in Figure 6.40, the top three areas that emerged about the visibility, relevance and institutional leverage of MBOT recognition in the broader professional ecosystem. Enhanced Credibility and Compliance (56.6%) show the most frequently cited priority, demonstrating that members are seeking stronger institutional signalling and regulatory weight behind MBOT certification.

Respondents emphasised the need for titles—Ts. and Tc. —to be more widely acknowledged across sectors, including clearer mandates for usage in project tendering, accreditation exercises and HR frameworks. This concern aligns with both the qualitative feedback from FGDs and quantitative findings on perceived value and professional benefits.

Next, the Talent Attraction and Employee Development (42.8%) that highlight the importance of linking MBOT recognition to tangible professional growth pathways. This includes structured onboarding, clearer Continuing Professional Development (CPD) guidelines and closer collaboration with employers on how recognition supports upskilling and promotion. The finding strengthens the survey's observation that younger members, particularly Graduate Technologists, report lower satisfaction across personal benefit items, suggesting a need for early-career support.

The third priority was Networking and Industry Collaboration (39.8%). Participants identified industry engagement and professional networking as underdeveloped aspects of the current recognition experience. While MBOT's ecosystem role is acknowledged, members seek more structured platforms for cross-sector collaboration, peer learning and public-private partnerships. The relatively low scores under the Personal Benefits and Customer Service dimensions highlight the need for stronger member engagement beyond certification.

Overall, these improvement areas suggest a reform agenda that goes beyond service delivery, to one that reinforces MBOT's recognition as a career enabler, a trust signal and a connector within Malaysia's T&T talent ecosystem.

Figure 6.40: Top three priority areas for improvement

6.6 Discussion and Policy Implications

This chapter has brought together diverse evidence from the survey conducted among the MBOT's members, GTS datasets and the FGDs to examine the extent to which MBOT's role as a professional body and role in academic accreditation shape professional identity, employment and labour market outcomes among T&T talent in Malaysia.

The analysis of this chapter hinges on three main areas, namely, the impact of professional recognition on career mobility and employer utilisation, contributions of MBOT on academic accreditation in technical and technological qualifications, as well as the institutional mechanisms that support certification and service delivery. Together, these pillars reveal how recognition must be understood not just as a formal credential but as a dynamic ecosystem involving individual aspirations, academic pathways and institutional performance. The key findings of the chapter are as follows:

Professional recognition act as a lever for career advancement and labour market signalling, but returns are not uniform

MBOT's professional recognition system, anchored in the "badges" of titles like Ts. and Tc., has begun to establish itself as a valuable instrument for elevating career trajectories. These recognitions have strengthened professional identity and act as signals for competencies across the spectrum of the T&T talent pipeline. However, the returns from recognition are not uniform. While many technologists and technicians experience improvements in confidence, credibility and mobility, the full potential of recognition remains limited by sectoral awareness, inconsistent employer utilisation and weak linkage to tangible career rewards.

Professional recognition strengthens technical confidence and enables career mobility. However, employer uptake for talent with recognition is inconsistent

Over 75% of respondents across all recognition levels reported greater confidence in their technical capabilities and stronger motivation to apply for higher-skilled roles. However, motivations for pursuing certification varied, with younger or early-career members (especially Qualified Technicians) citing lower awareness of their recognition eligibility and weaker intrinsic motivation. FGDs also revealed that many only realised the value of recognition after completing their studies, limiting its proactive use in career planning. **A recognition awareness campaign is needed to target eligible students at the beginning of their programmes, as well as early-career professionals, particularly women and technicians in lower-paying sectors.** This should include recognition clinics, mentorship pairing (such as among the Ts. for Ts.), and industry showcases of successful certified individuals.

The analysis also showed strong longitudinal patterns in career progression among certified members, with more than 70% of Graduate Technologists and 66% of Certified Technicians reporting multiple job transitions after receiving professional recognition. The share of members in professional-level roles increased significantly over time, for instance, among Graduate Technologists, from 44% in their first job to 62% currently. These transitions point to the function of recognition as a career enabler, particularly in unlocking mobility and signalling career progression within technical roles.

However, inconsistencies between the employer's appreciation of the recognition have led to gaps between the perceived return of higher recognition and actual labour market returns among those with higher recognition. While over 65% of Graduate Technologists and Qualified Technicians believe employers prefer higher professional recognition, only 22% of Professional Technologists and Certified Technicians reported career progression as a direct result. FGDs reveal that many employers still misunderstand or underappreciate MBOT titles, with some equating them to honorary or optional credentials.

Thus, it is timely to think about embedding the professional recognition mechanism into formal career pathways. MOHR, together with relevant industry bodies, should develop Recognition-Linked Career Ladders Framework[209], where it supports the mobility pathways where MBOT titles (Ts., Tc.) and recognition are tied to promotion points, functional responsibilities and remuneration[210]. This could also further enhance the credibility of these recognitions, allowing them to efficiently act as signals of competency within the industry.

Yet, there are bright spots: GLCs and some government bodies recognise certification in promotion schemes. Additionally, support for membership fee subsidies is concentrated in GLCs, while MNCs lag behind whereby only 10.9% of those working in this sector reported the provision of full MBOT fee support. This points to a fragmented landscape of employer appreciation, where public sector models could inform private sector replication.

[209] Konnikov (2023)
[210] Bjornavold et al. (2013); Braňka (2016)

At the same time, MBOT should position itself as a recognition-centric complement in national workforce planning by identifying emerging occupational clusters and developing adaptive, forward-looking certification pathways aligned with labour market shifts. **Integrating MBOT's certification registry into the existing My National Skills Registry (MyNSR) by TalentCorp**[211] **would ensure coherence aligning talent pipelines with actual and future demand.**

Formalisation of MBOT professional recognition for employers, especially among the SMEs and MNCs is key[212]**.** Through these formalisation initiatives, employers' awareness and understanding about the importance of professional recognition could be enhanced and perhaps could be integrated internally within the organisation as part of HR policy for hiring process, performance evaluation models and eligibility mapping for promotions. Incentives (e.g. levy rebates or tax offsets) should be tied to employers that adopt recognition in their internal systems[213].

Individual with academic accreditation has market appeal, though wage gains remain uneven and gendered

While career mobility improves with professional recognition, wage progression is inconsistent. Only half of the survey respondents perceived an improvement in earnings after certification. The benefits of recognition can also vary by industry sector and age group. Wage gains were more pronounced in structured sectors like industrial fields and weaker in Applied Science and SCT sectors. **Thus, it is timely to introduce Recognition-Indexed Wage Guidelines to complement existing salary frameworks or be integrated into future wage policy formulations. This would ensure that professional certification is not only symbolically valued but also materially recognised through structured wage progression mechanisms**.

Findings from this chapter also found that return of wages in relation to professional recognition is particularly lower among women and older technicians. For instance, wage differences between male and female Professional Technologists were substantial—RM4,904 in mean income in favour of males (aged 40–49). While wage appreciation and career progression may be constrained due to qualification levels, disparity between genders in similar fields and recognition may point to larger structural issues. Hence, **mandate gender pay gap audits in sectors where MBOT recognition is prominent, to ensure equitable returns on skill certification**.

Academic accreditation shapes graduate pathways and labour market readiness, though its potential is underutilised

MBOT academic accreditation plays a critical yet underutilised role in Malaysia's technical and vocational education landscape. While initially designed as a quality assurance mechanism, the evidence from the survey shows that its influence extends well beyond institutional benchmarking. MBOT accreditation of these courses also serves as a signalling tool for employers, a career enabler for students and a catalyst for closing structural labour market gaps.

---

[211] TalentCorp (2025)
[212] Werquin (2010)
[213] J. Yang (2015)

Stepping-stone effect of academic accreditation and early career trajectories

The strongest impact of academic accreditation emerges at the earliest juncture of graduates' careers. Graduates from MBOT-accredited programmes, especially those aged 20–29, reported significantly higher perceptions of employability, confidence and career mobility. For instance, a majority of Qualified Technicians (87.6%) viewed accreditation as an important vehicle for career progression and over 70% believed it facilitated faster employment than peers from non-accredited institutions. These findings affirm the role of accreditation as a stepping stone, particularly for those from diploma-level institutions like vocational colleges and polytechnics. The outcomes suggest that MBOT accreditation enhances the value of non-degree credentials by standardising competencies and validating applied skills.

Therefore, early-career impact implies that accreditation should not be treated merely as a compliance tool, but rather as a strategic investment in long-term employability. MBOT and higher learning institutions, specifically those under the ambit of vocational and technical education must recalibrate accreditation strategies to focus on post-graduation transitions, linking outcomes to job-matching services, employer engagement and career counselling[214].

Mismatch, visibility and structural bottlenecks

Despite its promising signal, the academic accreditation system remains underleveraged due to gaps in visibility and coordination. More than 40% of students only discovered their programme was MBOT-accredited after graduation, undermining the intended function of accreditation as a pre-graduation value proposition. The issue is particularly stark among Qualified Technicians where one-fifth (21.6%) were unaware of their programme's accreditation status. Hence, **strategic action is needed to increase the visibility of the accreditation status of the various qualifications under MBOT** to ensure that potential students are able to proactively plan their career trajectory. This calls for collaborative outreach efforts between institutions, industry, and MBOT to ensure that accreditation becomes a visible and influential factor in student decision-making from the outset.

Furthermore, while MBOT's role in ensuring curriculum-industry alignment is evident (as seen in improved job-field match rates and accreditation requirements), wage returns remain modest. For example, over 75% of graduates from fully accredited institutions still earn below RM2,000; a troubling signal of horizontal mismatch and suppressed wage structures despite accreditation compliance. However, accreditation alone does not solve structural misalignment in the labour market. **MBOT must strengthen its partnership with industry clusters and skill training provider to embed accreditation into hiring, promotion and salary scales**. Visibility must also be tackled upstream through school counsellors, career fairs and TVET rebranding campaigns. Only through systemic integration and multi-stakeholder engagement can accreditation evolve from a compliance marker into a true driver of economic mobility and professional recognition.

[214] Yoon and Hutchinson (2018); Green and Taylor (2020); Mokrani, Lauringson, and Xenogiani (2024); Méndez, Martínez, and García (2025)

Accreditation continuity and institutional fragility

Analysis across accreditation types (Full, Temporary, SWA and Transitional accreditation) provides prevailing evidence on how accreditation maturity influences outcomes. Graduates from institutions with full or SWA accreditation consistently showed better field-match rates and salary levels. In contrast, outcomes deteriorated sharply for transitional institutions, where only half (47.8%) were employed in 2023 and nearly half earned less than RM2,000.

This pattern emphasises the importance of institutional accreditation continuity, not just initial accreditation. Gaps in documentation capacity, compliance fatigue and sudden policy shifts (e.g. mandatory Ts.-certified lecturers) have created bottlenecks in sustaining accreditation quality. Without stronger institutional support, accreditation risks becoming a bureaucratic hurdle rather than a developmental milestone.

Hence, accreditation policies must move beyond point-in-time certification. Better coordination is needed to help institutions with documentation, capacity-building and compliance[215]. Additionally, MBOT's TTAC must work closely with MQA and ministries to phase policy shifts more gradually and transparently[216].

Strengthening member trust and institutional value through professional recognition

MBOT's professional accreditation framework serves a dual role: it serves as a personal career milestone and a system-level signal of technical competence. However, our satisfaction survey reveals that while overall member sentiment is moderately positive, deep-seated structural and communicational challenges remain that hinder MBOT's full potential in assisting its members.

Satisfaction varies with career stage, certification level and sectoral context

While the overall satisfaction index of 63.1 suggests a relatively stable institutional standing, disaggregated findings point to a loud divergence in experiences. Certified Technicians and Professional Technologists reported the highest levels of satisfaction, particularly among mid-career individuals in permanent roles, those from public HEI/private HEI backgrounds and sectors with clearer HR structures like academia and GLCs. In contrast, Graduate Technologists, who represent the entry-level talent pipeline, reported significantly lower satisfaction across every index dimension—from perceived value and service expectations to personal benefits.

This gap highlights the urgent need for MBOT to develop structured early-career onboarding mechanisms and CPD pathways that facilitate a smoother transition from education to professional practice. Without targeted support, recognition may fail to gain traction among young technologists, potentially undermining the long-term credibility and adoption of the certification system[217].

[215] Hou et al. (2021); Kayyali (2024); Singh, Yadav, and Aswal (2024)
[216] Amin (2016); Bateman and Liang (2016); A. M. Akhir, Sarip, and Abd Fatah (2020); A. W. M. Akhir et al. (2021)
[217] Timpson and Bayerlein (2021); Irons et al. (2021); Amaral and Norcini (2023)

Perceived value is undermined by weak returns and limited visibility

At score only 56.8, the Perceived Value index is the weakest among the dimensions. While members acknowledged opportunities and prospects tied to MBOT (58.5 and 57.6 respectively), they expressed strong reservations on whether membership fees were justified. The low value-for-money score (55.4) echoes a recurring theme from FGDs: that professional titles like Ts. and Tc. do not consistently translate into wage gains, promotions or project tendering advantages, especially in the private sector (see FGD Findings 6.7).

Hence, **elevating the return on investment (ROI) of professional recognition would require systemic alignment. This includes formalising MBOT titles in HR promotion frameworks, wage classifications and civil service salary matrices.** Mandating the recognition of Ts./Tc. in public procurement or licensing schemes—akin to "Ir." status in engineering— though it could be a great challenge for MBOT for its longer-term functionality and visibility, this mechanism would bolster institutional legitimacy and member buy-in[218].

Service expectations reveal gaps between messaging and delivery

With a moderate score at 57.4, the Service Expectation dimension reflects growing but fragile confidence in MBOT's outreach and responsiveness. While members acknowledged improved communication efforts, gaps remain in how MBOT addresses needs, closes feedback loops and fulfils service promises. Many discovered MBOT through word-of-mouth or LinkedIn, revealing fragmented awareness and outreach strategies.

To address this, a robust institutional communication strategy for MBOT is required. This includes launching sector-specific awareness campaigns, developing interactive onboarding portals and building targeted engagement platforms for underrepresented cohorts (e.g. women, rural technologists, contract workers)[219]. Embedding service benchmarks and response timelines into MBOT's SOPs would further institutionalise reliability. Clearer articulation of MBOT's value proposition across multiple channels, including schools, training institutions, and industry partners, will be key to closing the expectation-delivery gap and strengthening stakeholder trust.

Service quality points to need for personalisation and relevance

While overall Service Quality scored 59.5, it remains below optimal, especially in Personal Benefits (e.g. career mobility, updated industry information) and Customer Service Satisfaction (particularly among younger members). FGDs reveal that many see MBOT's recognition as symbolically credible but lacking practical utility especially in industries that do not mandate certification for advancement. **Thus, MBOT must operationalise more personalised member journeys,** including segmenting services by career stage, launching mentorship programmes for Graduate Technologists and Qualified Technicians and ensuring CPD offerings are aligned with current industry shifts.

[218] Ferns, Dawson, and Howitt (2021b); Rachmad (2025)
[219] Timpson and Bayerlein (2021); Ferns, Dawson, and Howitt (2021b); Rachmad (2025)

Professional ecosystem support appreciated, but not widely understood

The Professional Benefits dimension scored relatively higher (61.1), with members recognising MBOT's role in setting standards, influencing policy and supporting education-to-career pipelines. Yet these strengths are appreciated more by those already integrated into structured institutions, not by emerging professionals or those in SME/private sectors.

It is particularly important for MBOT to leverage its ecosystem-building strength as a policy anchor. This means formalising cooperation with regulatory bodies (e.g. Department of Occupational Safety and Health (DOSH), Construction Industry Development Board (CIDB), MQA), integrating Ts./Tc. status into education-accreditation cycles and tying recognition to key policy agendas (e.g. the Digital Economy Blueprint, Green Growth Strategy). MBOT's institutional influence must be amplified beyond its current member pool to reshape public perceptions. Additionally, MBOT should be positioned as a strategic advisor in national human capital planning frameworks, ensuring that technologist pathways are embedded in Malaysia's long-term workforce development blueprints. By aligning with sectoral masterplans and industry roadmaps, MBOT can help calibrate training supply with market demand, reduce skill mismatches, and strengthen the role of technologists in driving innovation-led growth

6.7 Concluding Remarks

In summary, this chapter found that the establishment of MBOT and its role in professional recognition and academic accreditation have led to positive developments for Malaysia's T&T talent's career mobility. Competency 'badges' awarded through these mechanisms offer technicians and technologists a structured pathway to assess and validate their technical capabilities. This not only enhances their confidence and motivation, but also encourages upward mobility into high-skilled occupations within their respective fields. In this context, MBOT plays a critical role in positioning these badges as credible signals of industry readiness and professional growth.

Despite these gains, the full potential of MBOT's impact remains constrained by structural limitations, mainly the low visibility of recognition among early-career talent, limited employer adoption in hiring and promotion frameworks and fragmented awareness across sectors. Strengthening employer recognition systems and developing a dynamic, forward-looking skills registry are two immediate policy levers to elevate the relevance of certification in the labour market. These efforts must be coupled with stronger signalling mechanisms and stakeholder alignment to ensure recognition translates into tangible rewards.

Incentivising employers through tax benefits or public recognition schemes could accelerate the institutionalisation of MBOT certification within hiring and salary structures. Furthermore, embedding MBOT credentials within national qualification databases and linking them to career progression ladders in both public and private sectors would reinforce their perceived and actual value. Ultimately, a whole-of-ecosystem approach that spans ministries, employers, institutions, and technologists is essential to unlock MBOT's full role in building a future-ready T&T talent pipeline.

Equally important is understanding how recognition and accreditation are experienced by those within the system. Member satisfaction insights show that while MBOT is broadly valued, gaps in service delivery, engagement and post-certification support persist. These issues are particularly pronounced among early-career members and those in non-traditional or underrepresented fields. Enhancing member experience through tailored services, clear communication and structured upskilling pathways will be critical in ensuring member loyalty and system credibility.

MBOT should consider implementing a member feedback dashboard to systematically capture real-time user experiences and inform continuous service improvement. In addition, mentoring networks, peer learning circles, and dedicated support hubs for underrepresented groups could offer more inclusive engagement opportunities and help bridge post-certification disconnects. Ultimately, a more member-centric approach will not only boost satisfaction but also strengthen the long-term legitimacy and resilience of the MBOT ecosystem.

This requires MBOT to adopt a proactive role in shaping future skills policies, aligning certification pathways with emerging industry demands, and embedding recognition systems within national workforce development strategies. Furthermore, MBOT could integrate digital credentials, expand cross-border recognition frameworks, and actively participate in regional and global skill mobility platforms such as the ASEAN Qualifications Reference Framework (AQRF), and the East Asia Summit TVET Quality Assurance Framework. MBOT can also amplify its global relevance and futureproof Malaysia's T&T workforce by championing the APEC Technologist Registers as such transformation will not only raise the profile of T&T careers but also solidify MBOT's role in driving inclusive, innovation-led economic growth.

Ultimately, for MBOT to become a transformative anchor in the national T&T talent ecosystem, its mandate must evolve. The policy recommendations outlined in this chapter aim to position MBOT not just as a certifying body—but as a strategic lever of decent, high-value employment and a champion of lifelong career development for Malaysia's T&T talent pipeline.

REFERENCES

Abbott, Andrew. 2014. *The System of Professions: An Essay on the Division of Expert Labor*. University of Chicago press.

Akhir, Asymal Wajdi Muhd, Syuhaida Ismail, Mohd Syazli Fathi, and Shamsul Sarip. 2021. "Centre of Accreditation and Recognition of Excellence (CARE): Managing Scope of Technical and Vocational Education and Training (TVET) Courses towards Industrial-Based Recognition." *Turkish Journal of Computer and Mathematics Education* 12 (3). Ninety Nine Publication:1790–96.

Akhir, AW Muhd, S Sarip, and AY Abd Fatah. 2020. "Strategy to Develop Centre of Accreditation of Excellence (CARE) with Industrial-Based Recognition." *International Journal* 8 (1.1).

Amaral, Eliana, and John Norcini. 2023. "Quality Assurance in Health Professions Education: Role of Accreditation and Licensure." *Medical Education* 57 (1). Wiley Online Library:40–48.

