



TRENDS, JOBS AND SKILLS FOR ICT PROFESSIONALS

Research Partnership between **National Trades Union Congress (NTUC)**,
Tech Talent Assembly (TTAB) and **NTUC LearningHub**

Supported by **Singapore Computer Society** and **IT Management Association**

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**Tech
Talent
AssemBly**



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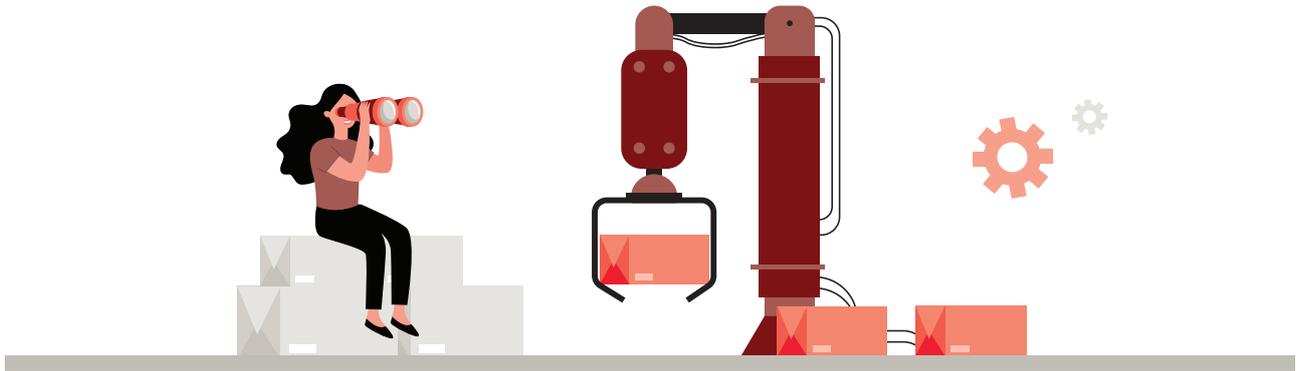
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Objectives of Research Study

1. Examine emerging global and local trends and their impact on ICT Professionals in Singapore
2. Analyse the employment landscape and job opportunities for ICT Professionals in the ICT and ICT-related sectors
3. Validate currently articulated/known required skills and surface unknown in-demand skills of ICT Professionals in the ICT and ICT-related sectors
4. Identify the future/emerging skills required of ICT Professionals over the next three years
5. Ideate strategic recommendations to help ICT Professionals reskill, upskill and adapt to changing skill demands



Research Methodology

A mixed-method to integrate qualitative and quantitative data



Extensive review of existing relevant studies



Focus Group Discussions and Survey with 61 CTOs/ CIOs



Survey of 500 ICT Professionals



Chapter 1: Global Trends

Global trends that influence emerging skills and jobs



1. Automation/Robotics

The shift in focus on cost optimisation and prevention of further production losses are accelerating the adoption of professional-service industrial robots across industries.



2. Advanced Data Analytics

Data will be integral to a company's digital transformation. Artificial Intelligence (AI), Machine Learning (ML), and advanced analytics will help companies detect new consumer behavior and consumption patterns.



3. IoT & Sensorisation

Rising installation of IoT technologies has provided an imperative for the use of Digital Twins in industries such as retail, automotive, healthcare, manufacturing, and energy, as well as smart cities.



4. Security & Privacy

As workplaces become more decentralised, organisations must prioritise cybersecurity. Cyber malwares controls and privacy enhancing technologies (PET) will be key for reducing privacy concerns across enterprises.



5. Business Model Innovation

Companies can explore the adoption of new remote working models. Technology will play a critical role in shifting to a virtual workplace, and this includes the metaverse.

How Unions in other countries have responded

Country	Switzerland	Sweden	Germany
Union Orgs	<ul style="list-style-type: none"> Swiss Confederation of Trade Unions (SGB) Travail Suisse (TS) 	<ul style="list-style-type: none"> Swedish Trade Union Confederation (LO) Swedish Confederation of Professional Employees (TCO) Swedish Confederation of Professional Associations (SACO) 	<ul style="list-style-type: none"> German Confederation of Trade Unions (DGB)
Means	<ul style="list-style-type: none"> Heightened training efforts with employers' financing workers' training High emphasis placed on Vocational, Study, and Career Guidance Encourage companies to offer apprenticeship programmes 2030 Vocational and Professional Education and Training (VEPT) Strategy 	<ul style="list-style-type: none"> Sectoral programme councils that advise on Vocational Education and Training (VET) for ICT Integrate training and lifelong learning in Collective Agreements 	<ul style="list-style-type: none"> Develop occupational profiles, curriculum, and create new profiles for training ICT-related VET courses that aim to develop ICT professionals such as software developers, network administrators, and technicians Involvement in Committee of Enquiry on VET in the Digital World of Work

Please refer to Annex for details

Chapter 2: Development in the Local Landscape

ICT remains a bright spot but thwarted by a severe talent shortage and slower pace of hiring



ACCELERATED GROWTH OF TECH ADOPTION

- Evolving with the pandemic, the industry has seen accelerated growth in B-A-S-I-C technologies and IT resilience
- Data analytics becomes further granular, creating niche professions
- High salary ranges for major roles in ICT
- Sector with the highest placements under the SGUnited Jobs & Skills Package
- Possibility of machines taking over basic coding in 5-10 years



WAR FOR ICT TALENT REMAINS FIERCE

- High attrition rate due to many ICT professionals being poached
- Singapore's talent pipeline does not meet demands of the industry
- Most Singaporeans take up project managerial roles impacting their employability in the future
- Challenging for midcareerists with no tech background to enter ICT industry



DEPENDENCE ON FOREIGN RESOURCES

- Singapore continues to buy solutions from overseas instead of creating them
- Lack of knowledge transfer to plug capability gaps
- Investors are acting with caution, with many start-ups affected
- Emerging trend of local ICT Professionals working for overseas companies remotely
- Increasing remote hiring observed leading to new talent-sourcing opportunities and competition

Employment of ICT Professionals in Singapore

Employers are seeking passionate candidates

For 73% of vacancies in 2021, academic qualifications were not the main determinant for hiring. Candidates' skill-sets and work attitude were the key considerations instead (MOM, 2021).