Amin, JB. 2016. "Quality Assurance of the Qualification Process in TVET: Malaysia Country." *The Online Journal for Technical and Vocational Education and Training in Asia* 7:1–12.

Arifpin, Mansor Muhamad, Kamaluddin Rohaya, and Wan Mohamad Wan Mansor. 2024. "A Comparative Study of Accreditation for Engineering and Technology Education in Malaysia and Japan." In , 1–6. IEEE.

Ashforth, Blake E, and Fred Mael. 1989. "Social Identity Theory and the Organization." *Academy of Management Review* 14 (1). Academy of Management Briarcliff Manor, NY 10510:20–39.

Bateman, Andrea, and Xiaoyan Liang. 2016. "National Qualification Framework and Competency Standards." *World Bank Other Operational Studies*. The World Bank.

Bjornavold, Jens, Slava Pevec-Grm, Michael Graham, Arjen Deij, Madhu Singh, Borhène Charkoun, and Shivani Agrawal. 2013. "Global National Qualifications Framework Inventory." *Cedefop-European Centre for the Development of Vocational Training*. ERIC.

Braňka, Jiří. 2016. "Understanding the Potential Impact of Skills Recognition Systems on Labour Markets." *International Labour Organization (ILO)*.

Braun, Virginia, and Victoria Clarke. 2021. "Thematic Analysis: A Practical Guide." SAGE publications Ltd.

EPU. 2016. "Strategy Paper 09: Transforming Technical and Vocational Education and Training to Meet Industry Demand." Putrajaya: Economic Planning Unit. https://ekonomi.gov.my/.../pdf.

Ferns, Sonia J, Vaille Dawson, and Christine Howitt. 2021. "Professional Accreditation: A Partnership Proposition." In *Advances in Research, Theory and Practice in Work-Integrated Learning*, 60–72. Routledge.

Fornell, Claes, Michael D Johnson, Eugene W Anderson, Jaesung Cha, and Barbara Everitt Bryant. 1996. "The American Customer Satisfaction Index: Nature, Purpose, and Findings." *Journal of Marketing* 60 (4). SAGE Publications Sage CA: Los Angeles, CA:7–18.

Green, Anne, and Abigail Taylor. 2020. "Review of the Evidence on 'What Works' to Support the Development of the Employment Support Framework within the West Midlands Combined Authority." West Midlands Combined Authority.

Hawati Abdul Hamid. 2022. "Memahami Statistik Kebolehpasaran Graduan." Views 4/22. Kuala Lumpur: Khazanah Research Institute.

———. 2023a. "Higher Learning, Higher Earnings? The Influence of Sociodemographic Factors on Graduate Starting Pay." Working Paper 01/23. Kuala Lumpur: Khazanah Research Institute.

———. 2023b. "Melonjak Potensi Graduan TVET Menjana Pendapatan Tinggi." Views 16/23. Kuala Lumpur: Khazanah Research Institute.

Hou, Angela Yung Chi, Christopher Hill, Sheng Ju Chan, Dorothy I-Ru Chen, and Monica Tang. 2021. "Is Quality Assurance Relevant to Overseas Qualification Recognition in Asian Higher Education? Examining the Regulatory Framework and the Roles of Quality Assurance Agencies and Professional Accreditors." *Journal of Education and Work* 34 (3). Taylor & Francis:373–87.

Irons, Alastair, Tom Crick, James H Davenport, and Tom Prickett. 2021. "Increasing the Value of Professional Body Computer Science Degree Accreditation." In , 1336–1336.

Jiří, Braňka. 2016. "Strengthening Skills Recognition Systems: Recommendations for Key Stakeholders." Geneva: International Labour Organization. https://www.ilo.org/publications/strengthening...stakeholders.

Kayyali, Mustafa. 2024. "Exploring Accreditation Standards and Processes." In *Quality Assurance and Accreditation in Higher Education: Issues, Models, and Best Practices*, 1–60. Springer.

Ki, Eyun-Jung, and Yuan Wang. 2016. "Membership Benefits Matter: Exploring the Factors Influencing Members' Behavioral Intentions in Professional Associations." *Nonprofit Management and Leadership* 27 (2). Wiley Online Library:199–217.

Konnikov, Alla. 2023. "Intersections on the Road to Skills' Transferability: The Role of International Training, Gender, and Visible Minority Status in Shaping Immigrant Engineers' Career Attainment in Canada." *Canadian Review of Sociology/Revue Canadienne de Sociologie* 60 (3). Wiley Online Library:438–62.

KRI. 2024. "Shifting Tides: Charting Career Progression of Malaysia's Skilled Talents." Kuala Lumpur: Khazanah Research Institute.

Markova, Gergana, Robert C Ford, Duncan R Dickson, and Thomas M Bohn. 2013. "Professional Associations and Members' Benefits: What's in It for Me?" *Nonprofit Management and Leadership* 23 (4). Wiley Online Library:491–510.

MBOT. n.d. "Technology and Technical Accreditation Council (TTAC)." Web page. Accreditation. https://www.mbot.org.my/accreditation/ttas-ttac.

———. n.d. "Technology Expert Panel (TEP)." MBOT - Malaysia Board of Technologists. Accessed June 23, 2025. http://mbot.org.my/technology-fields/technology-expert-panel-tep.

MBOT, MOHE, and MOE. 2025. "Graduate Tracer Study by MBOT-Accredited Institutions under MOHE and MOE, 2018-2023."

Méndez, Lourdes Mella, Silvia Fernández Martínez, and Bárbara Torres García. 2025. *Employment, Training and Lifelong Learning: Comparative Perspectives*. Taylor & Francis.

Mohd Amirul Rafiq Abu Rahim and Shazrul Ariff Suhaimi. 2022. "Fresh Graduate Adversities: A Decade's Insight on the Graduate Tracer Study." Working Paper 6/22. Kuala Lumpur: Khazanah Research Institute.

Mokrani, Sofia Dromundo, Anne Lauringson, and Theodora Xenogiani. 2024. "The Role of Public Employment Services in Enhancing Labour Market Matching." In *Handbook on Labour Markets in Transition*, 442–62. Edward Elgar Publishing.

MQA. n.d. "Self-Accreditation (SWA)." Web page. SWA Portal. https://www2.mqa.gov.my/portal_swa/.

Rachmad, Yoesoep Edhie. 2025. "Talent Without Degrees: Managing Gen Z with Competence and Certification." *United Nations Development Programme*.

Rivera, Lauren A. 2012. "Hiring as Cultural Matching: The Case of Elite Professional Service Firms." *American Sociological Review* 77 (6). Sage Publications Sage CA: Los Angeles, CA:999–1022.

Ryan, Richard M, and Edward L Deci. 2000. "Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being." *American Psychologist* 55 (1). American Psychological Association:68.

Singh, Battal, Sanjay Yadav, and DK Aswal. 2024. "Landscape and Status of Global Accreditation Bodies." In *Handbook of Quality System, Accreditation and Conformity Assessment*, 529–73. Springer.

Spence, Michael. 1973. "Job Market Signaling." *The Quarterly Journal of Economics* 87 (3). Oxford University Press:355–74. https://doi.org/10.2307/1882010.

TalentCorp. 2025. "Malaysia National Skills Registry (MyNSR)." TalentCorp MyNSR. 2025. https://mynsr.talentcorp.com.my/about-mynsr/.

Timpson, Mel, and Leopold Bayerlein. 2021. "Accreditation without Impact: The Case of Accreditation by Professional Accounting Bodies in Australia." *Australian Accounting Review* 31 (1). Wiley Online Library:22–34.

Werquin, Patrick. 2010. "Recognition of Non-Formal and Informal Learning: Country Practices." *Organisation de Coopération et de Développement Économiques OCDE. Paris. Disonible En*.

Yang, Jin. 2015. *Recognition, Validation and Accreditation*. Hamburg: Unesco.

Yoon, Hyung Joon, and B Hutchinson. 2018. "Syntheses and Future Directions for Career Services, Credentials, and Training." *International Practices of Career Services, Credentialing and Training*, 217–38.

CHAPTER

07

ENHANCING THE T&T TALENT LANDSCAPE THROUGH INFORMED POLICY RECOMMENDATIONS

CHAPTER 7

ENHANCING THE T&T TALENT LANDSCAPE THROUGH INFORMED POLICY RECOMMENDATIONS

7.1 Bridging Research to Policy

Malaysia's path to a future-ready economy hinges on the strength of its technology and technical workforce. While national strategies such as the NIMP 2030 and the National TVET Policy aim to build this foundation, challenges persist from underutilised technical qualifications to a fragmented professional recognition landscape.

This report, a collaborative research initiative between Khazanah Research Institute (KRI) and the Malaysia Board of Technologists (MBOT), investigates how professional recognition and academic accreditation frameworks can be better leveraged to strengthen the T&T workforce. While it features MBOT as a central case study, the analysis looks beyond professional recognition and accreditation, but it also investigates a broader ecosystem of T&T talent in Malaysia.

Each chapter in this report builds progressively to offer a layered understanding of the current landscape of T&T pipeline. We begin with a comprehensive overview of the evolution of Malaysia's TVET education system, tracing its trajectory through decades of policy reform and institutional expansion. By anchoring this development within the wider industrialisation agenda, we show how TVET has grown in response to economic demands, yet continues to grapple with strategic, structural and spatial imbalances. Mapping of technical fields and institutional supply reveals regional concentrations of programmes, aligned to economic hubs, but also highlights disparities in access and outcomes.

Subsequent chapters shift the focus from the education system to labour market realities. Using cross-sectional data, we examine graduate transition patterns, job conditions and how talent supply matches industrial demand. A dedicated analysis of spatial employment patterns reveals how job agglomeration in key urban corridors shapes regional competitiveness and economic inclusion. This spatial framing helps clarify where T&T jobs are concentrated, how they evolve and how policy must address both sectoral and geographical mismatches.

The second part of the report delve into the institutional role of MBOT. Here, we explore how professional recognition and academic accreditation systems anchored by MBOT are perceived by its members and how they influence career mobility, wage outcomes and employer demand. A nationwide survey of 2,041 MBOT members, complemented by focus group discussions (FGDs), reveals both the promise and pitfalls of recognition systems. This deeper analysis provides the foundation for evidence-based policy recommendations to improve the credibility, relevance and impact of MBOT's work.

7.2 Policy Recommendations

7.2.1. Pillar 1: Establish a Responsive and Industry-Aligned Talent Pipeline

Key findings from Chapters 2 & 3

The output of TVET graduates' skills and qualifications is constrained by available education pathways

Malaysia's TVET system is characterised by a highly diverse and fragmented institutional landscape. This diversity reflects the system's intent to serve a broad range of socio-economic groups, industries and labour market needs. However, the differing mandates and objectives of various institutions result in inconsistent programme quality, depth and outcomes. As a result, TVET graduates' skills and qualifications are significantly shaped and are often limited by the particular education pathways available to them. These pathways are frequently determined by the field of study and level of high school certification, such as SPM and SVM. This, in turn, influences the extent to which graduates can develop advanced competencies.

Despite ongoing reforms to improve the TVET sector, the system remains heavily skewed towards lower-level qualifications. Although TVET opportunities are widely distributed geographically, only about half of the institutions offer tertiary-level programmes such as diplomas and degrees. Most enrolments are concentrated at the certificate and diploma levels. Meanwhile, advanced qualifications, particularly at the postgraduate level, are scarce and largely confined to academic rather than vocational tracks. Consequently, upward mobility within the TVET system is constrained, leaving many graduates with only basic or intermediate credentials. This limits their capacity to adapt to an increasingly complex and innovation-driven economy, where higher-order technical skills are in growing demand.

Underemployment of T&T talents in semi-skilled roles reflects poor talent utilisation. Meanwhile, field mismatch still persists, where not all T&T graduates land in field-aligned jobs

The underemployment of T&T graduates in semi-skilled roles highlights a persistent issue of poor talent utilisation within Malaysia's labour market. While slightly more than half of graduates enter the workforce upon graduation, a significant share remains unemployed and pursuing further studies or training programmes. However, among those employed, many are not working in fields aligned with their training, especially in TVET-based disciplines such as manufacturing and automotive. This field mismatch is less pronounced in sectors like ICT, where curriculum alignment with industry demands appears stronger. Despite this, horizontal mismatch (where graduates work outside their trained fields) remains widespread and reflects structural challenges such as outdated curricula, misaligned training outcomes and a lack of demand in certain traditional sectors. These misalignments hinder the full economic potential of T&T graduates and contribute to underemployment, whereby individuals with specialised qualifications are in roles where they are unable to leverage their capabilities.

The job market's composition further compounds the issue. Semi-skilled roles dominate employment opportunities, leaving fewer pathways for high-skilled placements that align with the training of T&T graduates. While sectors like manufacturing absorb a large number of young workers, many of these roles do not require tertiary qualifications. This results in a downward pressure on salaries and skill application. For example, graduates from the Engineering, Manufacturing and Construction fields are less likely to secure high-skilled employment while their average earnings remain modest, with fewer surpassing the RM2,000 monthly threshold. Agriculture graduates face even starker outcomes in both skill alignment and income. The prevalence of workers with only SPM-level qualifications in T&T-related industries also suggests limited upward mobility and weak integration of tertiary-trained individuals. These patterns underscore the slow realignment to national industrial policies, whereby job openings remain concentrated in lower-skilled roles.

The future economy demands new T&T talent strategies. However, industry-focused fields dominate the T&T graduate pipeline, with slow course diversification

Malaysia's current T&T graduate pipeline remains heavily skewed toward industry-focused fields such as engineering and manufacturing, a trend shaped by longstanding policy focus and institutional inertia. Over 60% of T&T graduates come from these sectors, driven by government emphasis on industrial development and human capital strategies that favour manufacturing and engineering. While this output has helped meet the demands of traditional industries, it has also resulted in a large proportion of graduates entering the job market with diplomas or certificates, which in turn affects their long-term career advancement and salary potential. Concurrently, diversification of T&T programmes has been slow, limiting the system's ability to support new and rapidly growing economic areas.

This mismatch is further complicated by structural issues in the labour market. While Malaysia is actively promoting economic transitions toward higher-skilled, service-oriented and sustainable sectors, job creation and its related graduate output continue to lag. While government investments and development plans have begun targeting future-facing industries like renewable energy and green mobility, the higher education system has been slower to adapt accordingly. Meanwhile, the proportion of graduates pursuing T&T fields falls short of Malaysia's aspirations of a 60:40 STEM to non-STEM ratio, as more graduates show a preference to pursue non-STEM disciplines such as Business and Law, further reinforcing a narrow T&T talent supply base.

TVET-specific lifelong learning channels are fragmented, with opportunities tied to specific fields or industries

Lifelong learning within Malaysia's TVET system is increasingly important for ensuring workforce adaptability and long-term career development. However, the available pathways remain fragmented and uneven. Rather than being supported by an integrated national framework, most lifelong learning opportunities in TVET are constrained to selected fields – typically in fields with strong institutional or industry backing, such as manufacturing or ICT. Meanwhile, many other technology and technical fields do not have these established relationships and thus have limited development pathways.

While Malaysian Technical University Network (MTUN) have expanded degree-level and postgraduate TVET qualifications, these developments are largely concentrated in a few disciplines, leaving professionals in other technical and technology areas without comparable options for structured academic or professional progression. This lack of uniformity limits the ability of many TVET-trained individuals to upskill or pivot their careers through formal channels.

Microcredential programmes and professional competency certifications, key tools for enabling modular, flexible upskilling, face similar constraints. These options are often only available in selected fields with strong employer engagement. Thus, sectors with weaker industry linkages or limited institutional support remain underserved. However, promising developments are emerging. MBOT, for instance, offers a structured system for recognising technical and technological practitioners, providing both legitimacy and a clear framework for career progression.

Recognising the need to establish a more responsive and industry-aligned talent pipeline**, we propose three policy recommendations as follows**:

1 Strategically broaden the availability of higher-level TVET programmes

To enhance career growth and opportunities in strategic economic sectors, **Malaysia should focus on producing more TVET graduates with higher-level certifications and professional recognition.** While TVET graduates often secure better initial job prospects than their non-TVET peers due to industry-aligned training, their long-term career progression is limited by the predominance of diploma and certificate qualifications, which are often suited to semi-skilled roles. Increasing access to bachelor's and postgraduate-level TVET education, alongside formal recognition and accreditation from professional technical bodies, would boost the global competitiveness, skills and knowledge base of TVET graduates.

Thus, **there is a pressing need to establish and strategically distribute more tertiary-level TVET institutions and programmes across Malaysia** to address the current imbalance in access and qualification pathways. Despite recent efforts to strengthen the TVET system, most programmes remain concentrated at the certificate and diploma levels, with limited progression routes to bachelor's degrees and beyond. This constraint is especially pronounced in regions like Sabah and Sarawak, where tertiary-level technical education is largely confined to a few districts. Public institutions such as MTUN, along with private providers like UniKL and UNITAR, offer higher-level qualifications, but these are mostly located in Peninsular Malaysia. Expanding both tertiary TVET institutions and programme levels, particularly in East Malaysia, would help unlock local talent, support regional industrial growth and promote more equitable national development.

2 Strengthen MBOT's role in the broader TVET and lifelong learning landscape

MBOT should spearhead efforts in developing broader, field-diverse postgraduate pathways tailored specifically for TVET graduates. As it currently stands, access to postgraduate education for TVET graduates remains limited, with most opportunities concentrated at the diploma and degree levels and few structured pathways beyond MQF Level 6.

While some postgraduate programmes exist, mainly in MTUN institutions offering Master degrees in Science, Engineering technology and Technical education, they often require a specific bachelor's degree for entry, which is limited for TVET diploma holders from non-SPM routes. This lack of accessible and inclusive postgraduate options restricts technical professionals from advancing their skills and careers. The development and introduction of these postgraduate programmes, such as a Master in Technology, in MTUNs and other TVET HEIs would not only enhance technical talent development but also elevate TVET as a respected and sustainable lifelong learning pathway alongside academic routes.

There is a pressing need to expand and enhance the credibility, accessibility and utility of microcredential offerings to include all 24 fields under MBOT's mandates. This can ensure all TVET professionals have access to accredited, recognised pathways for continuous learning. Microcredential programmes play a critical role in the technical and technology sectors, offering flexible upskilling pathways that bridge the gap between formal qualifications and evolving industry demands. However, the availability of such programmes remains uneven across many technical fields, largely due to limited institutional capacity and weak collaboration with industry bodies. This lack of recognised and accessible microcredentials undermines their value as tools for professional growth and career advancement, particularly for TVET graduates. Hence, strengthening the role of institutions like MBOT and aligning microcredential development with their tiered registration framework can elevate the credibility of these programmes, ensuring they are recognised by employers and serve as legitimate markers of technical competence within Malaysia's broader lifelong learning ecosystem.

3 Encourage job and talent creation in T&T-related service subsectors

To strengthen Malaysia's position in the global value chains, **there is a need to develop policies that encourage greater job creation in technology and technology-related services subsectors** such as ICT, Modern Services, Natural Sciences, Education and Health. These sectors not only demand highly qualified talent but also offer better pay and more promising employment outcomes. Strategic government intervention, both through direct investments and supportive policies, can boost the growth of these subsectors, enhance labour market participation and improve access to high-quality jobs. Prioritising the development of these high-value, service-based industries will support long-term economic advancement and ensure Malaysia remains competitive in an increasingly knowledge-driven global economy.

Complementing this, Malaysia also needs a recalibrated T&T talent strategy—one that fosters agility, promotes course diversification and aligns graduate output with the needs of a dynamic, forward-looking economy. Hence, **there is a need to shift the focus of HEIs toward producing more graduates in T&T-related service sectors** such as communication, IT, science-related services, as well as statistical data analysis. While HEIs have long concentrated on Business, Administration, Law and industrial-related disciplines like Engineering and Manufacturing, this focus has led to an oversupply of graduates in these areas. This imbalance has contributed to persistent job mismatches and limited career progression. In contrast, service-based T&T fields are experiencing growing demand and offer greater potential for meaningful employment and career development. Redirecting HEI efforts to these high-growth sectors would help ensure graduates are better matched to labour market needs and positioned for long-term success. This also necessitates a stronger coordination between education providers and industry to improve both employment quality and field relevance.

7.2.2. Pillar 2: Strengthen Regional and Industry Talent Matching

Key findings from Chapters 3, 4 & 5

Distribution of TVET courses echoes regional industrial activity, but there is room for improvement

The distribution of TVET courses in Malaysia generally aligns with regional industrial activity, illustrating a strategic effort to match education with local economic needs. Districts such as Kulim in Kedah, Pekan in Pahang and Shah Alam in Selangor host a high number of manufacturing and industrial-focused TVET courses, reflecting their roles as major industrial and automotive hubs. This alignment strengthens job placement prospects for graduates, as it facilitates practical industry partnerships and better matches training with regional labour demand. Similarly, the availability of petrochemical-related TVET programmes in Pekan, Kuantan and Kemaman supports talent pipelines for the Gebeng and Kerteh petrochemical sector.

Despite this general alignment, the distribution of TVET programmes across Malaysia still presents room for improvement in both geographic equity and industry relevance. Some districts, particularly in central and eastern Peninsular Malaysia as well as much of Sabah and Sarawak, lack adequate access to specialised technical tertiary TVET courses, including in high-growth sectors like computer science and IT. In these areas, students may face challenges in accessing training that aligns with future-oriented industries or regional development plans. Additionally, while industrialised areas enjoy strong integration between industry and education, not all districts benefit from this synergy. In some cases, TVET institutions offer generalised or poorly aligned courses that do not correspond with local economic priorities, limiting graduate employability and the overall impact of the training system.

Technical and technology-based economic activities are concentrated in major urban regions with little spillover to neighbouring areas, but there is potential for designated regional industrial to drive innovation

Malaysia's economic landscape reveals a stark urban-rural divide, with high-value technical and technology-based sectors such as manufacturing, construction and services concentrated in key urban regions like Selangor, Johor, Kuala Lumpur (KL) and Pulau Pinang (P. Pinang). These states exhibit strong national and regional competitiveness, benefiting from advanced infrastructure, skilled talent pools and integration into global value chains. In contrast, rural and resource-reliant states such as Sabah, Sarawak and Pahang remain structurally constrained, with weak performance in primary sectors like agriculture and mining and limited transition into higher-value industries. Shift-Share and Moran's I analyses highlight not only the geographic isolation of sectoral strengths but also the lack of meaningful spillover to surrounding areas. Despite the emergence of transitional economies in states like Kedah and Terengganu, which show signs of manufacturing and construction growth, their progress remains uneven and vulnerable to structural bottlenecks and labour mobility limitations.

To bridge these disparities, policy must move beyond growth concentration in urban cores and enable regional industrial hubs to drive innovation and employment. Strengthening the economic role of corridors like the East Coast Economic Region and SCORE, alongside strategic infrastructure upgrades and diversification incentives, can help unlock latent potential in underperforming states. Labour market interventions must also account for automation threats in rural sectors and enhance workforce adaptability through targeted skilling and digital inclusion. A more spatially balanced development strategy that fosters both urban dynamism and rural resilience is essential to ensuring inclusive growth and equitable access to technical and technology-driven opportunities across regions.

Despite the presence of concentrated job clusters, many local T&T talents are still not effectively matched to opportunities within these areas.

Despite the existence of concentrated job clusters and specialised economic zones in Malaysia, local talent in the T&T sectors is not always effectively matched to opportunities within these areas. While Malaysia's education and training systems are producing increasingly skilled workers, this alone does not ensure that multinational corporations (MNCs) will shift their high-value functions, such as research and development (R&D), into local operations. Many firms located in industrial or tech clusters, such as those in Cyberjaya, tend to operate in lower-value segments like support services or call centres, with core R&D functions remaining abroad. This weakens the potential for meaningful knowledge transfer, limits innovation spillovers and ultimately stifles the development of a vibrant regional innovation ecosystem. Without strong, firm-level engagement and detailed data on actual corporate activities within these clusters, it is difficult to assess whether colocation is generating the expected economic benefits.

Furthermore, the success of job clusters and industrial agglomerations depends not just on physical proximity but also on the quality of interactions between firms, workers and supporting institutions. As seen in globally renowned innovation hubs like Silicon Valley, effective clustering requires a high level of collaboration, including partnerships between large firms, startups, academic institutions and research centres. In Malaysia, however, such synergies are often limited by weak social capital infrastructures and a lack of mechanisms to foster interdependence among local actors. Simply clustering firms in the same area does not automatically lead to innovation or regional development. Especially in a globalised economy where cost advantages are the main draw for foreign investment, more deliberate policy measures are needed to build a supportive ecosystem that encourages local talent utilisation, R&D engagement and knowledge sharing within clusters. Without this, Malaysia risks having job-rich regions that still underperform in terms of innovation and inclusive economic growth.

To strengthen regional and industry talent matching, **we bring forward three policy recommendations as follows**:

1 Enhance regional integration through stronger industry-academia coordination

To better translate national ambitions into local outcomes, policy efforts should focus on **improving coordination between training institutions and industries at the local level. This includes enhancing the colocation and interaction of TVET institutions and firms.** Past studies from several countries have shown that the social capital gained through successful collaboration between firms and institutions can shape the regional and national technology, knowledge and innovation systems, thus emphasising the need for a strong industry-academia coordination within the TVET ecosystem.

Further enhancing industry specialisation in TVET institutions, based on key regional activities, can significantly enhance the relevance and quality of training. By concentrating on specific fields such as automotive technology or petrochemicals, these institutions can allocate their resources, infrastructure and expertise more effectively to deliver high-quality education and practical experience. Specialised institutions are also better equipped to invest in the expensive equipment, skilled instructors and facilities needed for hands-on learning. Replicating real-world work environments is essential for effective TVET, as it helps produce highly skilled and job-ready graduates.

2 Promote the development of industrial cluster-specific training programmes

To bridge the urban–rural divide, **the development of cluster-specific training programmes must go beyond urban cores and be deliberately embedded within emerging regional industrial zones**. While high-value technical and technology-based sectors are currently concentrated in urban centres like Selangor Johor and P. Pinang, these growth nodes have generated limited spillover to surrounding districts or less-developed states.

To address this, embedding TVET and professional certification programmes within designated regional industrial hubs, aligned with dominant or emerging industries in those corridors. For example, advanced manufacturing certifications can be co-located with the Kulim Hi-Tech Park or oil and gas maintenance training with Pengerang. Such tailored programmes should be co-developed with local employers, enabling a tighter feedback loop between industrial needs and training curricula. In turn, training institutions can evolve from generalist centres into specialised, high-impact anchors of regional innovation. This approach not only enhances local job readiness but also ensures that industrial growth translates into inclusive economic participation across regions.

3 Incentivise the hiring and training of local and regional talent

To ensure that investments in training programmes and industry–academia collaboration translate into actual employment gains, **firms must be incentivised to hire and upskill local talent within their regional ecosystems**. While enhancing regional integration with tailored training to industrial clusters improve the supply side of skills development, it is equally important to tackle demand-side measures to ensure local absorption. Without employer buy-in, training systems risk producing graduates disconnected from local labour markets, especially in transitional and less-developed regions.

To achieve this, implementation of **place-based incentive schemes that encourage firms operating within regional industrial hubs to actively recruit and invest in local talent is needed**. These could include wage subsidies for local hires, co-funded apprenticeships with nearby training institutions, tax deductions for in-house training initiatives, or fast-tracked industrial approvals for firms demonstrating strong local employment commitments. Tying incentives to specific economic corridors, industrial parks, or high-potential rural districts could reinforce the effectiveness of cluster-specific training and industry–academia coordination, at the same time ensures that local communities benefit directly from nearby industrial growth.

7.2.3. Pillar 3: Elevate Social Recognition of Technical Professions

Professional recognition must be understood not just as a formal credential but as an ecosystem that involves individual aspirations, academic pathways and institutional performance. The key findings of under this pillar is as follows:

Key findings from Chapter 6

Professional recognition acts as a lever for career advancement and labour market signalling, but returns are not uniform

Professional recognition is evidenced to boosts technical confidence and career mobility among T&T talent. More than a third of members across all recognition status reported greater confidence and motivation to apply for higher-skilled roles after obtaining certification. Evidence from the shift into professional-level roles over time, the upward mobility is pronounced among the Qualified Technicians and Certified Technicians. However, recognition uptake remains reactive rather than planned, especially among early-career professionals, women and those in low-paying technical sectors. Awareness gaps were also common among members with many only realising the value of certification post-graduation.

Despite strong perceived employer preference for recognised professionals, the actual return on certification remains limited. Only about one-fifth of Professional Technologists and Certified Technicians reported career progression resulting from recognition. FGDs reveal persistent employer misconceptions, mostly in the private sector where MBOT titles are often viewed as honorary rather than competency based.

Fragmented employer appreciation further contributes to uneven wage gains and minimal formal integration of recognition into HR systems. Gender disparities persist, with women in senior technical roles reporting remarkably lower wage returns even within similar certifications.

Academic accreditation shapes graduate pathways and labour market readiness, though its potential is underutilised

Academic accreditation plays a key but underutilised role in shaping graduate employability and early career mobility. Graduates from MBOT-accredited programmes, particularly among diploma-level holders and those aged 20–29, reported higher confidence in job readiness and faster employment outcomes than peers from non-accredited institutions. The accreditation functions not merely as a quality assurance mechanism, but also as a signalling device that validates applied competencies and improves field-of-study job alignment. However, awareness remains low with almost half graduates discovered their accreditation status only after graduation, hence, it's hinting to limit its use as a proactive career planning tool.
Accreditation were found uneven outcomes across institutions and constrained by structural bottlenecks. Graduates from institutions with full or SWA accreditation consistently show better job alignment and salary outcomes. By contrast, those from transitional institutions face poorer labour market prospects, with nearly half earnings below RM2,000. While MBOT accreditation contributes to curriculum-employer alignment, wage returns remain suppressed. Thus, this situates that accreditation alone is insufficient without complementary reforms in hiring, promotion and compensation structures. Institutional fragility, compliance fatigue and abrupt policy changes further hinder continuity and the effectiveness of accreditation systems.

Strengthening member trust and institutional value through professional skill recognition

Member satisfaction with MBOT reflects moderate institutional trust, but early-career engagement and perceived value remain critical weaknesses. While the overall satisfaction index sits at a moderately positive score, detail analysis shows disparities across recognition status and career stages. Mid-career professionals, particularly Certified Technicians and Professional Technologists in structured organisations (e.g. academia, GLCs), report relatively higher satisfaction. In contrast, Graduate Technologists and Qualified Technicians (who represent the entry point into the professional recognition pathway) report consistently lower satisfaction in couple of areas such as perceived value, personal benefits and service delivery. This signals an urgent need for MBOT to tailor onboarding, communication and support mechanisms for early-career members to protect long-term legitimacy of its role and function.

Perceived returns from recognition are undermined by limited visibility, weak wage gains and fragmented communication. The lowest index score lies in perceived value, driven by members' scepticism about whether recognition justifies the cost. In particular among private sector settings where Ts. or Tc. titles carry little weight in promotions, wage scales, or procurement eligibility. FGDs further revealed that many discovered MBOT through informal channels, pointing to fragmented outreach. While members value MBOT's policy influence and its ecosystem-building role, this appreciation is concentrated among those already embedded in structured sectors, not among emerging or underrepresented cohorts.

Thus, recognising the important role that MBOT brought in elevating the visibility, credibility and career progression of technical talent, **we propose three policy recommendations to strengthen MBOT's position in professional recognition, academic accreditation and member engagement frameworks**:

1 Institutionalise recognition for real returns

Formalise MBOT professional recognition within national and organisational career frameworks. MOHR, with MBOT and industry bodies, should work towards establishing Recognition-Linked Career Ladders Framework that ties MBOT's professional recognition and certification (Ts. and Tc.) to promotions, functional roles and remuneration. Such frameworks are growing in place within various public sector agencies and government-linked corporations, where competency-based systems tie professional recognition to advancement into higher technical and managerial roles. Progress is also seen in the private sector across diverse industries, including energy, plantation, healthcare, technology services, higher education and consulting where job specifications are beginning to explicitly require or recognise MBOT certification. Some policy incentives such as recognition-linked HRD tax exemptions, procurement advantages for recognition-compliant firms or employer accreditation schemes would make this career ladders gain traction in the private sector, especially among SMEs and high-growth industries.

MBOT should lead recognition-centric workforce planning by identifying emerging occupational clusters and building adaptive certification frameworks that reflect labour market needs. To maximise impact, MBOT's registry should be integrated into TalentCorp's My National Skills Registry (MyNSR)—creating a coherent labour market intelligence system. Simultaneously, targeted campaigns such as recognition clinics, mentorship pairings and industry showcases should be deployed to increase awareness among students, early-career professionals and underrepresented groups, particularly women and technicians in informal or low-paying roles.

Recognition must translate into meaningful economic rewards. Introduce Recognition-Indexed Wage Guidelines to complement existing salary frameworks or inform future wage policy formulation. This would institutionalise wage progression linked to skill certification and reinforce certification's labour market value. To address persistent gender wage gaps, mandate gender pay audits in sectors where MBOT certification is prevalent—ensuring equitable returns for certified women and setting industry benchmarks for inclusive recognition outcomes.

2 Reposition MBOT accreditation as a strategic tool for graduate employability, institutional visibility and wage equity

Reposition accreditation as a strategic enabler of graduate employability. MBOT and TVET institutions should embed accreditation into post-graduation transitions, including employer outreach, structured career guidance and job-matching mechanisms. Accreditation should not be treated as a one-time compliance exercise, but a continuous quality investment that supports student-to-job pipelines, particularly in non-degree qualifications.

Elevate visibility and integrate accreditation into wage and HR structures. National-level campaigns are needed to raise awareness of MBOT-accredited programmes — particularly among school leavers, counsellors and employers. Simultaneously, MBOT must work with industry bodies and employers to ensure that accreditation is recognised within recruitment, promotion and wage-setting frameworks. Wage disparities despite accreditation highlight the need to integrate recognition-linked compensation mechanisms into national and sectoral salary benchmarks.

Strengthen institutional capacity and ensure accreditation continuity. Institutions require sustained support to maintain accreditation quality. MBOT should invest in documentation training, digital accreditation management systems and capacity-building for institutional coordinators. Technology and Technical Accreditation Council (TTAC) must also coordinate with MQA and MOHE to manage accreditation policy changes more transparently, ensuring smooth transitions and avoiding disruption to programme continuity and labour market outcomes.

3 Strengthen recognition value through career integration, early support and institutional visibility

Build a stronger early-career pipeline and structured member journey. MBOT should launch targeted onboarding and continuous professional development pathways tailored for Graduate Technologists and early-career members. Mentorship schemes, such as pairing Ts. with Ts., segmented engagement strategies and personalised member journeys can help bridge the gap between certification and real-world application. In the longer term, MBOT should also consider creating a structured pathway to level up current Ts. and Tc. into more advanced tiers based on practical experience and specialised skill certifications. This may include the introduction of a "Senior Ts." / "Senior Tc." designation to distinguish members with industry-recognised expertise, thereby reinforcing a recognition system that reflects both qualification and professional maturity. Such efforts ensure that recognition takes root early and retains its relevance across the career lifecycle.

Formalise professional recognition within public and private HR frameworks to unlock tangible labour market outcomes. MOSTI should support MBOT's coordination with key ministries, particularly the Public Service Department (JPA), to integrate Ts./Tc. titles into wage structures, promotion criteria, and broader functional requirements in policies and procedures, such as eligibility in procurement processes, technical validations or project approvals. Hence, Ts./Tc. titles are recognised not only for career progression and salary scales but also for eligibility in broader functional requirements in policies and the validation of specific technical skill sets, similar to how the "Ir." designation is used. At the same time, stronger engagement with the private sector, especially SMEs and HR associations, is key to embedding these recognitions into internal hiring practices, performance assessments and upskilling systems.

Enhance communication strategies and broaden institutional visibility. MBOT must overhaul its communications to improve outreach and responsiveness. This includes launching targeted campaigns for underrepresented groups (e.g. rural technologists, contract workers, women), onboarding platforms with career-planning resources and embedding feedback-response benchmarks in its SOPs. To strengthen its public legitimacy, MBOT should also formalise ecosystem partnerships with key national agencies (e.g. DOSH, MQA, CIDB) and link professional recognition to national agendas like digitalisation and green growth.

7.3 Concluding Remarks

As a collaborative research initiative between Khazanah Research Institute and the Malaysia Board of Technologists, this report examines how professional recognition and skills accreditation can be more effectively harnessed to strengthen Malaysia's T&T workforce. While MBOT serves as a key case study, the analysis extends beyond accreditation to explore the wider ecosystem shaping T&T talent in the country. Each chapter contributes to a progressively deeper understanding of the current state and challenges within the national T&T pipeline.

With the growing mentions of TVET education as a game changer for Malaysia's technical talent, it is important to understand its development in relation to national goals and industrial demands. Examination of the evolution and current state of Malaysia's TVET education system reveals several key challenges, including limited pathways to tertiary-level TVET education, regional imbalances in access and training alignment and the underutilisation of lifelong learning opportunities due to fragmented programmes. While the system has grown and adapted to regional economic needs, its expansion is hindered by structural gaps and a lack of coordination.

The analysis on the supply and demand of T&T talents in Malaysia also brought forward several interesting findings. Focusing on graduate transitions from education to employment and the conditions they face in the labour market, we found significant horizontal and vertical mismatches between qualifications and jobs, uneven employment outcomes across study fields and gender and skill-based wage disparities. Our report also identified a disconnect between job vacancies and actual employment, especially in sectors beyond Services, underscoring the need for better policy alignment in job creation strategies.

Complementing the discussion of the talent landscape, we then shift our lens to regional economic disparities, examining how spatial economic patterns influence labour market dynamics. The findings reveal a polarised structure where urban centres like KL, Selangor, P. Pinang and Johor dominate high-value sectors due to strong infrastructure and global integration, while rural states remain reliant on agriculture and mining, constrained by low diversification and competitiveness. Despite efforts through economic corridors to spur development in less urbanised areas, regional inequalities persist, with job opportunities heavily concentrated in urban hubs.

Agglomeration has been a national development approach, particularly in line with Malaysia's regional development strategy that focuses on achieving balanced growth across regions by optimising resource use and reducing economic disparities between urban and rural areas. However, this report identified persistent challenges, including talent underutilisation, premature deindustrialisation and weak regional labour markets. These issues reflect inefficient resource use, as seen in the mismatch between graduate qualifications and job availability, often forcing skilled individuals from less developed regions to seek temporary or unrelated work in urban centres like the Klang Valley.

While professional recognition and academic accreditation offer clear potential as levers for career advancement, their actual returns remain uneven and constrained by structural and perceptual barriers. Certification boosts confidence and career mobility, particularly among early-career technicians, but its impact is dulled by fragmented employer appreciation, gender disparities and low awareness among firms.

Similarly, MBOT's academic accreditation enhances job readiness and employment outcomes, yet many graduates remain unaware of its value until after entering the workforce. Satisfaction with MBOT's services reflects this ambivalence: mid-career professionals in structured organisations report higher trust and benefits, while entry-level members feel underserved. Without stronger visibility, employer buy-in and clearer pathways linking recognition to wage and role progression, the system risks under-delivering on its promise.

Given the complex challenges highlighted above, we suggest three policy pillars and their related recommendations, summarised as follows:

Pillar 1	Establish a Responsive and Industry-Aligned Talent Pipeline	
1	**Strategically broaden the availability of higher-level TVET programmes**	• Malaysia should focus on producing more TVET graduates with higher-level certifications and professional recognition. • There is a pressing need to establish and strategically distribute more tertiary-level TVET institutions and programmes across Malaysia.
2	**Strengthen MBOT's role in the broader TVET and lifelong learning landscape**	• MBOT should spearhead efforts in developing broader, field-diverse postgraduate pathways tailored specifically for TVET graduates. • There is a pressing need to expand and enhance the credibility, accessibility and utility of microcredential offerings to include all 24 fields under MBOT's mandates.
3	**Encourage job and talent creation in T&T-related service subsectors**	• To develop policies that encourage greater job creation in technology and technology-related services subsectors • Shift the focus of HEIs toward producing more graduates in T&T-related service sectors.