Chapter 3: SWOT Analysis of ICT Professionals in Singapore

A summary of opportunities and threats ahead



STRENGTHS

- Bilingual and able to work alongside with people of diverse cultures
- Intake into ICT courses/clusters in our local IHLs has grown over the last three years
- Upcoming ICT graduates are trained ahead of demand to maintain steady growing pipeline

WEAKNESS

- Mismatch between ICT Professionals and expectations on work experience and salary, qualifications, skill sets and knowledge
- Traditional modes of education are not sufficient to keep up with industry needs
- Lack of international exposure and experience as Singaporeans are reluctant to take on overseas assignments
- Challenging for displaced mid-career PMEs to build cutting-edge technology skills
- Lack of supply of ICT Professionals to fill the widening talent gap
- Uneven talent demand across tech verticals

OPPORTUNITIES

- Company-hosted traineeships and attachments e.g., Skills Ignition SG, GetReadySG
- High demand of ICT Professionals globally and locally, with high number of job vacancies
- High salary ranges for major job roles in ICT
- Place-and-train programmes for new hires and reskilling of existing staff e.g., Tech Skills Accelerator Programme

THREATS

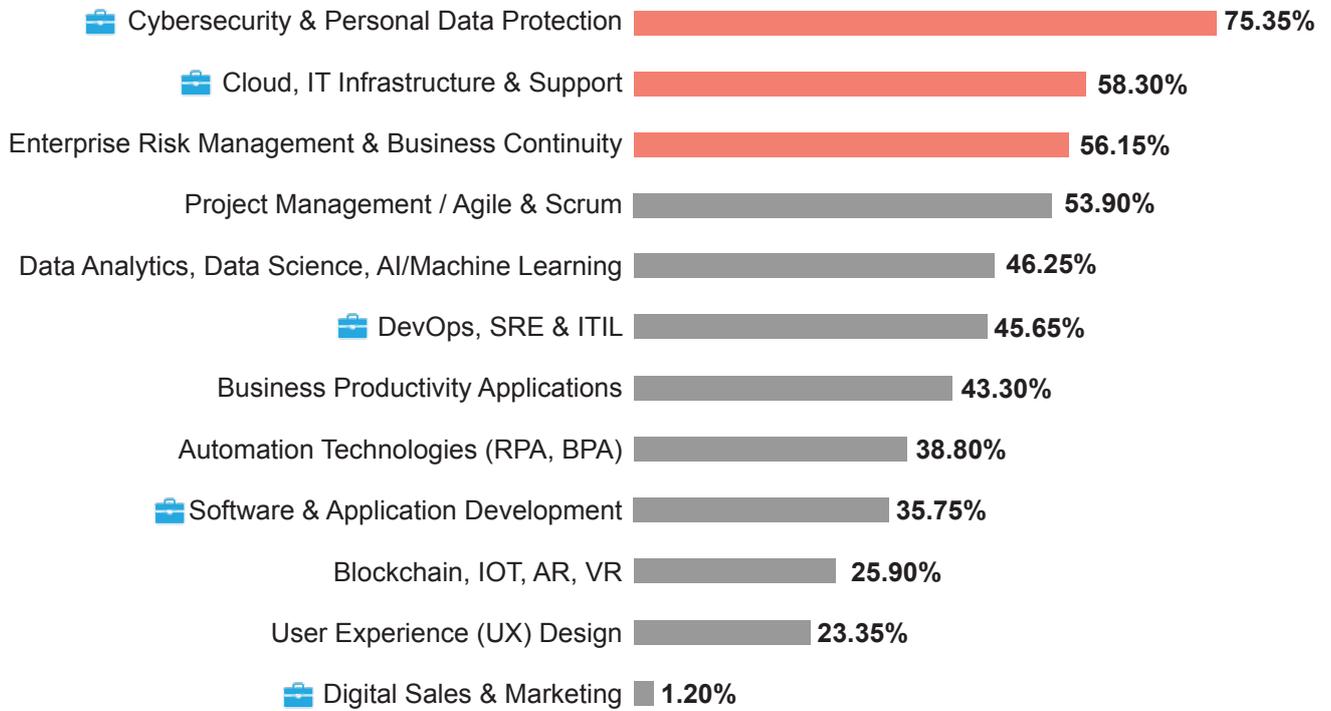
- Competition with foreign ICT professionals
- Proliferation of alternative credentialing standards resulted in a confusing array of training options of varying quality and relevance
- “Hollowing out” of mid-skilled jobs held by mid-career PMEs due to increasingly sophisticated automation
- Shift in the choice of offshore markets and remote work environment
- Evolving technology and computer systems are more complex
- Around 20% of ICT roles will experience high impact of changes in job tasks which might lead to displacement of convergence in next 2-3 years

Chapter 4: Jobs and Skills Insights

Current Skills Mismatch

Gap between market demand and supply of skills by ICT Professionals

Skills Mismatch



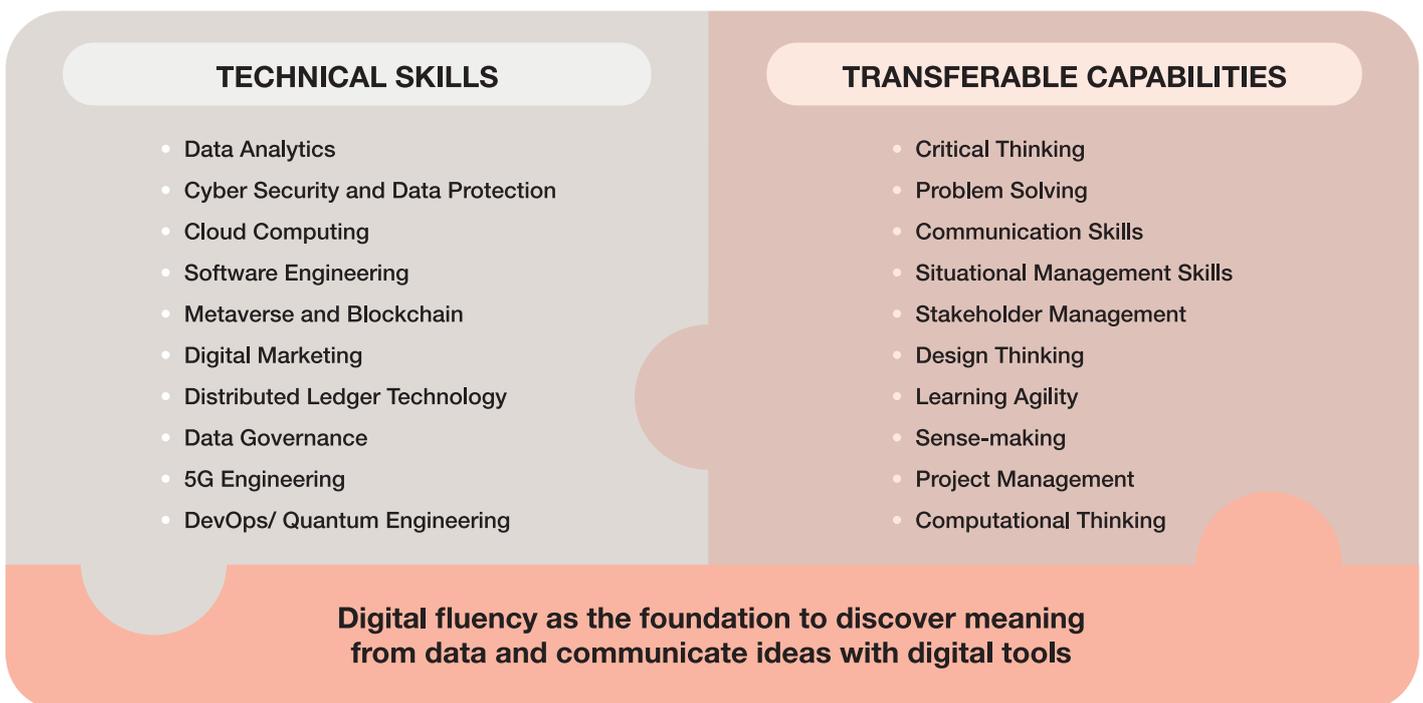
 Indicates those with higher number of vacancies



Future Skills Insights

In-demand skills and capabilities

- When ideas and technologies converge, job descriptions will change; some roles will become obsolete while new types of work will surface. This is occurring rapidly in ICT.
- While it is impossible to predict exactly the technical skills businesses require five years or more from now, identifying gaps in capabilities and what is needed for the next three years is critical.
- In the coming years, workers need to have a mix of highly transferable capabilities in addition to technical skills, with digital fluency as the foundation to enhance employability by enabling workers to discover meaning from data and communicate ideas with digital tools.