Pillar 2	Strengthen Regional and Industry Talent Matching	
1	**Enhance regional integration through stronger industry-academia coordination**	• Improve coordination and colocation between training institutions and local industries to align curricula with regional economic activities. • Specialise TVET institutions by regional strengths (e.g. automotive, petrochemicals) to enhance training relevance and job readiness.
2	**Promote the development of industrial cluster-specific training programmes**	• Embed cluster-specific TVET and certification programmes within emerging regional industrial hubs beyond urban centres. • Co-develop training with local employers to ensure alignment with industry needs and create specialised, high-impact institutions.
3	**Incentivise the hiring and training of local and regional talent**	• Introduce place-based incentives (e.g. wage subsidies, tax relief, co-funded apprenticeships) for firms hiring and upskilling local workers. • Tie incentives to economic corridors and industrial zones to reinforce local employment absorption and community participation.

Pillar 3	Elevate Social Recognition of Technical Professions	
1	**Institutionalise recognition for real returns**	• Formalise MBOT professional recognition within national and organisational career frameworks. • MBOT should lead recognition-centric workforce planning by identifying emerging occupational clusters and building adaptive certification frameworks. • Recognition must translate into meaningful economic rewards.
2	**Reposition MBOT accreditation as a strategic tool for graduate employability, institutional visibility and wage equity**	• Reposition accreditation as a strategic enabler of graduate employability. • Elevate visibility and integrate accreditation into wage and HR structures. • Strengthen institutional capacity and ensure accreditation continuity.
3	**Strengthen recognition value through career integration, early support and institutional visibility**	• Build a stronger early-career pipeline and structured member journey. • Formalise recognition into public and private HR frameworks to improve value-for-money. • Enhance communication strategies and broaden institutional visibility.

Our recommendations are grounded in the realities of technology and technical talent in Malaysia. They are not designed to reinvent the wheel but to strengthen the spokes that connect our talent ecosystem, from education and training to recognition and employment. Our proposals aim to complement existing policies and frameworks while addressing the cracks that have left many skilled individuals under-recognised and underutilised.

At the heart of this report is a belief that meaningful professional recognition, equitable opportunity and structured support are critical for building a resilient and future-ready workforce. While challenges in implementation remain, this research hopes to offer a set of practical, inclusive and forward-looking policy pathways to elevate the value, visibility and strength of T&T talent in Malaysia.

APPENDICES

APPENDICES

APPENDIX A

RESEARCH METHODOLOGY

This study adopts a mixed-methods approach that integrates secondary and primary data through triangulations from both quantitative and qualitative inquiry to answer its research questions. A systematic triangulation of statistical evidence with experiential insights could enhance the research credibility and depth of its findings, where the observed patterns are not only validated but meaningfully contextualised within the scope of the research.

A.1. Methodology Overview

The methodology of this research is structured in two main components:

1. Landscape of T&T Talents: Anchored by secondary data sources, this component examines the supply-demand dynamics of T&T talents, skills development patterns and the spatial clustering of jobs across Malaysia.
2. MBOT as a case study: Driven by primary data sources, this component explores career pathways, the market value of certifications and the effectiveness of MBOT's professional recognition and academic accreditation functions.

Primary data collection involved a large-scale online survey conducted from March to April 2025, reaching over 3,710 MBOT members across key recognition categories: Graduate Technologists, Qualified Technicians, Professional Technologists (Ts.) and Certified Technicians (Tc.). To complement the survey findings with deeper insights, a series of focus group discussions were conducted among the key stakeholders, including industry representatives, training providers and policymakers.

A.1.1. Secondary data and analysis: The landscape of T&T talents

Secondary data sources were employed to provide a foundational understanding of the current state and trends within the T&T-based labour market landscape. Secondary data is collected from multiple administrative and survey-based datasets, including:

1. Graduate Tracer Study by MOHE: Provides insights into the supply of technical talent from tertiary institutions.
2. Graduate Career Tracking Survey by KRI: Focuses on outcomes of graduates from technical education streams.
3. Employment Statistics and Labour Force Survey by DOS: Analyses on employment outcomes of technical graduates (e.g. job match, employment status, sectors) and contributes to insights on industrial clustering.
4. Salary and Wages Survey by DOS: Captures salary trends across technical subsectors.
5. Web Scraping from TVET Madani[220]: To assess the number of TVET institutions across all states in Malaysia and the qualification level offered.
6. Several other Policy Documents: Reviewed to contextualise findings within current policy directions (e.g. TVET Policy 2030, NIMP, NETR).

These secondary sources were used to conduct descriptive trend analysis and spatial analysis, including Location Quotient (LQ), Shift-Share Analysis and Moran's I to map industrial hubs, identify regional disparities and understand the spatial dynamics of T&T job concentrations. Appendix B explains in detail the methodological aspects of each approach.

[220] https://www.tvet.gov.my/

A.1.2. Primary data and analysis: MBOT as a case study

Primary data collection was undertaken to provide micro-level insights into the experiences, outcomes and perceptions of T&T professionals, with a specific focus on MBOT's functions. Two main primary research activities were conducted during the data collection phase:

Online survey

In partnership with MBOT, a survey was distributed to its members, yielding responses from 2,043 individuals across four recognition categories, namely Graduate Technologists, Qualified Technicians, Professional Technologists (Ts.) and Certified Technicians (Tc.). The support provided by MBOT was instrumental, particularly in facilitating the sample selection process and dissemination the survey among its selected members. The survey captured information on career pathways, labour market value of certifications, satisfaction with recognition mechanisms and expectations for professional development.

Survey design and structure

The survey instrument was developed based on the instrument adapted from established frameworks such as the ILO[221] to assess the recognition and accreditation institutional mechanism and the American Customer Satisfaction Index (ACSI)[222] to assess member satisfaction and expectation. A closed-ended questionnaire (featuring multiple-choice and Likert scale items) was used to gather insights for the research. Refer to Appendix C for the full questionnaire. The questionnaire developed covers several key domains:

a. Demographic and professional background
b. Career entry and progression
c. Labour market value of certifications
d. Satisfaction with recognition and accreditation systems
e. Future aspirations and professional development needs

Pilot testing and instrument validation

A pilot test was conducted prior to the full execution of the survey to ensure that the questionnaire yielded reliable and valid responses aligned with the study's objectives. The pilot exercise involved 56 respondents, strategically selected to reflect the diversity of MBOT's membership across recognition categories, gender and technology fields. The collected survey data were carefully analysed for patterns such as response distribution, incidence of missing data and preliminary indicators of scale reliability. Necessary refinements were then made to strengthen the instrument and ensure the integrity of the final data collection. Complementing the pilot exercise, expert validation was undertaken to strengthen the content validity of the instrument. The questionnaire was reviewed by a panel of subject matter experts with established expertise in technical and technology education, labour market analysis and instrument development:

a. Dr Md Fauzi Md Ismail, MBOT
b. Dr Ahmad Nazim Aimran, Universiti Teknologi MARA
c. Dr Umawathy Techanamurthy, Universiti Kebangsaan Malaysia
d. Dr Diana Abdul Wahab, Universiti Malaya

[221] Jiří (2016)
[222] ACSI (n.d.)

The expert review process focused on ensuring the alignment of the questionnaire with the research objectives, verifying the relevance and adequacy of question items and strengthening the conceptual and operational framing of key domains. Feedback from the pilot and expert validation was incorporated to refine the final version of the questionnaire.

Method of data collection

The survey was administered online via the SurveyMonkey™ platform to ensure ease of access and participation. Email invitations containing unique survey links were sent by MBOT to the selected sample of registered members, encouraging direct engagement and ensuring that only eligible respondents participated. The approach provided a controlled and efficient mechanism to reach a wide cross-section of the MBOT membership while maintaining the confidentiality and integrity of the responses.

Through this dissemination strategy, the survey successfully collected completed and valid responses from 2,043 MBOT members, enabling representative subgroup analysis across different membership types and professional recognition status. The survey was open for responses from 26 March to 18 April 2025, during which MBOT actively supported outreach and follow-up communication to boost participation rates. The survey was designed to capture a representative snapshot of the experiences, outcomes and perceptions of T&T talent, with a specific focus on members registered under the MBOT, covering several key areas:

a. **Career Pathways –** Understanding the entry points, career progression and mobility patterns of T&T talents post-certification.
b. **Labour Market Outcomes –** To assess employment status, job matching, sectoral distribution, salary progression and the perceived value of certifications.
c. **Professional Recognition and Certification** – To evaluate the effectiveness of MBOT's certification system in improving employability, salary growth and career advancement.
d. **Training and Skills Development** – To gather feedback on training relevance, skills preparedness and the role of upskilling in meeting industry demands.
e. **Member Satisfaction and Expectations** – Through the adapted Member Satisfaction Index (MSI) model, based on the American Customer Satisfaction Index (ACSI), to assess satisfaction with recognition processes, certification credibility and career support mechanisms.

Sampling frame

The sample frame for this survey was constructed using the MBOT registry of active individual members as of March 2025. While the overall MBOT registration comprises more than 93,000 members, the study covers individual members with active status and complete information for stratification and analysis purposes. To ensure uniqueness in sample selection, each member was classified according to their highest recognition status, based on MBOT's established hierarchy, i.e. Professional Technologist, Certified Technician, Graduate Technologist and Qualified Technician. This highest recognition approach was essential because individual members can hold multiple recognitions simultaneously. Thus, for consistency, the survey population only considered the member's highest achieved recognition level. After applying this classification, the initial eligible population stood at 65,541 active members. Upon reviewing the demographic records, it was found that 188 members had missing information regarding their assigned field of technology. As the field information is necessary for appropriate stratification process, these members were excluded from the final sample frame. Thus, the final effective sample frame retained a total of 65,353 members.

Table A.7.1: Population size of MBOT and effective sample frame of survey

Recognition category	Population size		Effective Sample frame	
	N	(%)	N	(%)
Professional Technologist	23,878	36.4	23,877	36.5
Graduate Technologist	30,326	46.3	30,182	46.2
Certified Technician	3,160	4.8	3,160	4.8
Qualified Technician	8,177	12.5	8,134	12.5
Overall	**65,541**	**100**	**65,353**	**100**

These members were then further classified across 24 technology and technical fields and grouped into four broader categories for analytical purposes:

Table A.7.2: MBOT population distribution by recognition category and technology field

Recognition Category	Technology Field	N	(%)
Applied Science	Agro-Based Technology (AF)	642	1.0
	Biotechnology (BT)	1,225	1.9
	Chemical Technology (CM)	1,413	2.2
	Food Technology (FT)	602	0.9
	Material Science Technology (MT)	1,063	1.6
	Nano Technology (NT)	167	0.3
	Total	**5,112**	**7.8**
IT-based	Art Design & Creative Multimedia Technology (AM)	1,001	1.5
	Cyber Security Technology (CS)	534	0.8
	Information & Communication Technology (IT)	8,796	13.5
	Total	**10,331**	**15.8**
Industrial-based	Aerospace & Aviation Technology (AV)	946	1.4
	Automotive Technology (AT)	1,923	2.9
	Building & Construction Technology (BC)	13,742	21.0
	Electrical & Electronic Technology (EE)	13,957	21.4
	Health & Medical Technology (HM)	470	0.7
	Manufacturing & Industrial Technology (ME)	8,906	13.6
	Maritime Technology (MI)	755	1.2
	Oil & Gas Technology (OG)	4,455	6.8
	Telecommunication & Broadcasting Technology (TB)	1,200	1.8
	Transportation & Logistic Technology (TL)	605	0.9
	Total	**46,959**	**71.9**
Sustainable & Critical Technologies (SCT)	Atmospheric Science & Environment Technology (AC)	664	1.0
	Green Technology (GT)	1,428	2.2
	Marine Technology (MR)	187	0.3
	Nuclear & Radiological Technology (NR)	202	0.3
	Resource Based, Survey & Geomatics Technology (RB)	470	0.7
	Total	**2,951**	**4.5**
	Total	**65,353**	**100**

Source: MBOT (2025)

This step at ensuring proper identification of sample frame is important to confirm that the survey findings accurately reflect the active MBOT individual member population based on unique recognition status, gender composition and technological specialisation.

Sample Design

A two-stage stratified sampling approach was used to ensure the survey sample reflected the diversity of MBOT's membership. Since members vary by recognition category, gender and field of technology, this method ensured all key subgroups were properly represented, making the survey results more representative of the overall MBOT population.

Step 1: Stratification

The first step involved stratifying the list of active MBOT members based on key variables known to influence the experiences and perspectives of members:

Table A.7.3: Stratification of MBOT members by category

Strata	Category
Primary strata	Recognition category: (1) Professional Technologist (2) Certified Technician (3) Graduate Technologist (4) Qualified Technician
Secondary strata	Gender: (1) Male (2) Female
Tertiary strata	Broad technology fields: (1) Applied Sciences (2) IT-based (3) Industrial-based (4) Sustainable & Critical Technologies (SCT)

Step 2: Sample size determination

The sample size for this survey was determined in accordance with appropriate statistical approach with practical feasibility considerations, i.e. time constraints, budgetary limitations and expected response rates. The following criteria were used to determine the survey sample size:

a. Required precision (targeting a 10% margin of error)
b. A confidence level of 90%
c. Expected variability within the population
d. Anticipated response rate based on past survey experiences (estimated at 85%)

While a 95% confidence level and a 5% margin of error are often considered standard in many large-scale population surveys[223], such parameters significantly increase the required sample size, which may not always be feasible in organisational or targeted population surveys[224]. Given the operational feasibilities of project, a 90% confidence level was adopted as a pragmatic alternative to reduce the required sample size without substantially compromising the validity or generalisability of the results.

Literature supports the use of 90% confidence levels in social science and organisational research, where it aligned with the approach taken in this survey, when (i) the population is well-defined[225] (i.e., MBOT registry of active members (ii) Sampling is stratified[226] (to ensure representativeness) and (iii) the aim is to support policy insights or operational decisions rather than legal or clinical outcomes[227].

[223] Krejcie and Morgan (1970)
[224] Lohr (2021)
[225] Alwin (2007)
[226] Rahman et al. (2022)
[227] Dillman, Smyth, and Christian (2014); Fink (2024)

A 10% margin of error was applied, considering the stratified nature of the sample and the policy-oriented objectives of the survey. According to standard survey practice[228], higher margins of error (up to 10%) are often acceptable when (i) the survey targets a specific population of interest with relatively small population size and (ii) resource constraints limit the ability to achieve large sample sizes.

Furthermore, the use of stratified sampling ensures that key subgroups (recognition status, gender, technology fields) are adequately represented, helping mitigate some risks associated with a larger margin of error. An 85% response rate was assumed based on previous survey experiences held by MBOT, which demonstrated strong participation among members. Several factors support this optimistic response rate assumption:

a. Historical evidence from prior survey conducted by MBOT to its member that demonstrates strong participation and responses;
b. Targeted incentives to further encourage participation, including (i) tokens of appreciation for respondents who completed the survey and (ii) Bonus Continuing Professional Development (CPD) points awarded upon completion, offering direct;
c. High perceived relevance of the survey content, as it directly benefits members; and
d. Direct communication channels between MBOT and its membership base, enhancing outreach effectiveness.

These strategies are consistent with best practices in maximizing survey response rates, particularly in professional organisation contexts[229]. The formula used for determining the sample size for each stratum was:

$$n_h = \frac{N_h}{N} \text{ x } n$$

Where n_h is sample size for stratum h, N_h is total members in each stratum h, N is total members in the entire population and n is total sample size. A structured multi-step sample size determination process was undertaken to ensure the survey results are statistically reliable and representative of the MBOT members population. This process accounts for population structure, design effects and expected survey response rates, as follows:

Proportionate sample size (n_1) : The initial step involved determining the proportionate sample size relative to the total population of MBOT members across each stratum. A stratum here refers to a unique combination of recognition category, gender and broad technology field. Based on the total eligible population of 65,353 members, an initial proportionate sample size (n_1) of 1,527 respondents was calculated. This proportionate sampling ensures that larger strata receive more weight in the sample, preserving representativeness.

Adjustment for Design Effect (n_2): Stratified sampling, while reducing sampling error, can introduce intraclass correlation within strata. It simply means that individuals in the same subgroup may have more similar responses compared to individuals from different groups. To account for this issue, a Design Effect (DE) of 2.0 was applied. Effective Sample Size (ESS), denoted as n_2, adjusts the initial sample size to maintain statistical validity under these conditions. Applying the design effect resulted in an ESS (n_2) of 3,054 respondents:

$$n_2 = n1 \ x \ DE$$

[228] Dillman, Smyth, and Christian (2014)
[229] Baruch and Holtom (2008)

Adjustment for Expected Response Rate (n_3): Given practical survey conditions, not all selected respondents will complete the survey. Based on previous MBOT surveys, a response rate of 85% was assumed — a strong rate, reflecting members' engagement levels. To ensure that the final achieved sample meets the required analytical power, the sample size was further adjusted. The final targeted total sample size (n_3) was therefore set at 3,710 respondents, calculated as:

$$n_3 = \frac{n_2}{ERR}$$

This means the survey needed 3,710 members to achieve the desired effective responses after accounting for non-responses. The distribution of expected sample size is presented in Table A.7.4.

Table A.7.4: Distribution of expected sample size by stratification code

Recognition Category	Technology Field	Gender		Total
		Male	Female	
Professional Technologist	Applied Science	145	145	290
	IT-based	150	147	297
	Industrial-based	153	151	304
	Sustainable & Critical Technologies (SCT)	144	133	277
Graduate Technologist	Applied Science	147	148	295
	IT-based	151	149	300
	Industrial-based	153	152	305
	Sustainable & Critical Technologies (SCT)	144	139	283
Certified Technician	Applied Science	73	10	83
	IT-based	124	32	156
	Industrial-based	150	117	267
	Sustainable & Critical Technologies (SCT)	46	8	54
Qualified Technician	Applied Science	99	30	129
	IT-based	142	120	262
	Industrial-based	152	144	296
	Sustainable & Critical Technologies (SCT)	95	17	112
	Overall	**2,068**	**1,642**	**3,710**

Sampling Precision (Relative Standard Error): To maintain high precision, the Relative Standard Error (RSE) for each stratum was kept below 30%, as shown in the orange-highlighted table. Sample sizes for smaller strata were adjusted upwards where needed to control RSE, ensuring that even small groups within the population were adequately represented for analysis. RSE is a measure of the precision of a survey estimate, expressed as a percentage of the estimate itself:

$$RSE = \left(\frac{Standard\ Error}{Estimate}\right) \times 100$$

Lower RSE values indicate more precise estimates and RSE below 30% is commonly accepted in social surveys and organisational studies[230], ensuring that estimates at the subgroup level are statistically reliable and not overly distorted by sampling variability. Thus, monitoring RSE during the sample size determination phase is important to ensure the quality and interpretability of results.

Actual sample and response rate

Data collection for the survey was conducted over a period of four weeks, from 26 March 2025 to 28 April 2025. Table A.7.5 summarises the key outcomes of the survey data collection process. A total of 3,710 invitations were sent to the sampled MBOT members. Over the four-week collection period, 2,423 responses were received, representing a gross response rate of 65.31%. A total of 380 responses (approximately 15.7%) were excluded due to incompleteness or invalid entries, consistent with standard practice in survey-based research.

[230]Maintaining RSE below 30% is a common standard in survey research to ensure reliability of subgroup estimates (Lohr, 2021).

After conducting data cleaning and quality checks, 2,043 responses were retained as complete and usable for analysis, resulting in a net usable response rate of 55.06. Although the final response rate for the survey is lower than the originally anticipated, it remains high compared to typical response rates observed in professional, membership-based surveys and labour force studies.

Table A.7.5: Key outcomes of the survey data collection

Category	Distribution	
	N	(%)
Total Invited	3,710	100
Total Received	2,423	65.3
Completed Responses	2,043	55.1
Incomplete Responses	380	10.2

According to Baruch and Holtom (2008), average response rates for organisational surveys typically range between 35% and 40%, even under optimal conditions. In comparison, the survey's response rate of 55.06% is substantially higher than typical benchmarks, reflecting strong engagement from MBOT's member base despite the shorter data collection window and growing survey fatigue commonly observed across professional populations. Importantly, the sample of 2,043 completed responses remains adequate to represent the key strata defined in the survey's sampling design.

Preliminary checks against the stratified design show that the collected data retains sufficient subgroup distribution to allow for meaningful disaggregation and comparative analysis across key segments, even though some minor weighting adjustments is needed for full inferential analysis if needed. Thus, the final sample remains sufficiently robust, particularly given the relatively short collection period and growing challenges in responses gathered among Graduate Technician and Qualified Technician cohorts. Furthermore, preliminary representativeness checks indicate that the completed sample maintains close alignment with the key stratification variables, namely, recognition category, gender and broad technology field. This step would reinforce confidence in the generalisability of the findings.

Representativeness and non-response bias

Preliminary comparisons between the achieved sample distribution and the original sampling frame show no major distortions across recognition categories and technology fields. While minor deviations were observed in some gender subgroups, they remain within acceptable thresholds for organisational survey standards (typically within ±5%). Thus, the risk of significant non-response bias affecting the main findings is considered low.

Table A.7.6: Population versus sample proportion for the survey

Category	Details	Distribution		
		Population Proportion	Sample Proportion	Proportion Difference
Professional Category	Professional Technologist	36.4	35.8	-0.6
	Graduate Technologist	46.3	47	0.7
	Certified Technician	4.8	4.5	-0.3
	Qualified Technician	12.5	12.7	0.2
Gender	Male	73.5	74.2	0.7
	Female	26.5	25.8	-0.7
Broad Technology Field	Applied	21.5	21	-0.5
	IT-based	27.4	28	0.6
	Industry	31.6	30.8	-0.8
	SCT	19.6	20.2	0.6

Estimation procedures

To ensure that the survey findings are statistically representative of the MBOT membership population, weighting adjustments were applied during the estimation stage. Weighting is necessary in survey analysis to correct for potential biases caused by non-response, sample design characteristics and variations between the sample and the target population. For the survey, two key forms of weighting were used. First, adjusted weight was calculated to account for non-response cases observed during the survey. Although the initial sample was designed to proportionally reflect the MBOT member population across recognition categories, gender and broad technology fields, some degree of non-response within strata was inevitable. The adjusted weight modifies the contribution of each respondent to correct for differential response rates across strata. Specifically, the adjusted weight for each stratum was determined based on the ratio of the total number of individuals selected in the sample to the number of completed and usable responses obtained from that stratum. This adjustment ensures that each subgroup's actual influence in the analysis reflects its intended weight in the population, thereby reducing bias due to uneven participation across groups.

Second, the population factor calibration is applied to the final sample. In this sampling design, the final achieved sample size is treated as a random variable, which can introduce sampling variability and potential error when producing population-level estimates. To mitigate these effects, an external calibration factor, referred to as the Population Factor, was applied. The population factor serves to align the weighted sample estimates with the most up-to-date MBOT population totals as of March 2025. This factor inflates or adjusts the rates, ratios and aggregates estimated from the survey so that they better approximate what would have been obtained had a complete census been conducted. The Population Factor was calculated based on the current MBOT active membership registry, benchmarked across three key stratification variables.

Focus Group Discussion (FGD) design and execution

In addition to the quantitative survey, a qualitative data collection exercise was conducted to complement and deepen the findings of the study. Recognising that survey instruments may not fully capture the complex and nuanced experiences surrounding skills accreditation and professional recognition, FGD were employed to provide richer insights to the study. The qualitative component aligns with MBOT's broader mandate not only to professional recognition and certification but also to assess the quality of academic accreditation in technology-based education programmes. In fulfilling this mandate, MBOT has established the Technology and Technical Accreditation Council (TTAC), serving as a Technical Accreditation Committee alongside the Malaysian Qualifications Agency (MQA) in overseeing the accreditation processes of educational programmes within the technology and technical domains.

To support the objectives of this study, the research conducted a series of FGDs that aimed to explore issues such as (i) stakeholders' perceptions of the value and effectiveness of MBOT's accreditation processes (ii) the influence of accreditation on the quality of training programmes and (iii) the challenges and opportunities arising from MBOT's role in programme evaluation. The FGD process followed several key steps as the following to ensure its methodological rigour:

Instrument development

A semi-structured FGD guide was developed, grounded in the conceptual framework of the study and aligned with MBOT's accreditation policies. The guide included open-ended questions designed to elicit in-depth reflections on accreditation processes, quality assurance practices, stakeholder engagement and career outcomes. The FGD instrument was carefully designed to explore the impact of MBOT's accreditation activities on institutions, graduates, industries and policy aspirations. It was structured into five key focus areas; each aligned with the research objectives to ensure it could answer the objective of the research:

a. Awareness and recognition of MBOT accreditation
   i. how institutions and stakeholders became aware of MBOT's accreditation role.
   ii. Perceptions of MBOT accreditation compared to other accreditation bodies such as BEM/ETAC and MQA.
   iii. Motivations behind seeking MBOT accreditation and its value among employers and industry players.
b. Career impact and professional growth
   i. how MBOT accreditation influences graduates' labour market value, professional credibility and career advancement opportunities.
   ii. differences observed between MBOT-accredited and non-MBOT-accredited programme graduates.
c. Accreditation process and institutional challenges
   i. institutional experiences with the TTAC-MBOT accreditation process, including smoothness, clarity of guidelines and areas of difficulty.
   ii. challenges faced during accreditation and gathering suggestions for process improvements and efficiency enhancements.
d. Future directions and strategic recommendations
   i. views on how MBOT can strengthen its accreditation system, improve international recognition and contribute more effectively to Malaysia's workforce development agenda.
   ii. policy reforms or improvements supporting accreditation efforts.
e. Closing reflections
   i. final thoughts on MBOT's accreditation role, its perceived impact on bridging the skills gap and participants' broader aspirations for MBOT's role in the next 5–10 years.

To ensure that the FGD instrument was methodologically sound, contextually appropriate and capable of generating in-depth, actionable insights to support the broader objectives of the research, the instrument was tested trough expert feedback and pilot testing. Feedback from the expert panel was incorporated to refine the language, sequencing and scope of the discussion guide, ensuring that the instrument would be effective in eliciting rich and policy-relevant insights.

Subsequently, a pilot FGD session was conducted with a small group of participants drawn from a similar profile to the target participants. The aim of pilot testing was to test the practicality and flow of the discussion guide, to assess the timing and pacing of key sections, as well as to identify any ambiguities or areas requiring further clarification. In addition, it also helps to fine-tune the moderation techniques to foster active and balanced participation. Observations from the pilot session confirmed that the guide was fit for purpose, with minor adjustments made to enhance question sequencing and improve participant engagement.

Participant selection: Participants were selected purposively to ensure a diverse and relevant representation, including individuals directly involved in programme development, accreditation reviews, or beneficiaries of accredited programmes. Invitations were issued for closed-door discussions to promote candid and honest dialogue.

Data collection: The FGDs were conducted in a moderated format by trained facilitators, ensuring structured yet flexible discussions. Participants were briefed on the objectives of the session, assured of confidentiality and informed consent was obtained before participation.

Data Documentation and Analysis: Detailed notes and recordings (where consented) were taken during the sessions. The qualitative data was subsequently analysed using thematic analysis techniques to identify key patterns, recurring themes and emerging issues relevant to MBOT's accreditation efforts.

APPENDIX B

ANALYTICAL APPROACH

The overall analytical framework employed in this study, integrates both secondary data analysis and primary data collection to provide a comprehensive and multidimensional understanding the T&T talents pipeline and landscape, experiences and institutional mechanisms. The framework reflects a structured combination of quantitative and qualitative approaches, designed to extract robust evidence to support policy recommendations. The approach is organised into four main pillars – (a) Labour market & training (b) Spatial analysis (c) Member's experience & outcomes and (d) Institutional mechanisms.

B.1. Labour Market Landscape & Training

B.1.1. Descriptives Assessment & Trend Analysis

This component analyses existing labour market and training datasets to critically assess insights into the broader supply-demand dynamics that frame the experiences of T&T talents pipeline in Malaysia:

a. Assess flows of graduates, access to training, skill levels and the alignment of training systems with market needs;
b. Identify sector-specific job trends and emerging skill demands;
c. Support analysis of career progression pathways based on training system outputs and evolving industrial needs; and
d. Trend analysis provides critical insights into the broader supply-demand dynamics that frame the experiences of T&T professionals.

B.1.2. Spatial Analysis

Spatial analysis was conducted to complement the labour market assessment by examining the geographic distribution and concentration of T&T job opportunities in Malaysia. Using techniques such as Location Quotient (LQ), Shift-Share Analysis and Moran's I spatial autocorrelation, the study identified key industrial hubs, emerging regional clusters and spatial mismatches between training institutions and labour market demand. This approach provides critical insights into where skills are needed most, how regional specialisations are evolving and where policy interventions may be required to address spatial inequalities in access to T&T employment opportunities. Thus, the study supports more targeted workforce development and regional planning strategies aligned with Malaysia's talent aspirations.

Location Quotient (LQ)

The Location Quotient (LQ) measures industry specialisation in each state relative to the national average, identifying job concentration by sector. It is a standard tool in economic geography for detecting agglomeration[231].

[231] Mo et al. (2020); Amalia (2025)

The LQ is calculated as:

$$\left[LQ_{s,i,t} = \frac{\frac{E_{s,i,t}}{E_{s,t}}}{\frac{E_{i,t}}{E_t}} \right]$$

Where:
- $(E_{s,i,t})$ = Employment in industry (i) in state (s) in year (t)
- $(E_{s,t})$ = Total employment in state (s) in year (t)
- $(E_{i,t})$ = Total national employment in industry (i) in year (t)
- (E_t) = Total national employment in year (t)

An LQ > 1 indicates specialisation, LQ < 1 suggests underrepresentation and LQ = 1 aligns with the national share.

Shift-Share Analysis (SSA)[232]

SSA is commonly used to disaggregate regional employment or output changes into three main components: national growth, industry mix and regional competitiveness[233]. To classify regions based on their intrinsic characteristics, a typology is developed using the signs (positive or negative) of the three intrinsic regional effects:

i. Competitive Effect (CE): CE measures the competitiveness of a specific sector (i) in region (j) relative to the same sector at the national level. A positive CE indicates that the regional sector is growing faster than its national counterpart, suggesting a competitive advantage due to region-specific factors such as innovation, productivity, or favourable local conditions. A negative CE implies that the regional sector is underperforming compared to the national sector, highlighting a competitive disadvantage that may require targeted interventions to improve sectoral performance.
ii. Regional Industry Mix Effect (RIE): RIE evaluates the performance of sector (i) within region (j) compared to the overall regional economy. This effect assesses whether the region has a comparative advantage or disadvantage in the specific sector relative to other sectors within its economy. A positive RIE suggests that the sector is more dynamic than the regional average, indicating a regional specialisation or strength in that sector. Conversely, a negative RIE implies that the sector is less dynamic than other sectors in the region, pointing to a lack of regional specialisation.
iii. Regional Sectoral Effect (RSE): is a novel component introduced in the comprehensive shift-share analysis, comparing the overall growth of the regional economy (g) to the national economy's growth across all sectors (G) This effect evaluates the relative strength or weakness of the entire regional economy compared to the national economy, regardless of the specific sector. A positive RSE indicates that the region's economy is growing faster than the national economy, suggesting a robust regional economic structure that can support sectoral growth. A negative RSE suggests that the regional economy is less dynamic than the national economy, which may hinder sectoral performance.

[232] The comprehensive non-spatial shift-share analysis (SSA) applied in this study is built upon the framework proposed by Montanía et al. (2024)
[233] Manullang, Rusgiyono, and Warsito (n.d.)

The Regional Sectoral Effect Together, CE, RIE and RSE form the "intrinsic regional effects" that capture the unique characteristics of a region's economy, distinguishing them from national trends (captured by the National Effect and Industry Mix Effect)[234]. CE focuses on how a region's sector compares to the national sector, RIE examines the sector's role within the regional economy and RSE assesses the overall regional economy's performance against the national benchmark.

These effects provide a nuanced understanding of regional growth drivers, enabling policymakers to identify whether sectoral performance stems from national competitiveness, regional specialisation, or overall regional economic dynamism.

This results in 8 different typologies classified as T1 to T8 as shown in Table B.1 Key indicators:

1. T1 regions exhibit competitive advantages in a sector at both national and regional levels with a dynamic regional economy,
2. T2 to T4 regions show varying combinations of sectoral competitiveness and regional economic performance, such as national strength but regional weaknesses.
3. T5 to T6 regions have regional sectoral advantages but struggle nationally, with R5 benefiting from a strong regional economy and R6 hindered by a weaker one.
4. T7 and T8 regions face sectoral disadvantages, with T7 having a stronger regional economy and R8 showing weaknesses across all dimensions.

Table B.1: Regional classification based on intrinsic regional effects of the shift-share analysis

CE	RIE	RSE	Region Type
+	+	+	T1
+	+	-	T2
+	-	+	T3
+	-	-	T4
-	+	+	T5
-	+	-	T6
-	-	+	T7
-	-	-	T8

Source: Montanía et al. (2024)

The SSA is used to decompose regional economic changes into components that capture both national and regional influences, focusing on the intrinsic characteristics of regions. The variable of interest, denoted as (X), represents the economic indicator i.e. the number of employments for sector (i) in region (j) at time (t). Four growth rates are defined to facilitate the decomposition:

$\left(g_i = \frac{X_{i,j}^{t+1} - X_{i,j}^{t}}{X_{i,j}^{t}}\right)$: The annual growth rate of (X) in sector (i) in of region (j) in

$\left(g = \frac{X_{j}^{t+1} - X_{j}^{t}}{X_{j}^{t}}\right)$: The annual growth rate of (X) across all sectors in region (j), reflecting the regional sectoral composition.

$\left(G_i = \frac{X_{i}^{t+1} - X_{i}^{t}}{X_{i}^{t}}\right)$: The annual growth rate of (X) in sector (i) in at the national level.

$\left(G = \frac{X^{t+1} - X^{t}}{X^{t}}\right)$: The annual growth rate of (X) across all sectors at the national level, conditioned by the national sectoral composition.

[234] Montanía et al. (2024)

The comprehensive non-spatial SSA extends the traditional decomposition by Dunn (1960) to include additional effects that account for regional characteristics. The proposed decomposition is expressed as:

$$\left[g_i X_{i,j}^t = G X_{i,j}^t + (G_i - G) X_{i,j}^t + (g_i - G_i) X_{i,j}^t + (g_i - g) X_{i,j}^t + (g - G) X_{i,j}^t + (G - g_i) X_{i,j}^t\right]$$

This equation decomposes the regional sectoral growth into six components, defined as follows:

1. National Effect (NE): $\left(G X_{i,j}^t\right)$, representing the influence of national economic growth on the sector in the region.
2. Industry Mix Effect (IM): $\left((G_i - G) X_{i,j}^t\right)$, capturing the impact of the national sectoral structure, indicating whether the region benefits from specializing in nationally dynamic sectors.
3. Competitive Effect (CE): $\left((g_i - G_i) X_{i,j}^t\right)$, measuring the competitiveness of the regional sector compared to the same sector nationally.
4. Regional Industry Mix Effect (RIE): $\left((g_i - g) X_{i,j}^t\right)$, assessing whether the region has a comparative advantage or disadvantage in sector (i) relative to other sectors within the region.
5. Regional Sectoral Effect (RSE): $\left((g - G) X_{i,j}^t\right)$, a novel effect evaluating the strength or weakness of the regional economy compared to the national economy across all sectors.

Residual Contextual Competitive Effect (RCCE): $\left((G - g_i) X_{i,j}^t\right)$, a combined effect comparing the national economy's growth to the regional sector's growth, providing supplementary insights but limited by its mixed geographical and sectoral nature.

Moran's I

Moran's I detect whether an economic variable is clustered, dispersed, or randomly distributed across space[235]. This method is particularly useful in analysing regional disparities and identifying economic clusters[236]. Studies have employed Moran's I alongside LQ and Shift-Share Analysis to examine the spatial concentration of industries and regional employment dynamics[237].

The equation for Moran's I is:

$$\left[I = \frac{n}{\sum_i \sum_j w_{ij}} \cdot \frac{\sum_i \sum_j w_{ij}(x_i - \bar{x})(x_j - \bar{x})}{\sum_i (x_i - \bar{x})^2}\right]$$

Where:

- (n)= Number of spatial units i.e. states
- (w_{ij}) = Spatial weight based on kNN approach with $\boldsymbol{k = 4}$
- (x_i) = Employment in state (i)
- ($\bar{x}$) = Mean employment

Values range from -1 (dispersion) to +1 (clustering).

[235] Twardowska and Jewczak (2017)
[236] Jing and Cai (2010)
[237] Manullang, Rusgiyono, and Warsito (n.d.)

The interpretation of Moran's I results hinges on understanding its role as a measure of spatial autocorrelation, ranging from -1 (perfect dispersion) to +1 (perfect clustering), with a value near zero indicating no spatial pattern. The associated p-value tests the statistical significance of this autocorrelation, where a p-value below 0.05 typically suggests a non-random spatial structure.

The Moran's I scatterplot divides the data into four quadrants based on the mean of log-transformed employment (x-axis) and spatially lagged log-employment (y-axis):

- Quadrant I (High-High) in the upper-right represents states with above-average employment surrounded by similar states, indicating clustering;
- Quadrant II (Low-High) in the upper-left shows states with below-average employment near high-employment areas, suggesting negative autocorrelation;
- Quadrant III (Low-Low) in the lower-left depicts states with low employment surrounded by low-employment neighbours, also indicative of clustering; and
- Quadrant IV (High-Low) in the lower-right captures states with high employment surrounded by low-employment areas, reinforcing dispersion.

Table B.2 summarises results for spatial autocorrelation analysis using Moran's I. It reveals no statistically significant clustering patterns in employment across Malaysia's states for all five major sectors: Agriculture, Construction, Manufacturing, Mining & Quarrying, and Services (p-values all > 0.05). Therefore, the result suggests that employment distribution in each sector does not follow strong spatial concentration or dispersion patterns. In other words, states with high (or low) employment in a sector are not consistently surrounded by states with similar employment intensity, pointing to a largely fragmented or spatially random employment geography. While quadrant positions (e.g. Sabah in High-High, Johor in High-Low) may suggest some intuitive patterns, these are not statistically robust and may reflect sector-specific industrial roles, administrative specialisation, or geographic isolation rather than true spatial clustering. The lack of significant spatial autocorrelation may indicate:

- Sectoral decentralisation (e.g. Services spread across states rather than concentrated);
- Administrative or economic specialisation (e.g. KL and Putrajaya's low employment due to administrative focus); and
- Limitations in capturing intra-state dynamics (e.g. urban-rural splits obscured in state-level aggregation).