Key ICT Job Vacancies

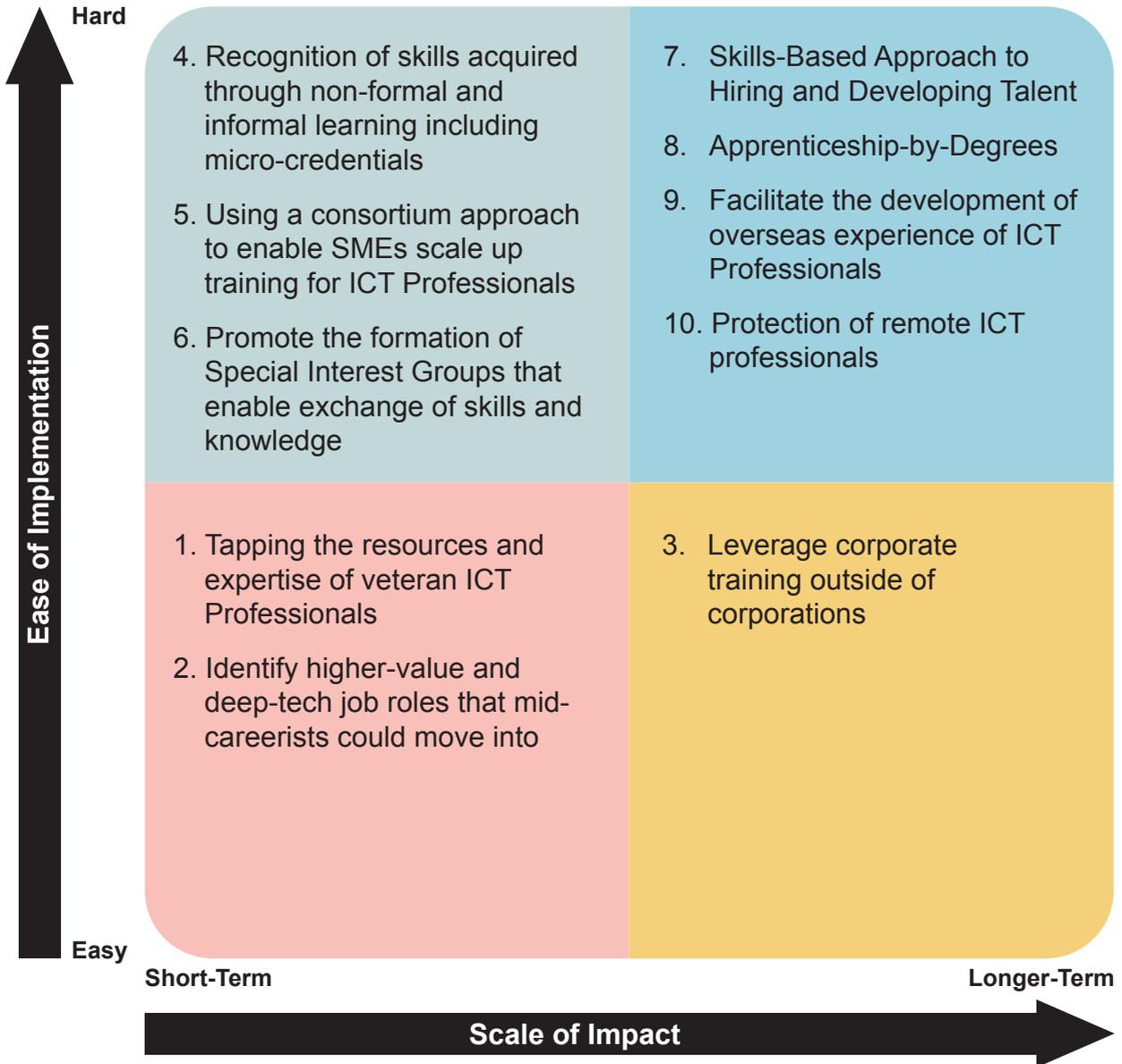


High salary ranges for major roles in ICT - Software, Web and Multimedia Developers ranked second among jobs with the most vacancies available, with minimum wages around S\$5000.

Tech-lite	E-Commerce Manager	Digital Marketing Manager	Data Analyst	Compliance Analyst	Systems Analyst
Tech-heavy	Cyber Security Engineer	Software, Web & Multimedia Developers	Network, Communications & Infrastructure Engineer	DevOps Engineer	Data Engineer

Chapter 5: Recommendations

Forging the path forward to fill the gap for skills and jobs for ICT Professionals



RECOMMENDATION 1

Tapping the Resources and Expertise of Veteran ICT Professionals

- There are extremely seasoned ICT Professionals who may be retired or near retiring but many of whom hold intrinsic knowledge of best practices and the nuances of the industry.
- To develop an initiative to leverage the knowledge and experiences of these retired/ near-retirees ICT Professionals to contribute to the development of the next generation of ICT Professionals, especially in the development of transferrable skills.



RECOMMENDATION 2

Identify Higher-Value and Deep-Tech Job Roles that Mid-Careerists Could Move Into

- Not all jobs in the ICT or ICT-related sectors require deep technical skills.
- Increasing importance of transferable capabilities by employers.
- Identify higher-value tech job roles that local mid-careerists could move into such as customer-facing technical roles, System managers, analysts, administrators and Data centre engineers.

“ No use bringing back jobs that have long been outsourced to other countries. The overseas workers are able to code faster, shorter and comes with a lower cost. What we need to identify is the higher-value tech jobs that are taken by highly paid foreign ICT Professionals? ”

– CIO of an MNC



The race to convert mid-careers into tech jobs

As corporate giants lean in, conditions may finally be ripe to skill the Singaporean masses for the tech economy

Tech-Lite Roles

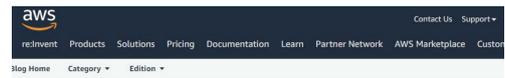
GAP
that mid
careerists could
move into

Tech-Heavy Roles

RECOMMENDATION 3

Leverage corporate training outside of corporations

- Many organisations have internal skills development platforms that help current employees acquire new skills. By pairing elements from best-of-class corporate programmes with a government policy framework, stakeholders can jointly help establish a high-quality national skills development programme that is germane to local populations, efficiently achieves scale, and doesn't need to be built from the ground up.
- Example: Amazon Web Services (AWS) and Microsoft Learn. AWS provides students and military veterans with access to skills training courses for cloud careers and outlines pathways to technology career tracks through its AWS Educate initiative, and its job board connects participants with technology jobs at Amazon and other companies. Microsoft Learn is an online training platform that helps any interested individual achieve proficiency on a series of Microsoft technologies.
- These platforms can incorporate national skills maps and become an important complement to skills training provided in IHLs.
- Tech companies to play the key role in the ecosystem to train the Singaporeans to develop their skills, example Google Skills Ignition SG.



AWS Public Sector Blog

AWS Educate Gives Students Access to Cloud Career Pathways, AWS Badges, and the AWS Educate Job Board

by AWS Public Sector Blog Team | on 19 OCT 2016 | in Education | Permalink | Share

AWS is announcing the launch of several new student-focused features in our AWS Educate program. AWS Educate provides students and educators with the resources needed to accelerate cloud-related learning. As part of the launch, AWS Educate is now offering Cloud Career Pathways that align curriculum directly to specific careers like software developer and cloud architect. Students will earn AWS Badges for different competencies like IoT, start-up, and gaming, and these competencies will help students match with potential companies hiring for these in-demand skills. The new AWS Educate Job Board includes cloud-related jobs at launch from Amazon, Salesforce, Udacity, Splunk, and Instructure, among other top employers around the world.

There is a growing demand for developers, and information technology (IT) professionals with not just knowledge of cloud computing, but also hands-on experience. We want to arm students with the right skills to help them directly apply their training to relevant internships and jobs.



Google supports 3,000 locals through a new jobs and skills initiative to boost employment and employability outcomes under the SGUnited Jobs and Skills Package

20 Jul 2020 • 2 min read



RECOMMENDATION 4

Recognition of skills acquired through non-formal and informal learning including micro-credentials

- Despite the proliferation of micro-credentials, online learning and mobile learning, workers will not invest sufficiently in them unless skills acquired from these non-formal learnings are recognised by the employers. Employers would first need to understand what a “micro-credential” is.
- Some countries (e.g., Denmark, Finland, UK) already have well-established systems for validation of non-formal and informal learning.