Table B.2: Results for spatial autocorrelation analysis using Moran's I by sector, 2023

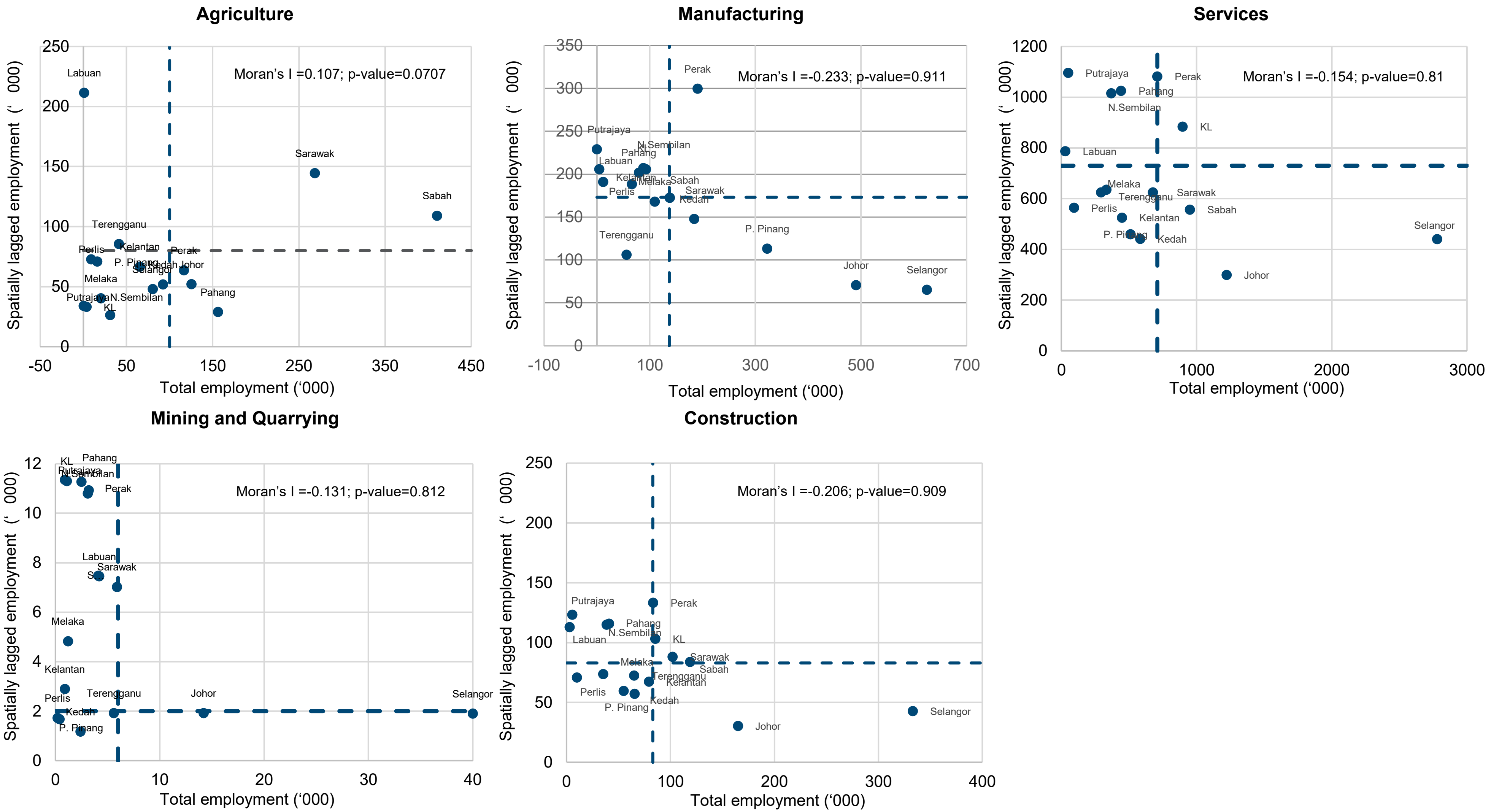
Sector	Moran's I	p-value	Quadrant Highlights
Agriculture	0.107	0.07	Sabah, Sarawak (High-High); KL, Putrajaya (Low-Low)
Construction	-0.206	0.91	Selangor, Johor (High-Low); Kedah, Terengganu (Low-Low)
Manufacturing	-0.233	0.91	Selangor, Johor (High-Low); Kelantan, Kedah (Low-Low)
Mining & Quarrying	-0.131	0.81	Sabah, Sarawak (High-High); KL, Putrajaya (Low-Low)
Services	-0.154	0.90	Selangor, Sabah (High-Low); Kedah, Kelantan (Low-Low)

Source: DOS (2023b) and KRI calculations

Note: All Moran's I results have p-values exceeding 0.05, meaning the observed spatial patterns are not statistically significant. These results should be interpreted with caution and not taken as definitive evidence of clustering or dispersion.

Figure B.1 displays the Moran's I scatterplots illustrating state-level employment distributions across different sectors.

Figure B.1: Moran's I scatterplots illustrating state-level employment distributions across different sectors, 2023



Source: DOS (2023b) and KRI calculations

Note: All Moran's I results have p-values exceeding 0.05, meaning the observed spatial patterns are not statistically significant. These results should be interpreted with caution and not taken as definitive evidence of clustering or dispersion.

B.1.3. Member experiences & outcomes

Career Progress Mapping and Matching

Career Progress Mapping involved analysing individual career trajectories to assess how MBOT recognition influenced employment pathways, professional advancement and labour market value. Respondents provided information about their current employment status, career progression since certification, salary ranges and perceived skills recognition in the workplace. The methodology applied included:

a. Descriptive statistics to map out typical career pathways by recognition category, gender and field of technology;
b. Cross-tabulation to explore how different strata (e.g. field of technology, gender) experience career mobility; and
c. Gap analysis comparing member expectations versus actual career outcomes in the labour market.

This analysis supports understanding of how MBOT accreditation translates into member career progression and value recognition across various sectors.

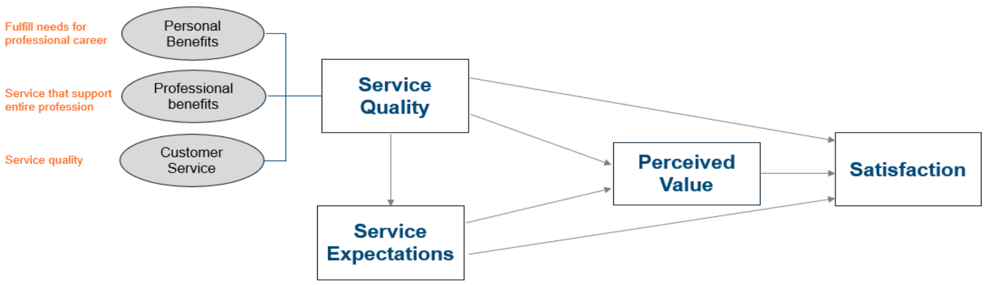
Member Satisfaction Index

To systematically assess members' experiences and outcomes, the study developed a Member Satisfaction Index grounded in a modified American Customer Satisfaction Index (ACSI)[238] model. The ACSI framework, originally conceptualised by Fornell et al. (1996), is internationally recognised for its strong explanatory power in measuring satisfaction outcomes across various organisational contexts, including professional associations. The adaptation of the ACSI model to the study reflects the unique nature of MBOT's role as a professional certifying and accrediting body. Figure B.2 features the index structure that captures three key dimensions of member experiences:

a. Service Quality (based on personal benefits, professional benefits and customer service);
b. Service Expectations, and;
c. Perceived Value of membership and services.

These dimensions collectively influence overall Member Satisfaction, as modelled through a structured set of interrelated latent variables. The relationship of the model provides a holistic picture of MBOT's ability to meet the needs of its certified members.

Figure B.2: Member Satisfaction Index framework



[238] ACSI (n.d.)

Several considerations justify the application of the ACSI model within this research. First, it aligns closely with the research objectives, where the core aim is to determine whether MBOT services and benefits meet member needs which directly reflecting the expectation-confirmation logic underpinning the ACSI framework. Second, the model's structure is highly relevant to MBOT's strategic goals, particularly those outlined in the MBOT STRIVE Strategic Plan[239], which emphasises strengthening member value propositions and service quality; adapting the ACSI model thus ensures the satisfaction measurement is well-aligned with MBOT's policy ambitions.

Third, the ACSI model is known for its high explanatory power, with literature demonstrating its strong predictive ability in explaining how satisfaction influences important outcomes such as customer retention, brand loyalty and service reputation[240] — a critical success factors for a professional body like MBOT. Finally, the reliability and adaptability of the ACSI constructs, as confirmed by prior studies across diverse sectors, further support its suitability for application in MBOT's professional and regulatory context[241].

Analytical approach: Weighting and estimation through the Structural Equation Modelling (SEM)

To construct the Member Satisfaction Index, a quantitative survey was administered incorporating (i) core ACSI-based items on Service Expectations, Service Quality, Perceived Value and Overall Satisfaction and (ii) additional items tailored to MBOT's unique service dimensions, such as impacts on career progression, networking opportunities and professional development.

Each question utilised a 6-point Likert scale to capture variations in responses, providing the necessary granularity for robust statistical modelling. An adoption of 6-point Likert scale for the survey instrument provides a deliberate choice aimed at enhancing the precision and reliability of member responses. Unlike odd-numbered scales (such as 5- or 7-point formats), a 6-point scale removes the neutral midpoint, thereby encouraging respondents to make a more definitive evaluation — either positively or negatively — regarding their experiences and perceptions[242].

This design choice is particularly relevant for the study, where the objective is to assess members' satisfaction and perceived value in a clear and actionable manner, reducing the risk of midpoint bias or non-committal answers. Additionally, a 6-point scale strikes a balance between providing sufficient response differentiation without overwhelming respondents, ensuring high response quality while maintaining survey engagement[243].

Given that MBOT members come from diverse professional and technical backgrounds, the even-point format facilitates clearer policy interpretation by avoiding ambiguous "neutral" positions, thus strengthening the validity of findings for informing MBOT's strategic and service improvement initiatives. Overall, the 6-point Likert approach supports more discriminative, policy-relevant data that better reflects member expectations and experiences. Importantly, to determine the relative importance (weight) of each construct in influencing satisfaction, the study employed Partial Least Squares Structural Equation Modelling (PLS-SEM). SEM accommodates complex inter-relationships between multiple latent variables[244], allowing for a more accurate representation of the theoretical model underpinning member satisfaction.

[239] MBOT (2024)
[240] See for example Xue and Yang (2008); Bazrafkan, Iranban, and Jafarpour (2014); Kim et al. (2013)
[241] ACSI (n.d.)
[242] Chomeya (2010); Garland (1991)
[243] Finstad (2010)
[244] Sarstedt, Ringle, and Hair (2021)

Additionally, SEM minimises measurement error by accounting for errors in observed variables, thereby improving the precision of estimates[245]. It also supports the computation of self-weighted indexes based on the empirical strength of relationships between constructs, rather than relying on arbitrary weight assignments (Sarstedt, Ringle and Hair, 2021). Furthermore, SEM provides robust tools for validity and reliability testing, such as assessing convergent validity and composite reliability, ensuring that the index developed is both statistically sound and methodologically rigorous[246]. The final Member Satisfaction Index is a weighted composite score, calculated using the following formula adapted from the ACSI structure:

$$Composite\ Score = \left(\frac{\sum_{i=1}^{3} w_i \bar{x}_i - \sum_{i=1}^{3} w_i}{9\sum_{i=1}^{3} w_i}\right)$$

where:
w_i = weight of each construct derived from SEM;
$\bar{x}_i$ = mean score for each construct; and
The denominator standardises the scale based on the 10-point Likert format.

The Partial Least Squares Structural Equation Modelling (PLS-SEM)

PLS-SEM was employed to assess and estimate the relationships between latent constructs relevant to MBOT recognition and member satisfaction developed in the Satisfaction Index Framework (Figure B.2). PLS-SEM is especially suitable in this study for several reasons:

a. It handles complex models involving reflective-reflective higher-order constructs
b. It is a component-based estimation technique that focuses on maximising the explained variance (R^2) of endogenous constructs, making it particularly useful for predictive modelling. (in this case, the satisfaction score)
c. It accommodates non-normal data, which is often the case in social science survey datasets.

Measurement and structural model evaluation

The evaluation of the model was carried out in two sequential stages: first by assessing the measurement model (outer model) to confirm the reliability and validity of the latent constructs, followed by the structural model (inner model) to test the hypothesised relationships between constructs and determine the model's explanatory power.

[245] Byrne (2013)
[246] Fornell et al. (1996)

At the first stage, the measurement model assessment focused on three core psychometric properties: indicator reliability[247], internal consistency reliability[248] and convergent validity[249], as recommended by J. Hair and Alamer (2022) and Henseler, Ringle and Sinkovics (2009). Indicator reliability was examined through the outer loadings of each observed item on its respective construct.

All indicator loadings exceeded the recommended threshold of 0.70, indicating that each item made a substantial contribution to measuring its latent variable. Specifically, the loadings ranged from 0.801 to 0.847 across constructs such as Personal Benefits, Professional Benefits, Customer Service, Service Expectations, Perceived Value and Satisfaction (see Table B.3). This provides strong evidence for the reliability of individual measurement items.

Table B.3: Outer loadings of indicators tested

Construct	Indicator	Outer loading
Personal Benefits	PB1	0.812
	PB2	0.834
	PB3	0.821
	PB4	0.847
	PB5	0.829
	PB6	0.818
Professional Benefits	PRB1	0.801
	PRB2	0.822
	PRB3	0.834
	PRB4	0.845
	PRB5	0.808
Customer Service	CS1	0.816
	CS2	0.829
	CS3	0.841
	CS4	0.804
Service Expectations	EX1	0.812
	EX2	0.834
	EX3	0.821
	EX4	0.807
Perceived Value	PV1	0.811
	PV2	0.832
	PV3	0.826
	PV4	0.818
Satisfaction	SAT1	0.845
	SAT2	0.838
	SAT3	0.834
	SAT4	0.829
	SAT5	0.818

[247] Indicator reliability refers to how well each individual survey item (or question item) reflects the concept it is supposed to measure. If a survey item shows a strong correlation with its construct (typically above 0.70), it means respondents interpret and answer it consistently in line with the intended concept. In simple terms, it is like making sure every thermometer gives a similar reading when measuring the same person's temperature. A reliable item should do the same for attitudes or opinions in a survey. Source: J. Hair and Alamer (2022); Henseler, Ringle, and Sinkovics (2009)

[248] Internal consistency reliability assesses whether all the items under the same construct work well together as a group. For instance, if a construct is measuring Job Satisfaction, all the associated questions should give similar patterns of responses. This is measured using statistics like Cronbach's Alpha and Composite Reliability. Values above 0.70 usually indicate good consistency. Source: J. F. Hair et al. (2019); Nunnally and Bernstein (1994)

[249] Convergent validity checks whether multiple items designed to measure the same concept are actually doing so. In other words, it asks: "Are all the questions that are supposed to measure 'Customer Service' really measuring that, and not something else?" This is assessed through the Average Variance Extracted (AVE), where values above 0.50 mean the construct explains more than half of the variation in its indicators. a good sign that the concept is captured accurately. Source: Fornell and Larcker (1981); Sarstedt, Ringle, and Hair (2021)

Internal consistency reliability was assessed using both Cronbach's Alpha[250] and Composite Reliability (CR)[251] scores. All constructs demonstrated high internal consistency, with Cronbach's Alpha values ranging from 0.831 (Service Expectations) to 0.889 (Personal Benefits) and CR values exceeding 0.89 for all constructs. These values exceed the generally accepted threshold of 0.70, confirming the scale's consistency in capturing the underlying constructs.

Furthermore, convergent validity was verified using the Average Variance Extracted (AVE) metric[252]. All AVE values were above 0.60, well above the minimum threshold of 0.50, suggesting that the latent variables explain a majority of the variance in their observed indicators (see Table B.4). Collectively, these results support the conclusion that the measurement model is both statistically sound and conceptually coherent, laying a strong foundation for interpreting the structural model[253].

Table B.4: Construct Reliability and Convergent Validity

Construct	Cronbach's Alpha	Composite reliability	Average Variance Extracted (AVE)
Personal Benefits	0.889	0.917	0.647
Professional Benefits	0.871	0.905	0.657
Customer Service	0.847	0.899	0.691
Service Expectations	0.831	0.891	0.672
Perceived Value	0.835	0.891	0.672
Satisfaction	0.887	0.917	0.689

Subsequently, the structural model was evaluated to determine the strength, direction and significance of hypothesised relationships between constructs, as well as the model's overall explanatory power. This analysis was conducted using the bootstrapping procedure with 5,000 resamples[254], a standard practice in PLS-SEM to generate robust estimates of standard errors and p-values for path coefficients.

[250] Cronbach's Alpha is a statistic used to measure how well a set of items (such as survey questions) consistently reflect a single underlying concept. For example, if the survey has five questions about job satisfaction, Cronbach's Alpha checks whether respondent tend to respond to them in a similar way. Values range from 0 to 1, and a score above 0.70 is generally considered acceptable, indicating that the items are working well together as a group. It's like making sure all ingredients in a recipe blend well to create a consistent dish. Source: Nunnally and Bernstein (1994)

[251] Composite Reliability (CR) is a more modern and accurate measure of the internal consistency of a construct than Cronbach's Alpha, especially in Structural Equation Modelling. Like Cronbach's Alpha, it checks whether multiple items in a construct (e.g. Customer Service) reliably measure the same concept. A CR value above 0.70 is also considered good. CR accounts for the different strengths (loadings) of each item, making it especially useful when the items contribute unequally to the concept being measured. Source: J. F. Hair et al. (2019)

[252] AVE is a measure used to assess how well a group of survey questions represents a single concept or construct. It tells the average amount of information (or variance) captured by the items, compared to the amount of noise or error. An AVE value of 0.50 or higher means that more than half of the variation in the questions is due to the construct itself — not just random responses or measurement error. For example, if er measure Perceived Value with four questions, a high AVE means they are truly tapping into that value concept. This confirms the convergent validity, or how well the items converge on what they supposed to measure. Source: Fornell and Larcker (1981); J. Hair and Alamer (2022)

[253] Ibid.

[254] Bootstrapping with 5,000 resamples is a statistical technique used to test whether relationships between variables in a model are statistically significant and robust. Instead of relying on strict assumptions (like normal distribution), bootstrapping works by repeatedly drawing thousands of random samples (with replacement) from the original dataset. In our case, 5,000 times. Each time, the model is re-estimated, and the variability in the results is used to create more accurate estimates of standard errors, confidence intervals, and $p-values$. This method is especially useful in complex models like PLS-SEM and provides stronger and more reliable evidence for whether the relationships observed in the data are likely to exist in the population. Source: Tibshirani and Efron (1993); Sarstedt, Ringle, and Hair (2021)

The results revealed that all path coefficients were positive and statistically significant at $p < 0.01$, providing empirical support for the hypothesised relationships within the model. Specifically, the path from Service Quality to Perceived Value was the strongest ($\beta = 0.642, p = 0.000$), followed by Perceived Value to Satisfaction ($\beta = 0.734, p = 0.000$) and Service Expectations to Perceived Value ($\beta = 0.218, p = 0.002$) (Table B.5). These findings confirm that higher perceived service quality and service expectations are significantly associated with increased perceived value, which in turn positively influences satisfaction.

Table B.5: Structural Model Path Coefficients and Significance

Hypothesised Path	Path Coefficient (β)	$P - value$
Service Quality → Perceived Value	0.642	0.000
Service Expectations → Perceived Value	0.218	0.002
Perceived Value → Satisfaction	0.734	0.000

In terms of predictive power, the model demonstrated moderate to substantial explanatory strength. The coefficient of determination (R^2) for Perceived Value was 0.588, indicating that nearly 59% of the variance in perceived value could be explained by service quality and service expectations. Similarly, the R^2 value for Satisfaction stood at 0.539, signifying that more than half of the variance in satisfaction could be accounted for by perceived value. These R^2 values meet the acceptable thresholds for explanatory models in social sciences and policy research[255], thereby highlighting the relevance and robustness of the model in predicting key outcome variables.

Table B. 6: Coefficient of Determination (R^2 Values)

Endogenous Construct	R^2
Perceived Value	0.588
Satisfaction	0.539

Taken together, the results from both the measurement and structural model assessments provide strong empirical support for the conceptual framework employed in this study. Thus, the model confirms the critical role of service and service expectations in shaping perceived value and overall satisfaction among MBOT members.

B.1.4. Institutional Mechanisms

Descriptive assessment for the first part of institutional mechanism analyses includes (i) stakeholder perceptions of MBOT's recognition and certification processes and (ii) Whether MBOT certification is perceived as a credible signal of competence by employers and professional communities. Subsequently, the analysis conducted the gap & content analysis to identify (i) mismatches between accreditation frameworks and emerging industry needs; and (ii) assess the relevance and responsiveness of MBOT's institutional mechanisms in the context of evolving technology and labour market demands. Finally, an evaluation analysis is applied to investigate strengths, weaknesses, opportunities and threats relating to MBOT's current regulatory and accreditation roles; and to understand strategic opportunities for expanding MBOT's impact and the challenges it must navigate moving forward.

[255] Sarstedt, Ringle, and Hair (2021)

APPENDIX C

SURVEY QUESTIONNAIRE

KHAZANAH
RESEARCH
INSTITUTE

Understanding MBOT's Value:
Member Experience & Impact Survey

Dear Valued Member,

You have been randomly selected to participate in this survey as part of a collaborative research project between the Khazanah Research Institute (KRI) and the Malaysia Board of Technologists (MBOT). This study aims to assess MBOT's impact on its members, focusing on professional development, service quality and overall membership value.

The survey will take approximately 15-20 minutes to complete. Your honest feedback, based on your personal experience, is essential in helping MBOT improve its offerings and better serve its members.

Confidentiality and Research Ethics

By completing this survey, you acknowledge and consent that your responses will be analysed in an aggregated and anonymous manner for research purposes. All data will be treated with strict confidentiality, ensuring no personally identifiable information will be disclosed. The results will be used solely for research and policy development to enhance MBOT's services.