- LHUB and TTAB can support SSG on forming an industry workgroup to look into common standards and recognition for micro-credentials of ICT skills, including quality assurance and incorporation into a national framework to encourage adoption. This workgroup could also create a platform to standardise tests to assess one's knowledge and/or skills on a subject matter, thereby allowing for an objective assessment means.



RECOMMENDATION 5

Using a consortium approach to enable SMEs to scale up training for ICT Professionals

- Besides the perennial need to compete with bigger companies, SMEs find themselves having to compete for the right talent, in particular, those with the right digital skills.
- Many SME owners are reluctant to invest in training for their workers including ICT Professionals in the company because of the high training cost and gestation time. This leads to the vicious cycle of ICT Professionals in SMEs not being upskilled, and SMEs unable to keep up with the digital wave.
- The formation of a consortium (comprising of SMEs, trade unions/ associations and educational institutions and training providers) can be formed to look into training needs and development of training programmes to upskill ICT Professionals to better meet business requirements of SMEs.
- As its next step, the consortium could also look into creating a shared ICT resource/ services pool that each individual business can tap on where needed.

RECOMMENDATION 6

Promote the formation of Special Interest Groups that enable exchange of skills and knowledge

- Skills related to deep-tech are intensive and cannot be resolved simply by training programmes.
- This is especially so when there are many tools or skill sets required for one function.
- For example, being skilled in DevOps requires deep knowledge in the various tools in DevOps. While technical training can be provided on such tools, best practices and knowledge could be shared via such special interest groups to bring tangible value to members.
- Special Interest Groups would not only alleviate skills gaps, but they could build communities of practice that further enrich the local ICT ecosystem.
- The Labour Movement could also explore funding for members of Special Interest Groups to acquire accredited, technical training, given that these participants are those who are dedicated to developing their expertise in technology-related fields.

RECOMMENDATION 7

Skills-based approach to hiring and developing talent

- Hiring practices of ICT Professionals have to evolve. As job scopes will always evolve, and formal educational requirements will no longer be sufficient to assess a potential candidate, new approaches to hiring practices are needed.
- Not all ICT roles either require nor will benefit from workers first completing a 3 or 4 year bachelor degree.
- In the past year, LinkedIn has seen a 21% increase in job postings advertising skills and responsibilities instead of qualifications and requirements in the U.S., and the number of positions that don't require a degree increased by nearly 40% in 2020 compared to 2019.
- Mode of learning has evolved such as more Generation Z learners are learning new skills through youtube.
- Substitution of skills-oriented assessment rather than a degree or prior work experience will remove barriers for candidates that might not have the degree or network, while also creating a more diverse pool of potential new hirers.

Harvard Business Review
Diversity Latest Magazine Ascend Topics Podcasts Video Store The Big Idea

Hiring And Recruitment

You Need a Skills-Based Approach to Hiring and Developing Talent

by Ryan Roslansky

June 08, 2021



Skill assessment usage is growing, SHRM survey says

Published Aug. 17, 2022

Kathryn Moody
Senior Editor

in fi t e

USA TODAY

For You News Sports Entertainment Life Money Tech Travel Opinion

Surveys say: Employers leaning more into hiring those with skills versus experience

Terry Collins
USA TODAY

Published 12:55 p.m. ET Aug. 1, 2022 | Updated 2:42 p.m. ET Aug. 2, 2022

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Harvard Business Review

Diversity And Inclusion | How My Company Created an Apprenti

How My Company Created an Apprenticeship Program to Help Diversify Tech

by Ryan Carson

November 02, 2018



RECOMMENDATION 8

Apprenticeship-by-degrees

- COVID-19 has reshaped the workforce so rapidly that neither a competency-based approach nor traditionally designed university courses are adequately equipping workers for the jobs that will remain or be created.
- Rather than prepare workers for a discipline or narrow vocation, apprenticeships-by-degrees model focuses on filling work roles that do not conform to existing professional or occupational boundaries.
- Focuses on (1) Fill roles where substantial deficiencies exist in the talent supply pipeline; (2) Create a workforce that is both work-ready and able to transfer learning into an employer's context; (3) Reskill to rapidly overcome skill misalignments where new recruits from school or the existing talent pool hold skills appropriate for jobs that are being augmented or replaced by technology & (4) Ensure those in the programmes acquire capabilities that prepare them for a career, not a specific job, employable across multiple jobs/ occupations.

RECOMMENDATION 9

Facilitate the development of overseas experience of ICT Professionals

- Many business leaders during the FGDs have expressed the growing importance for ICT Professionals to have overseas exposure, and those that have overseas experience tend to gain a competitive edge against others.
- Individuals who have spent time overseas studying or working, tend to get hired faster and earn more than peers without international experience.
- The transferrable skills gained while abroad are especially attractive to employers in the current job market.
- A global mentor could also be arranged to help workers prepare for the overseas transitions.
- In partnership with Government agencies, the Labour Movement could facilitate in providing opportunities for workers to develop overseas experience such as overseas attachment to enhance opportunities for employability and progression.

“ The overseas exposure will inculcate a mentality that will be able to disrupt the mid-career crisis: you will start to realise that the world is so much bigger than Singapore’s stable environment. So, I think it’s something really good to have overseas exposure ”

– CTO of an MNCs



Forbes

FORBES > LEADERSHIP

Global Mobility: A Win-Win For You And Your Employer

Sylvia Vorhauser-Smith Former Contributor @

Oct 31, 2013, 03:48pm EDT

RECOMMENDATION 10

Protection of remote ICT professionals

- Digital nomadism is on the rise. By 2025, it is estimated that a whopping 35.7 million Americans or 22% of the workforce, will be remote workers (Forbes, 2022).
- The pandemic has hastened the growth of remote work such as workers working for overseas companies remotely especially ICT Professionals, which may lead to the weakening of social protections and the undermining of collective bargaining for these workers.
- Observation of increased ICT Professionals in Singapore are working for overseas companies remotely.
- Labour Movement will need to look into developing a set of strategies and principles that can be used to advance remote workers’ rights beyond geographical boundaries.

Forbes

FORBES > LEADERSHIP > CAREERS

Why The Digital Nomad Lifestyle Is On The Rise

Caroline Castrillon Contributor @

I write about career, entrepreneurship and women's advancement.

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INVEST IN YOU: READY. SET. GROW.

Meet the company that lets you work remotely from anywhere in the world

PUBLISHED FRI, MAR 11 2022-9:40 AM EST | UPDATED FRI, MAR 11 2022-7:50 PM EST



Michelle Fox @MFOXCNBC

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Anticipating the potential consequences ahead

Recommendations	Positive Outcomes	Negative Outcomes
1. Tapping the resources and expertise of the veteran ICT Professionals	Transfer of intrinsic knowledge and industry know-how to younger ICT Professionals.	-
2. Identify higher-value and deep-tech job roles that mid-careerists could move into	Develops job opportunities and career progression pathways for mid-careerists.	Negative sentiments that local mid-careerists are afforded a certain level of privilege or priority despite their level of skills could arise.
3. Leverage corporate training outside of corporations	Complements the skills training provided by IHLs, and better able to meet the demands of the industries.	Corporations that are providing the training might find themselves in a position of power/influence to decide prioritisation of skill sets OR steer the curriculum in a manner that benefits the corporation's agenda.
4. Recognition of skills acquired through non-formal and informal learning including micro-credentials	Companies develop the recognition framework for skills acquired through non-academic means which could then lead to greater transparency in hiring practices; Allows workers to personalise their learning, as they can select short-form micro-credentials tailored to their career goals and responsibilities.	There might be a lack of "buy-in" from the employers to recognise the micro-credentials if there is no national standard to recognise these micro-credentials.
5. Using a consortium approach to enable SMEs scale up training for ICT Professionals	Allows SMEs to leverage their combined resources; training providers could design customised training for ICT Professionals in SMEs.	The emphasis on ICT may lead to assertions of neglect in other skill areas or support that SMEs likewise require.
6. Promote the formation of Special Interest Groups that enable exchange of skills and knowledge	Alleviates skills gaps and builds communities of practice that further enrich the local ICT ecosystem.	Groups run the risk of dying out due to high investment of resources into setting up such groups; issue of sustainability.
7. Skills-based approach to hiring and developing talent	Companies develop the recognition framework for skills acquired through non-academic means which could then lead to greater transparency in hiring practices; Removes barriers for candidates that might not have the degree or network, while also creating a more diverse pool of potential new hirers.	Some organisations may not know how to use a skills-based approach to hiring and developing talent.
8. Apprenticeship-by-degrees	Offers the benefits of practical on-the-job career development and academic study at a higher level, leading to a degree.	Lack of opportunities for apprentices to develop technical knowledge; time-consuming nature of apprenticeships may also deter businesses from participating.
9. Facilitate the development of overseas experience of ICT Professionals	Enhances opportunities for employability and progression for ICT Professionals.	Brain drain where Singapore loses ICT Professionals to other countries where they choose to continue working.
10. Protection of remote ICT professionals	Remote ICT professionals receive better protection and support on work-related issues.	Reduces competitiveness of Singaporean ICT Professionals.

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Annex

Global Trends

COVID-19, Digitalisation, & Technological Advancements

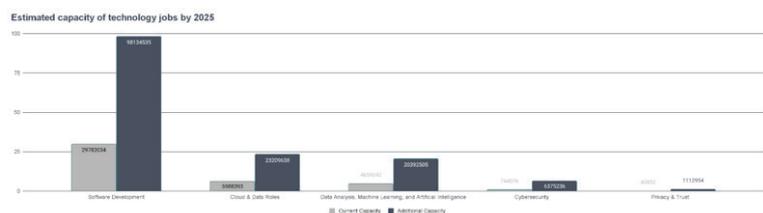
The COVID-19 pandemic has accelerated digitalisation across sectors and reshaped most industries. Technology advancements have also sped up the deployment of AI solutions and autonomous operations. With a renewed focus on developing digital platforms for citizens, countries around the globe have increased their spending on technology, leading to a surge in adoption of digital tools. These digital tools and solutions will continue to evolve, bringing to the forefront five critical success factors for companies/businesses to incorporate into existing processes and ensure continued growth:

				
<p>1. Automation/ Robotics The shift in focus on cost optimisation and prevention of further production losses are accelerating the adoption of professional-service industrial robots across industries.</p>	<p>2. Advanced Data Analytics Data will be integral to a company’s digital transformation. AI, ML, and advanced analytics will help companies detect new consumer behavior and consumption patterns.</p>	<p>3. IoT & Sensorisation Rising installation of IoT technologies has provided an imperative for the use of Digital Twins in industries such as retail, automotive, healthcare, manufacturing, and energy, as well as smart cities.</p>	<p>4. Security & Privacy As workplaces become more decentralised, organisations must prioritise cybersecurity. Cyber malwares controls and privacy enhancing technologies (PET) will be key for reducing privacy concerns across enterprises.</p>	<p>5. Business Model Innovation Companies can explore the adoption of new remote working models. Technology will play a critical role in shifting to a virtual workplace, and this includes the metaverse.</p>

Emerging Skills & Jobs

Microsoft predicts that there will be 149 million new technology-oriented jobs worldwide by 2025, approximately three times the digital job capacity in the year 2022. These 149 million jobs are further segmented into five broad groups: Software Development, Cloud and Data, Data Analysis, Machine Learning, Artificial Intelligence, Cybersecurity, and Privacy and Trust.

The magnitude and mixture of job growth will vary by country, industry, and sector. Microsoft estimates that of the 149 million new jobs created, 324,000 will be in the food production sector, while the healthcare and automotive sectors will see two million and six million respectively.