Your participation is voluntary and we greatly appreciate your valuable insights in shaping the future of MBOT.

Thank you for your time and contribution!

Sincerely,
Khazanah Research Institute (KRI) & Malaysia Board of Technologists (MBOT) Research Team

	A	Demographic Profiling
1	**Sex**	

☐ Male ☐ Female

2 Year of birth

☐ YYYY

3 Ethnic group

☐ Malay
☐ Bumiputera (Orang Asli/Asal Semenanjung)
☐ Bumiputera Sabah (Kadazan, Dusun, Bajau, Murut and other Bumiputera Sabah)
☐ Bumiputera Sarawak (Iban, Bidayuh, Melanau & other Bumiputera Sarawak)
☐ Chinese
☐ Indian
☐ Other (Please specify)

4 Current place of residence

☐ Wilayah Persekutuan Kuala Lumpur
☐ Wilayah Persekutuan Putrajaya
☐ Wilayah Persekutuan Labuan
☐ Pahang
☐ Perak
☐ Terengganu
☐ Perlis
☐ Selangor
☐ Negeri Sembilan
☐ Johor
☐ Kelantan
☐ Kedah
☐ Pulau Pinang
☐ Melaka
☐ Sabah
☐ Sarawak
☐ Overseas (Specify)

4.1 District of residence

☐ **Dropdown**: Refer to Appendix 5: List of Districts

B Education

5 What is your highest obtained level of qualification?

☐ PhD or equivalent
☐ Master's Degree
☐ Professional certificate
☐ Bachelor's Degree
☐ Advanced Diploma (Or equivalent)
☐ Diploma (Or equivalent)
☐ SKM Level 3
☐ SKM Level 2
☐ SKM Level 1

6 Year of graduation for highest obtained qualification

☐ **Text**: YYYY

7 Field of study of your highest level of qualification

☐ **Dropdown**: Refer to Appendix 1: Field of Study

8 Type of institution of your highest level of qualification

☐ Local Public Higher Education Institution (IPTA)
☐ Local Private Higher Education Institution (IPTS)
☐ Foreign Education Institution Local Branch
☐ Foreign Higher Education Institution Overseas

9 Was your highest level of qualification obtained from a TVET institution (including MTUN)?

☐ Yes
☐ No

10 In addition to your highest qualification, do you have any other qualification(s) at tertiary level?

☐ Yes
☐ No ***Go to C: Professional Recognition**

10.1 If YES, how many other tertiary education qualification(s) do you have in addition to the one above?

☐ 1
☐ 2
☐ 3 or more

10.2 For your second highest qualification, please specify:

(i) Level of qualification

☐ PhD or equivalent
☐ Master's Degree
☐ Professional certificate
☐ Bachelor's Degree
☐ Advanced Diploma (or equivalent)
☐ Diploma (or equivalent)
☐ SKM Level 3
☐ SKM Level 2
☐ SKM Level 1

(ii) Year of graduation

☐ **Text**: YYYY

(iii) Field of study

☐ **Dropdown**: Refer to Appendix 1: Field of Study

(iv) Type of institution

☐ Local Public Higher Education Institution (IPTA)
☐ Local Private Higher Education Institution (IPTS)
☐ Foreign Education Institution Local Branch
☐ Foreign Higher Education Institution Overseas

(v) Was it a TVET institution?

☐ Yes

☐ No

10.3 For your third highest qualification, please specify:

(i) Level of qualification

☐ PhD or equivalent
☐ Master's Degree
☐ Professional certificate
☐ Bachelor's Degree
☐ Advanced Diploma (or equivalent)
☐ Diploma (or equivalent)
☐ SKM Level 3
☐ SKM Level 2
☐ SKM Level 1

(ii) Year of graduation

☐ **Text**: YYYY

(iii) Field of study

☐ **Dropdown**: Refer to Appendix 1: Field of Study

(iv) Type of institution

☐ Local Public Higher Education Institution (IPTA)
☐ Local Private Higher Education Institution (IPTS)
☐ Foreign Education Institution Local Branch
☐ Foreign Higher Education Institution Overseas

(v) Was it a TVET institution?

☐ Yes
☐ No

10.4 For your fourth highest qualification, please specify:

(i) Level of qualification

☐ PhD or equivalent
☐ Master's Degree
☐ Professional certificate
☐ Bachelor's Degree
☐ Advanced Diploma (or equivalent)
☐ Diploma (or equivalent)
☐ SKM Level 3
☐ SKM Level 2
☐ SKM Level 1

(ii) Year of graduation

☐ **Text**: YYYY

(iii) Field of study

☐ **Dropdown**: Refer to Appendix 1: Field of Study

(iv) Type of institution

☐ Local Public Higher Education Institution (IPTA)
☐ Local Private Higher Education Institution (IPTS)
☐ Foreign Education Institution Local Branch
☐ Foreign Higher Education Institution Overseas

(v) Was it a TVET institution?

☐ Yes
☐ No

C Qualifications/Designations

11 Which of the following MBOT designations currently best describes you?

☐ Professional Technologist
☐ Graduate Technologist
Qualified Technician
Certified Technician

12 What year did you receive this professional recognition?

☐ **Dropdown**: 2016-2025

13 Have you previously held any other MBOT designations?

☐ Yes
☐ No

13.1 If YES, please select those that apply as well as the year received

☐ (Year Received: YYYY) ☐ Graduate Technologist
☐ (Year Received: YYYY) ☐ Certified Technician
☐ (Year Received: YYYY) ☐ Qualified Technician

14 In which field of technology does your MBOT recognition fall under?

☐ **Dropdown**: Refer to Appendix 2: MBOT Technology Fields

15 What motivated you to obtain this recognition? *(Select up to 3 that apply)*

☐ Career advancement
☐ Employer requirement
☐ Higher salary expectations
☐ To enhance credibility in the industry
☐ To build a professional network in the same field
☐ Encouraged by peers or mentors
☐ Personal interest in professional development
☐ Recommended by my academic institution
☐ To improve job security
☐ To transition into a new role or industry
☐ I obtained it automatically through my education qualification
☐ I obtained it, but I don't see any significant benefit
☐ Other (Please specify)

16 Have you experienced career progression (e.g., promotion, salary increment) after obtaining MBOT recognition?

☐ Yes
☐ No

☐ Not Sure

17 Do you have any other professional accreditations?

☐ Yes
☐ No

17.1 If YES, please select those you currently have:

☐ Chartered Engineer (CEng)
☐ Professional Engineer (Ir.)
☐ Professional Quantity Surveyor (Sr.)
☐ Certified Engineering Technician
☐ Professional Architect (Ar.)
☐ Certified Construction Project Manager
☐ Chartered Accountant (CA(M))
☐ Certified Financial Planner (CFP)
☐ Chartered Financial Analyst (CFA)
☐ Other (Please specify)

17.2 For each of the selected accreditation, please state:

(i) When did you receive the above recognition?

☐ (Year received: YYYY)

(ii) Which governing body did you receive the recognition from?

☐ Board of Engineers Malaysia (BEM)
☐ Institution of Engineers Malaysia (IEM)
☐ Malaysia Board of Technologists (MBOT)
☐ Board of Architects Malaysia (LAM)
☐ Board of Quantity Surveyors Malaysia (BQSM)
☐ Construction Industry Development Board (CIDB)
☐ Construction Personnel Malaysia (CPM)
☐ Department of Occupational Safety and Health (DOSH)
☐ Others (specify)

D Current Employment Status

18 Which of the following best describes your current employment status?

☐ Employed ***Go to D1 (Employed)**
☐ Self-employed, Freelance ***Go to D2 (Freelance)**
☐ Self-employed, Business owner ***Go to D3 (Business)**
☐ Not working/unemployed/retired

18.1 If NOT WORKING, what best describes your current situation?

☐ Actively seeking employment ***Go to D4 (Unemployed)**
☐ Not currently looking for work ***Go to D5 (Not Looking for Work)**
☐ Pursuing further education or training ***Go to D6 (Further Study)**
☐ Retired ***Go to E (Employment History)**

D1 Employed

19 How many jobs are you currently employed in?

☐ 1
☐ 2
☐ 3 or more

20 For your main employment, please specify:

20.1 When did you start this job?

☐ Year ☐ Month

20.2 Which of the following best describes that job?

☐ Full-time permanent
☐ Full-time contract
☐ Part-time permanent
☐ Part-time contract

20.3 What is your occupation?

☐ **Dropdown**: Refer to Appendix: Occupation

20.4 What industry are you working in?

☐ **Dropdown**: Refer to Appendix: Industry

20.5 What is the gross monthly salary for your current job? (Before tax, EPF, SOCSO deduction)

☐ Below RM2,000
☐ RM2,000 - RM2,999
☐ RM3,000 - RM3,999
☐ RM4,000 - RM4,999
☐ RM5,000 - RM7,499
☐ RM7,500 - RM9,999
☐ RM10,000 - RM14,999
☐ RM15,000 - RM19,999
☐ RM20,000 and above

(i) What is the exact gross monthly salary of your current job?

☐ **Text**: Number

20.6 Does your current job match your qualification and professional recognition?

☐ Yes, my current job matches my professionally recognised technical skillset
☐ Yes, my current job matches my field of study
☐ Yes, my current job matches both my professionally recognised technical skillset and field of study
☐ No, my current job does not match with my qualification or technical skillset

20.7 Which of the following best describes your current employer?

☐ Government/public sector
☐ Statutory Body (Government agencies)
☐ Government-linked company (GLC)
☐ Malaysian private company (Incl. SMEs)
☐ Private company located overseas
☐ Non-government organisation (NGO)

- [ ] Multinational private company (MNC)
- [ ]

20.8 What is the size of the company you are currently working in?

- [ ] Less than 5
- [ ] 5 - 10
- [ ] 11 - 30
- [ ] 31 - 50
- [ ] 51 - 75
- [ ] 76 - 100
- [ ] 101-200
- [ ] More than 200
- [ ] Not applicable/don't know

20.9 Does your employer provide you any of the following benefits? (Select all that apply)

- [ ] EPF and SOCSO contributions
- [ ] Other benefits (medical, insurance, etc.)
- [ ] Flexible working arrangement
- [ ] Work-related technical and soft skills training
- [ ] Performance-based bonuses or incentives
- [ ] Paid annual leave and sick leave
- [ ] Maternity/paternity leave benefits
- [ ] Subsidized meals or transport allowance
- [ ] Childcare support or subsidies
- [ ] Career development or mentorship programmes
- [ ] Not applicable/None of the above

20.10 Does your employer subsidise MBOT membership?

- [ ] Yes, fully subsidised
- [ ] Yes, but partially subsidised
- [ ] No, but they fully subsidise for other professional bodies' membership
- [ ] No, but they partially subsidise for other professional bodies' membership
- [ ] No, they do not subsidise for any professional bodies' membership

21 For your second job, please specify:

21.1 When did you start this job?

[ ] Year [ ] Month

21.2 Which of the following best describes that job?

- [ ] Full-time permanent
- [ ] Full-time contract
- [ ] Part-time permanent
- [ ] Part-time contract
- [ ] Self-employed: Freelance
- [ ] Self-employed: Own Business

21.3 What is your occupation?

[ ] **Dropdown**: Refer to Appendix: Occupation

21.4 What industry are you working in?

[ ] **Dropdown**: Refer to Appendix 4: Industry

21.5 What is the gross monthly salary for your current job? (Before tax, EPF, SOCSO deduction)

- [ ] Below RM2,000
- [ ] RM2,000 - RM2,999
- [ ] RM3,000 - RM3,999
- [ ] RM4,000 - RM4,999
- [ ] RM5,000 - RM7,499
- [ ] RM7,500 - RM9,999
- [ ] RM10,000 - RM14,999
- [ ] RM15,000 - RM19,999
- [ ] RM20,000 and above

(i) What is the exact gross monthly salary of your current job?

[ ] **Text**: Number

21.6 Does your current job match your qualification and professional recognition?

- [ ] Yes, my current job matches my professionally recognised technical skillset
- [ ] Yes, my current job matches my field of study
- [ ] Yes, my current job matches both my professionally recognised technical skillset and field of study
- [ ] No, my current job does not match with my qualification or technical skillset

22 Have you worked elsewhere previously aside from those mentioned above?

- [ ] Yes ***Go to Section E (Employment History)**
- [ ] No

D2 Freelance

23 When did you begin your (main) freelancing occupation?

[ ] Year [ ] Month

23.1 What best describes that occupation?

[ ] **Dropdown**: Refer to Appendix 3: Occupation

23.2 What industry are your (main) freelancing occupation currently in?

[ ] **Dropdown**: Refer to Appendix 4: Industry

23.3 What is your estimated average monthly earnings from this freelancing work?

- [ ] Below RM2,000
- [ ] RM2,000 - RM2,999
- [ ] RM3,000 - RM3,999
- [ ] RM4,000 - RM4,999
- [ ] RM5,000 - RM7,499
- [ ] RM7,500 - RM9,999
- [ ] RM10,000 - RM14,999
- [ ] RM15,000 - RM19,999
- [ ] RM20,000 and above

(i) What is the exact gross average monthly earnings from this freelancing work?

[ ] **Text**: Number

23.4 Does your current work match your qualification and professional recognition?

- [ ] Yes, my current job matches my professionally recognised technical skillset
- [ ] Yes, my current job matches my field of study
- [ ] Yes, my current job matches both my professionally recognised technical skillset and field of study

☐ No, my current job does not match with my qualification or technical skillset

23.5 How would you best describe your client base?

☐ Local (Within state)
☐ National (Multiple states)
☐ International

23.6 What is your main method to find clients/jobs?

☐ Agency (Work agencies)
☐ E-hailing/delivery platforms
☐ Online task-based platforms
☐ Personal network/word of mouth
☐ Digital and traditional advertisement
☐ Other (Please specify)

24 What is your main reason for freelancing?

☐ Opportunity for better income
☐ Flexibility in work schedule and lifestyle
☐ Did not secure a job in permanent and full-time employment
Opportunity for better income compared to standard employment
☐ Pursuing personal interests
☐ Other (Please specify)

25 Aside from the above, are you freelancing in any other industries?

☐ Yes
☐ No

25.1 If YES, how many other industries are you freelancing in?

☐ **Dropdown**: Number

For your second freelancing job, please specify:

25.2 When did you begin freelancing in this field?

☐ Year ☐ Month

25.3 How would you best describe your occupation?

☐ **Dropdown**: Refer to Appendix 3: Occupation

25.4 What industry are you in?

☐ **Dropdown**: Refer to Appendix 4: Industry

25.5 What is your estimated average monthly earnings from this freelancing work?

☐ Below RM2,000
☐ RM2,000 - RM2,999
☐ RM3,000 - RM3,999
☐ RM4,000 - RM4,999
☐ RM5,000 - RM7,499
☐ RM7,500 - RM9,999
☐ RM10,000 - RM14,999
☐ RM15,000 - RM19,999
☐ RM20,000 and above

(i) What is the exact gross monthly earnings from this freelancing work?

☐ **Text**: Number

25.6 How does this job match your qualifications?

☐ Yes, my current job matches my professionally recognised technical skillset
☐ Yes, my current job matches my field of study
☐ Yes, my current job matches both my professionally recognised technical skillset and field of study
☐ No, my current job does not match with my qualification or technical skillset

25.7 What is your main method to find clients/jobs?

☐ Agency (Work agencies)
☐ E-hailing/delivery platforms
☐ Online task-based platforms
☐ Personal network/word of mouth
☐ Digital and traditional advertisement
☐ Other (Please specify)

25.8 How would you best describe your client base?

☐ Local (Within state)
☐ National (Multiple states)
☐ International

25 Have you worked elsewhere previously aside from those mentioned above?

☐ Yes ***Go to Section E (Employment History)**
☐ No

D3 Business

27 When did you start your (main) business?

☐ **Text**: YYYY

27.1 What is the nature of your business?

☐ Manufacturing
☐ Retail
☐ Real Estate
☐ Financial Services
☐ Technology and IT
☐ Construction
☐ Education
☐ Healthcare
☐ Transportation/Logistics
☐ Hospitality
☐ Agriculture
☐ Engineering Services
☐ Technical Services
☐ Entertainment
☐ Energy and Utilities
☐ Legal & advisory
☐ Other (Please specify)

27.2 What industry is your (main) business currently in?

☐ **Dropdown**: Refer to Appendix 4: Industry

27.3 What is your estimated average take home monthly earnings from this business?

- [ ] Below RM2,000
- [ ] RM2,000 - RM2,999
- [ ] RM3,000 - RM3,999
- [ ] RM4,000 - RM4,999
- [ ] RM5,000 - RM7,499
- [ ] RM7,500 - RM9,999
- [ ] RM10,000 - RM14,999
- [ ] RM15,000 - RM19,999
- [ ] RM20,000 and above

(i) **State (in exact amount) your gross average take home monthly earnings from this business**

[ ] **Text**: Number

27.4 Does this business match your qualification and professional recognition?

- [ ] Yes, my current job matches my professionally recognised technical skillset
- [ ] Yes, my current job matches my field of study
- [ ] Yes, my current job matches both my professionally recognised technical skillset and field of study
- [ ] No, my current job does not match with my qualification or technical skillset

27.5 How would you best describe your client base?

- [ ] Local (Within state)
- [ ] National (Multiple states)
- [ ] International

27.6 Do you currently employ any workers?

- [ ] Yes
- [ ] No

(i) **If YES, how many workers do you have?**

- [ ] Less than 5
- [ ] 5 - 10
- [ ] 11 - 30
- [ ] 31 - 50
- [ ] 51 - 75
- [ ] 76 - 100
- [ ] 101-200
- [ ] More than 200
- [ ] Not applicable/don't know

Do you provide your workers with any of the following benefits? (Select all that apply)

- [ ] EPF and SOCSO contributions
- [ ] Other benefits (Medical, insurance)
- [ ] Paid annual leave and sick leave
- [ ] Flexible working arrangements
- [ ] Bonuses or incentives
- [ ] Work-related technical and soft skills training
- [ ] Maternity/paternity leave benefits
- [ ] Allowances (meals, transport)
- [ ] Childcare support or subsidies
- [ ] Career development or mentorship
- [ ] Not applicable/None of the above

Does your business subsidise MBOT membership?