These five broad groups of ICT jobs mirror the five critical success factors or growth areas as outlined earlier. The demand for cybersecurity specialists, for example, would increase as companies digitalise their operations, putting them at a greater risk of cyber-attacks. Roles in Data Analysis, ML, and AI would also be essential to companies exploring implementing Advanced Data Analytics to support organisational transformation. Software developers and engineers would also be critical to a company's journey towards automation and/or sensorisation.

The exponential growth of the number of ICT roles is further complicated by the tech talent shortage, which refers to the gap between the supply and demand of skilled tech employees. "Skilled tech employees" are those who have had formal education and/or training in technology, and are proficient in hard skills such as (but not limited to) programming, machine learning, and artificial intelligence.

Vacant tech roles outnumber skilled tech employees, and the rate at which new tech roles are created far outpace the rate at which education institutions produce IT graduates. This is a global phenomenon which no country is immune from. According to findings in an IMF study in 2019, there will be a global shortage of 85 million tech workers by 2030.

The impact of this shortage on workers has been well documented in the literature. According to Skillsoft's 2021 IT Skills and Salary Report, ICT professionals already face tight project timelines and the inability to deliver projects due to the absence of ICT talent to service those projects. As a result, they experience significant ramifications such as stress, lack of training, and lack of support from their organisations in their respective areas of work.

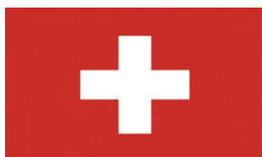
In Singapore, the tech talent shortage has also been reported to have negative effects on organisational practices, which in turn has downstream effects on employees. As tech companies pursue growth, many do not abide by best HR practices. Employees feedback unrealistic timelines, poor feedback mechanisms and unclear targets. This creates a vicious cycle of attrition that exacerbates the tech talent shortage.



What Unions In Other Countries Do

Unions around the world recognise the impact that the ICT talent shortage has in productivity and welfare. Efforts have been steered towards ensuring that workers are well-prepared with the right skills to take on emerging job roles. By encouraging the development of human capital in core ICT functions, the burdens on existing ICT professionals could be alleviated to ensure better welfare, working prospects, and wages for all.

We assess the measures taken by Unions in the following countries:



Switzerland

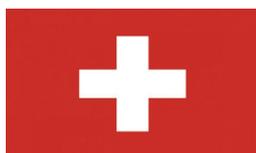


Sweden



Germany

Switzerland



In Switzerland, approximately 243,000 people held ICT professions across different sectors in 2020. This was a 50% increase from 2010, and comprised a third of workers who worked directly in the ICT sector, and two thirds that were employed across other sectors.

This demand for ICT talent is set to continue, with least 128,823 ICT job vacancies in Switzerland by the year 2025.



Travail.Suisse

The **Swiss Confederation of Trade Unions (SGB)** and **Travail Suisse (TS)** recognise the impact that digitalisation has had on labour. In a 2017 media release, the **SGB** called for an offensive in training efforts, and rallied employers to help finance workers in these efforts. According to a research study published in 2021, **TS** had called for “greater value to be placed on vocational, study and career guidance” especially in light of technological changes. This follows a longstanding effort to encourage greater commitment from companies to offer apprenticeship programmes.

Berufsbildung **2030**
Formation professionnelle
Formazione professionale

digitalinform
.swiss

Both associations are key stakeholders in Switzerland’s **2030 VPET Strategy**. The aim of the 2030 VPET Strategy is to ensure that holders of vocational and professional qualifications are equipped with the knowledge, skills and know-how needed on the labour market. They are part of the Tripartite Vocational Training Conference that controls vocational training in partnership at a strategic level and develops it further. It is responsible for managing and coordinating the 2030 projects.

Under the 2030 Strategy, a project titled **digitalinform.swiss** is housed. This project focuses on four thrusts:

- (i) improving digital skills at school;
- (ii) encouraging the use of ICT in teaching and learning;
- (iii) enabling the rapid adaptation of the education system to market requirements; and
- (iv) coordinating communication and enabling cooperation in training.

Limited information is available on the exact functions that Swiss unions play in these projects, but it is evident that they play key roles by lobbying for greater VPET innovations and by advocating for greater cooperation among the stakeholders involved. These efforts go towards enabling a holistic ICT environment across Swiss education, vocational training, and employment, by anticipating changes in the labour market and focusing on making vocational training fit for employees of the future.

Sweden



In Sweden, there were approximately 379,000 ICT professionals across different sectors in Sweden in 2020, representing 7.5% of the country's total workforce. In 2010, this percentage stood at 4.42%. By 2025, there would be at least 367,860 new ICT jobs.



Sweden has three main union confederations - the **Swedish Trade Union Confederation**, the **Swedish Confederation of Professional Employees**, and the **Swedish Confederation of Professional Associations**. Swedish trade unions are represented on the board of the Labour Market Council which is linked to the Swedish National Agency for Higher Vocational Education, and they are represented on 12 sectoral programme councils that advise on VET matters. Some Swedish unions also integrate training and lifelong learning in collective agreements. In the case of the union for Swedish Engineers, which covers the Information and Telecommunication Technology sector, the funding of outplacement trajectories in case of redundancies is also part of these agreements.

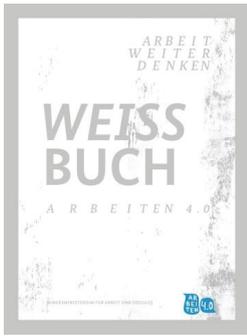
Germany



In Germany, approximately 1.9 million people held ICT professions across different sectors in 2020. This was more than twice as many ICT professionals in 2010, and represented ICT professionals across sectors such as ICT, Manufacturing, Construction, Public Administration, Professional Services, and Wholesale & Retail Trade. By 2025, there would be at least an additional 3,188,278 new ICT jobs.