- [ ] Yes, fully subsidised
- [ ] Yes, but partially subsidised
- [ ] No, but I fully subsidise for other professional bodies membership
- [ ] No, but I partially subsidise for other professional bodies membership

27.7 Do you provide yourself with any of the following benefits? (Select all that apply)

- [ ] EPF and SOCSO contributions
- [ ] Other benefits (Medical, insurance, etc.)
- [ ] Work-related technical and soft skills training
- [ ] Flexible working arrangements
- [ ] Bonuses or incentives
- [ ] Paid annual leave and sick leave
- [ ] Maternity/paternity leave benefits
- [ ] Allowances (meals, transport)
- [ ] Childcare support or subsidies
- [ ] Career development /mentorship
- [ ] Not applicable/None of the above

28 What is your main motivation for starting this business?

- [ ] Did not secure a job in permanent and full-time employment
- [ ] To attain better financial security
- [ ] Flexibility and work-life balance
- [ ] Pursuing personal interests
- [ ] To turn my passion into a business
- [ ] To pursue a career change or transition from employment
- [ ] To gain recognition and establish a name in the industry
- [ ] To solve a problem or fill a gap in the market
- [ ] To make positive impact on society/ environment
- [ ] Other (Please specify)

29 Aside from the one mentioned above, do you have any other businesses?

- [ ] Yes
- [ ] No

28.1 If YES, how many other businesses do you have?

[ ] **Text**: Number

30 Have you worked elsewhere previously aside from those mentioned above?

- [ ] Yes ***Go to Section E (Employment History)**
- [ ] No

D4 Unemployed

31 How long have you been unemployed?

- [ ] Less than 3 months
- [ ] 3-6 months
- [ ] 6-12 months
- [ ] More than a year

32 Have you worked before?

- [ ] Yes ***Go to Section E (Employment History)**
- [ ] No

33 What are the main challenges you face in finding a job? (Select up to 3)
- Cannot find jobs that match qualification
- Cannot find jobs that match salary expectations
- Cannot find jobs that match field of study
- Difficulties in securing job interviews
- Working arrangements are not suitable (e.g., location, work hours)
- Difficulty in paying for the job search expenses
- Low digital access
- Others (please specify)
- I do not face any challenge

34 Have you attended any job interviews in the past 6 months?
- Yes
- No

34.1 If YES, how many interviews did you attend?
- **Text**: Number

35 Have you received any job offers but declined them?
- Yes
- No

35.1 If YES, what were the reasons?
- Low Salary
- Not aligned with career goals
- Not my preferred location or required excessive travel
- Not my preferred working hours
- Other (Please specify)

36 Have you considered alternative career paths such as: (Select all that apply)
- Freelancing or gig work
- Starting a business
- Retraining or upskilling in a different field
- Government or community support programmes
- Working abroad
- Other (Please specify)
- Not considering other paths

37 What type of job are you ideally looking for?
- Position
- Industry
- Salary Expectation
- Other (Please specify)

38 Do you believe that obtaining a professional accreditation (e.g., MBOT certification) could improve your job prospects?
- Yes
- No
- Not Sure

39 What support do you think would help you the most in securing a job? (Select up to 3)
- Resume, cover letter assistance and other interview skills
- Career guidance and counselling (e.g., psychometric test)
- Job matching services
- Promotion of job search programmes
- Access to training or upskilling programmes
- Job search allowance (e.g., transportation cost)
- Others (please specify)
- Not applicable/ None of the above

D5 Not Looking for Work

40 What is your main reason that you are not looking for work?
- Family commitments
- Taking a career break
- Not interested in pursuing work
- Unfavourable job market conditions
- Lack of family/childcare support
- Poor health conditions
- Already achieved financial stability

41 Have you worked before?
- Yes ***Go to Section E (Employment History)**
- No

42 Do you any intention to look for employment in the future?
- Yes, within the year
- Yes, within the next three years
- Maybe
- No

D6 Further Study

43 What qualification level are you currently pursuing?
- PhD or equivalent
- Master's Degree
- Professional certificate
- Bachelor's Degree
- Advanced Diploma (or equivalent)
- Diploma (or equivalent)
- SKM Level 3

43.1 Field of study
- **Dropdown**: Refer to Appendix 1: Field of Study

43.2 Type of institution
- Local Public Higher Education Institution (IPTA)
- Local Private Higher Education Institution (IPTS)
- Foreign Education Institution Local Branch
- Foreign Higher Education Institution Overseas

43.3 Is it a TVET institution?
- Yes

☐ No

44 What is your motivation in pursuing further education?

☐ Upskilling/ to attain higher qualification level to enhance career prospect
☐ Reskilling/ To change career pathway
☐ Personal choice/ break from work
☐ Not ready to work yet
☐ Cannot find suitable job that match interest
☐ Cannot find jobs that match qualification
☐ To refresh skills after a career break
☐ Others (please specify)

45 Have you worked before?

☐ Yes ***Go to Section E (Employment History)**
☐ No

46 Do you have an intention to seek employment after you finish pursuing your studies?

☐ Yes
☐ No
☐ Not Sure

47 Do you believe that obtaining a professional accreditation (e.g., MBOT certification) could improve your job prospects?

☐ Yes
☐ No
☐ Not Sure

48 What support do you think would help you the most in securing a job? (Select up to 3)

☐ Resume, cover letter assistance/ interview skills
☐ Career guidance/counselling (psychometric test)
☐ Job matching services
☐ Promotion of job search programmes
☐ Access to training or upskilling programmes
☐ Job search allowance (e.g., transportation cost)
☐ Others (please specify)
☐ Not applicable/ None of the above

E Employment History

49 How many years have you been working since graduation? (Open-ended) (Note: to validate the total years of working experience.)

☐ **Text**: Number

50 In addition to the jobs you have mentioned previously, how many other occupations have you held after receiving your tertiary qualification?

☐ 1
☐ 2
☐ 3
☐ 4 and above

Please state your employment history starting with your most recent occupations. Only state those that you have not mentioned in previous sections.

For your latest job, please state:

50.1

☐ YYYY ☐ Month **Start date**
☐ YYYY ☐ Month **End date**

50.2 What was your occupation?

☐ **Dropdown**: Refer to Appendix 3: Occupation

50.3 What industry were you in?

☐ **Dropdown**: Refer to Appendix 4: Industry

50.4 Average monthly earnings

☐ Below RM2,000
☐ RM2,000 - RM2,999
☐ RM3,000 - RM3,999
☐ RM4,000 - RM4,999
☐ RM5,000 - RM7,499
☐ RM7,500 - RM9,999
☐ RM10,000 - RM14,999
☐ RM15,000 - RM19,999
☐ RM20,000 and above

(i) What is the exact gross monthly salary of your current job?

☐ **Text**: Number

50.5 What was the reason for leaving this occupation?

☐ Better opportunities fit with qualification
☐ Changed profession
☐ Higher wages
☐ Wanted to start own business
☐ Career development/growth
☐ Poor working conditions
☐ Career break
☐ Other (Please specify)

50.6 Was this your first job?

☐ Yes
☐ No

For your first job, please state:

51.1

☐ YYYY ☐ Month **Start date**
☐ YYYY ☐ Month **End date**

51.2 What was your occupation?

☐ **Dropdown**: Refer to Appendix 3: Occupation

51.3 What industry were you in?

☐ **Dropdown**: Refer to Appendix 4: Industry

51.4 Average monthly earnings

☐ Below RM2,000
☐ RM2,000 - RM2,999
☐ RM3,000 - RM3,999
☐ RM4,000 - RM4,999
☐ RM7,500 - RM9,999
☐ RM10,000 - RM14,999
☐ RM15,000 - RM19,999
☐ RM20,000 and above

☐ RM5,000 - RM7,499

(i) **What is the exact gross monthly salary of your current job?**

☐ **Text**: Number

51.5 What was the reason for leaving this occupation?

☐ Better opportunities fit with qualification
☐ Changed profession
☐ Higher wages
☐ Wanted to start own business
☐ Career development/growth
☐ Poor working conditions
☐ Career break
☐ Other (Please specify)

F1 Perceptions: Professional Technologists and Certified Technicians

For Professional Technologists and Certified Technicians only

52 For each of the following, please rate how much you agree with the following statements.

52.1 After gaining an MBOT professional recognition:	**1**	**2**	**3**	**4**	**5**	**6**
I was able to find employment opportunities easily.						
My credibility within my organisation has significantly improved.						
I have had better career progression as higher-level positions require MBOT recognitions.						
My earnings have improved.						
I was able to get jobs that allow me to take advantage of my gained/recognised skills.						
I have received more job offers or inquiries from potential employers.						
I feel more confident in my technical skills.						
I have built a stronger and wider professional network.						
I am more confident to apply in more demanding, higher-skilled jobs.						
52.2 In my opinion:	**1**	**2**	**3**	**4**	**5**	**6**
If I did not have MBOT certification, my career progression would have been slower.						

F2 Perceptions: Graduate Technologists and Qualified Technicians

For Graduate Technologists and Qualified Technicians only

53 When were you aware that your course/academic qualification was accredited by MBOT?

☐ I was aware prior to enrolling in the course
☐ I was aware while undergoing my course
☐ I was aware right before graduating from my course
☐ I was aware after graduating from my course
☐ I was not aware that it was accredited

54 Do you have any intention to upgrade to a higher certification, such as Professional Technologists and Certified Technician?

☐ Yes
☐ No

54.1 If YES, when?

☐ Within the next year
☐ Within the next 2-3 years
☐ Not sure of the timeline

54.2 If NO, what was the main reason?

☐ I do not see a significant career benefit in upgrading
☐ My current job does not require higher certification
☐ The certification cost is too high
☐ Lack of awareness or guidance on the upgrading process
☐ I do not meet the requirements for upgrading
☐ I am planning to pursue a different professional pathway
☐ I am satisfied with my current level of certification
☐ The upgrading process is inconvenient
☐ Other (Please specify)

55 For each of the following, please rate how much you agree with the following statements

55.1 Graduating from an MBOT accredited course…:	**1**	**2**	**3**	**4**	**5**	**6**
Enabled me to find employment opportunities more easily compared to my peers with non-MBOT accredited programmes.						
Was an essential requirement for career advancement in my field.						
Provided me with better career progression compared to my peers with non-MBOT accredited programmes.						
My professional network has expanded as a result of holding an MBOT-recognised qualification.						
I became more confident in my technical abilities.						
I am motivated to apply in more demanding, higher-skilled jobs.						
55.2 In my opinion …	**1**	**2**	**3**	**4**	**5**	**6**
My employer or potential employers have expressed a preference for candidates with higher levels of MBOT professional recognition such as Professional Technologists or Certified Technicians.						

I believe I would be able to enhance my career development by obtaining a higher MBOT professional recognition.						
After obtaining a higher MBOT professional recognition, I expect to receive more job offers or job interviews.						

F3 Perceptions: Business Owners

For Business Owners only

56 For each of the following, please rate how much you agree with the following statements.

56.1 For business owners with AND without workers:	**1**	**2**	**3**	**4**	**5**	**6**
Having MBOT-recognised employees improves the credibility and reputation of my organization.						
My clients look for any MBOT recognition that I or my employees may have as part of their business requirements.						
I gained more business opportunities after I or my employees gained MBOT recognition.						
56.2 For business owners WITH workers:	**1**	**2**	**3**	**4**	**5**	**6**
Workers with MBOT recognition demonstrate higher technical capabilities than those without.						
MBOT recognition is an important factor in my hiring decisions.						
My workers with MBOT recognition generally hold higher positions than those without, even with the same number of years of experience.						
My workers with MBOT recognition are often paid more than those without, even with the same role.						
I hire exclusively those with MBOT recognition for technical positions						
Whether or not a candidate has an MBOT recognition is an important part of my promotion or wage increase decisions.						
The productivity of my workers is higher when they have MBOT recognition.						

G Satisfaction

57 Member Satisfaction: For each of the following, please rate how much you agree with the following statements.	**1**	**2**	**3**	**4**	**5**	**6**
I am satisfied with my overall experience as a member of the MBOT professional body						
MBOT has fulfilled expectations as an ideal professional body						
Based on the value I have received so far, I am likely to renew my MBOT membership						
Based on my observation, MBOT has successfully achieved its objectives in transforming TVET education to meet industry demands						
I would recommend MBOT membership to my colleagues/friends/peers						
58 Perceived Value: How satisfied are you with MBOT's value in the following areas?	**1**	**2**	**3**	**4**	**5**	**6**
Overall value of MBOT services compared to fees paid						
Value for money of MBOT membership						
Opportunities provided by MBOT (programmes, career advancement, training, certifications)						
Impact of MBOT membership on professional competitiveness						
59 Expectations: How satisfied are you with MBOT’s performance in the following areas?	**1**	**2**	**3**	**4**	**5**	**6**
Fulfilling commitments and services to members						
Communicating services and benefits to members						
Efforts to continuously improve services to meet member expectations						
Addressing the needs and concerns of its members						

60 Service Quality

60.1 Personal Benefit: How satisfied are you with the following areas?	**1**	**2**	**3**	**4**	**5**	**6**
Certification and credentialing in advancing your career						
Professional development and educational programme offerings						
Availability of a reference directory of members and practitioners						
Networking opportunities provided by MBOT						
Opportunities to gain leadership experience						
Access to up-to-date industry information						
60.2 Professional Benefit: How satisfied are you with the following areas?	**1**	**2**	**3**	**4**	**5**	**6**
Attracting and certifying competent professionals in the field						
Supporting student education and entry into the profession						
Promoting awareness and appreciation of the field among practitioners						
Defining competencies and standards that shape the profession						
Influence on shaping policies, legislation and regulations impacting the field						
60.3 Customer Service Satisfaction: How satisfied are you with the following areas?	**1**	**2**	**3**	**4**	**5**	**6**

Knowledge of MBOT staff on all aspects of MBOT's operations						
Courtesy and friendliness of MBOT staff						
Responsiveness of MBOT to your requests/inquiries						
Usefulness of MBOT staff suggestions in addressing concerns						

61 In your opinion, in what ways does your organisation benefit from your professional recognition?

	Enhanced Credibility & Compliance		Access to Government & Industry Initiatives
	Competitive Advantage & Business Growth		Other (specify)
	Talent Attraction & Employee Development		None / no benefit to the organisation
	Networking & Industry Collaboration		Unsure
	Operational Excellence & Innovation		

62 Additional feedback: If there are aspects that MBOT should improve on, what would they be?

If there are three aspects that MBOT should improve on, what would they be? (Select up to three)

	Certification and credentialing process.		Professional networking opportunities.
	Networking opportunities for members.		Clarity and accessibility of information provided by MBOT.
	Availability of leadership opportunities for members.		Responsiveness to member inquiries and feedback.
	Relevance of training, workshops and educational programmes.		Online and digital services (e.g., website, portal, mobile accessibility).
	MBOT’s standards and guidelines.		International recognition/accreditation.
	Communication of MBOT’s services and benefits to members.		Other (Please specify)

REFERENCES

ACSI. n.d. “The American Customer Satisfaction Index (ACSI) - National Cross-Industry Measure of Customer Satisfaction.” The American Customer Satisfaction Index. Accessed April 17, 2025. https://theacsi.org/.

Alwin, Duane F. 2007. *Margins of Error: A Study of Reliability in Survey Measurement*. John Wiley & Sons.

Amalia, Lidya Nur. 2025. “Measuring the Competitiveness of Ciamis Regency Using Location Quotient and Shift Share Analysis.” *Mimbar Agribisnis: Jurnal Pemikiran Masyarakat Ilmiah Berwawasan Agribisnis* 11 (1):1378–87.

Baruch, Yehuda, and Brooks C Holtom. 2008. “Survey Response Rate Levels and Trends in Organizational Research.” *Human Relations* 61 (8). Sage Publications Sage UK: London, England:1139–60.

Bazrafkan, Sara, Seyed Javad Iranban, and Hedieh Jafarpour. 2014. “An Analysis of ACSI Model on the Processes of Service Quality Presented by Cell Phone Operators.” *Asian Journal of Research in Business Economics and Management* 4 (8). Asian Research Consortium:268–76.

Byrne, Barbara M. 2013. *Structural Equation Modeling with Mplus: Basic Concepts, Applications, and Programming*. routledge.

Chomeya, Rungson. 2010. “Quality of Psychology Test between Likert Scale 5 and 6 Points.” *Journal of Social Sciences* 6 (3):399–403.

Dillman, Don A, Jolene D Smyth, and Leah Melani Christian. 2014. “Internet, Phone, Mail, and Mixed-Mode Surveys: The Tailored Design Method.” *Indianapolis, Indiana*.

Fink, Arlene. 2024. *How to Conduct Surveys: A Step-by-Step Guide*. SAGE publications.

Finstad, Kraig. 2010. “Response Interpolation and Scale Sensitivity: Evidence against 5-Point Scales.” *Journal of Usability Studies* 5 (3). Usability Professionals’ Association Bloomingdale, IL:104–10.

Fornell, Claes, Michael D Johnson, Eugene W Anderson, Jaesung Cha, and Barbara Everitt Bryant. 1996. “The American Customer Satisfaction Index: Nature, Purpose, and Findings.” *Journal of Marketing* 60 (4). SAGE Publications Sage CA: Los Angeles, CA:7–18.

Fornell, Claes, and David F Larcker. 1981. “Evaluating Structural Equation Models with Unobservable Variables and Measurement Error.” *Journal of Marketing Research* 18 (1). Sage Publications Sage CA: Los Angeles, CA:39–50.

Garland, Ron. 1991. “The Mid-Point on a Rating Scale: Is It Desirable.” *Marketing Bulletin* 2 (1):66–70.

Hair, Joseph, and Abdullah Alamer. 2022. “Partial Least Squares Structural Equation Modeling (PLS-SEM) in Second Language and Education Research: Guidelines Using an Applied Example.” *Research Methods in Applied Linguistics* 1 (3). Elsevier:100027.

Hair, Joseph F, Jeffrey J Risher, Marko Sarstedt, and Christian M Ringle. 2019. “When to Use and How to Report the Results of PLS-SEM.” *European Business Review* 31 (1). Emerald Publishing Limited:2–24.

Henseler, Jörg, Christian M Ringle, and Rudolf R Sinkovics. 2009. “The Use of Partial Least Squares Path Modeling in International Marketing.” In *New Challenges to International Marketing*, 20:277–319. Emerald Group Publishing Limited.

Jing, Nan, and Wenxue Cai. 2010. “Analysis on the Spatial Distribution of Logistics Industry in the Developed East Coast Area in China.” *The Annals of Regional Science* 45 (2):331–50. https://doi.org/10.1007/s00168-009-0307-6.

Jiří, Braňka. 2016. “Strengthening Skills Recognition Systems: Recommendations for Key Stakeholders.” Geneva: International Labour Organization. https://www.ilo.org/publications/strengthening...stakeholders.

Kim, Seung Hyun, Jaemin Cha, AJ Singh, and Bonnie Knutson. 2013. “A Longitudinal Investigation to Test the Validity of the American Customer Satisfaction Model in the US Hotel Industry.” *International Journal of Hospitality Management* 35. Elsevier:193–202.

Krejcie, Robert V, and Daryle W Morgan. 1970. “Determining Sample Size for Research Activities.” *Educational and Psychological Measurement* 30 (3). Sage publications Sage CA: Los Angeles, CA:607–10.

Lohr, Sharon L. 2021. *Sampling: Design and Analysis*. Chapman and Hall/CRC.

Manullang, D., A. Rusgiyono, and B. Warsito. 2019. “Analysis of Aquaculture Leading Commodities in Central Java Using Location Quotient and Shift Share Methods.” https://doi.org/DOI 10.1088/1742-6596/1217/1/012096.

MBOT. 2024. “MBOT Strategic Plan.” MBOT STRIVE 2024-2029. Putrajaya: Malaysia Board of Technologists. https://www.mbot.org.my/media/mbot-strategic-plan.

———. 2025. “MBOT Membership Data.”

Mo, Soo Won, Kwang Bae Lee, Yong Joo Lee, and Hong Gyun Park. 2020. “Analysis of Import Changes through Shift-Share, Location Quotient and BCG Techniques: Gwangyang Port in Asia.” *The Asian Journal of Shipping and Logistics* 36 (3):145–56. https://doi.org/10.1016/j.ajsl.2020.01.001.

Montanía, Claudia V., Miguel A. Márquez, Teresa Fernández-Núñez, and Geoffrey J. D. Hewings. 2024. “Toward a More Comprehensive Shift-Share Analysis: An Illustration Using Regional Data.” *Growth and Change* 55 (1):e12693. https://doi.org/10.1111/grow.12693.

Nunnally, J, and I Bernstein. 1994. “Psychometric Theory 3rd Edition (MacGraw-Hill, New York).”

Rahman, Md Mizanur, Mosab I Tabash, Aidin Salamzadeh, Selajdin Abduli, and Md Saidur Rahaman. 2022. “Sampling Techniques (Probability) for Quantitative Social Science Researchers: A Conceptual Guidelines with Examples.” *Seeu Review* 17 (1):42–51.

Sarstedt, Marko, Christian M Ringle, and Joseph F Hair. 2021. "Partial Least Squares Structural Equation Modeling." In *Handbook of Market Research*, 587–632. Springer.

Tibshirani, Robert J, and Bradley Efron. 1993. "An Introduction to the Bootstrap." *Monographs on Statistics and Applied Probability* 57 (1). Citeseer:1–436.

Twardowska, Klaudia, and Maciej Jewczak. 2017. "The Issues of Healthcare-Associated Infections-the Economic and Social Perspective." *Engineering Management in Production and Services* 9 (2).

Xue, Le, and Chun Yang. 2008. "An Exploratory Study of Customer Satisfaction Based on ACSI Model." *University of Gavle*, 1–26.

KHAZANAH RESEARCH INSTITUTE

Level 17-1 Mercu UEM
Jalan Stesen Sentral 5
Kuala Lumpur Sentral
50470 Kuala Lumpur

Tel: +603-2705 6100

www.KRInstitute.org

MBOT LEMBAGA TEKNOLOGIS MALAYSIA
MALAYSIA BOARD OF TECHNOLOGISTS
10 YEARS 2015-2025 A DECADE OF UPLIFTING TECH TALENTS

A1-3-1 & A1-3-3
Ayer@8, Jalan P8G
Presint 8
62250 Putrajaya

Tel: +603-8800 6268

www.mbot.org.my