The **German Confederation of Trade Unions (DGB)** is Germany's umbrella association for trade unions. The Board of the Federal Institute for Education and Training, established in 1970, is the Federal German Institute that deals with all aspects of vocational education, and is composed of trade unions and employers in equal representation. Thus, trade unions play an important role in the development and the implementation of the Vocational Education and Training (VET) system, where apprenticeships in a company are combined with education at a vocational school. They develop occupational profiles, curriculum, and create new profiles for training. **ICT-related VET courses** aim to develop ICT professionals such as software developers, network administrators, and technicians.



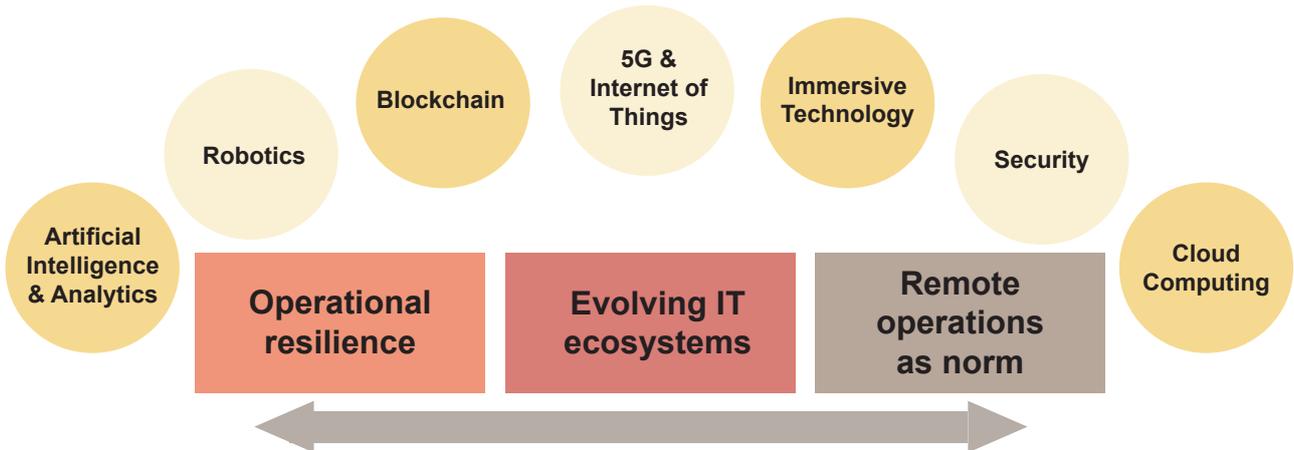
In 2016, the **Weißbuch Arbeiten 4.0 (Work 4.0)** was published. It aimed to highlight the concerns surrounding job losses, skills, and work-life balance in the age of digitalisation. It was the product of a consultation process by the German Federal Ministry of Labour and Social Affairs, with input from associations, trade unions, and companies. Of note, the paper called for the initiation of **regular monitoring of future demand for skilled labour to enable the identification of skills mismatches across demographic and regional landscapes.**

The **DGB**, in particular, argued that the identification of skills should be a key element in ensuring continued VET. The paper called for the state, companies, and individuals to **share the costs relating to release from work and wage replacement** when undertaking VET during employment.

In June 2018, the German Lower House of Parliament established a Committee of Enquiry on VET in the Digital World of Work, tasked to look into how to structure VET in light of rapid digitalisation and identify the areas that the VET would need to be adjusted to meet the demands of the digital world of work. **Trade unions were involved in this effort**, in addition to employers, industry experts, and members from the Lower House of Parliament. The Committee serves to examine areas of potential for **socioeconomic modernisation, develop policy recommendations, and strengthen VET.** The final report was expected to be out in mid-2021.



Mega Trends That Will Impact The ICT Workforce In Singapore In The Next 3-5 Years



- Due to Covid-19, need for “IT resilience” led to new technological investments accelerating the technology adoption in organisations
- Increasing number of organisations moving towards DevOps/ Site Reliability Engineering models and the evolving IT ecosystems will result in reshaping of job functions
- Remote operations as norm will result in new talent-sourcing opportunities and competition

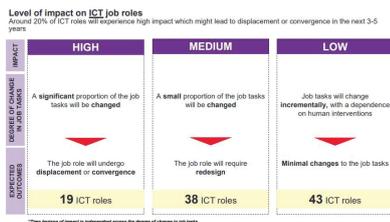
Adapted from EY, 2022

Landscape In Singapore

Accelerated adoption of technology by companies due to COVID-19 pandemic



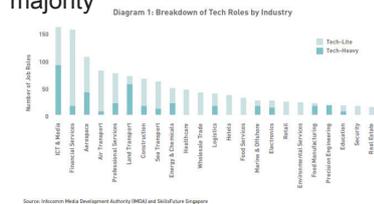
Around 20% of ICT roles will experience high impact in change in job tasks which might lead to displacement of convergence in next 3-5 years



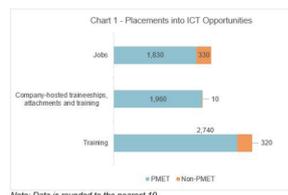
ICT Professionals has grown to more than 200,000 today, with the number of tech jobs increasing by about 10,000 annually in the last 3 years



Tech jobs are required across sectors, with tech-lite roles as majority



Sector with the highest placements under the SGUnited Jobs & Skills Package



Singapore's war for ICT talent remains fierce -another 60,000 needed over the next 3 years.

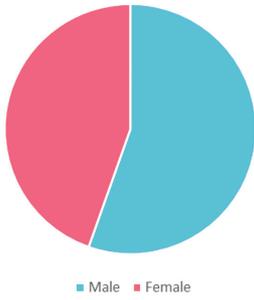


High salary ranges for major roles in ICT - Software, web and multimedia developers ranked second among jobs with the most vacancies available, with minimum wage of \$5000. Pay jumps of between 15- 30%

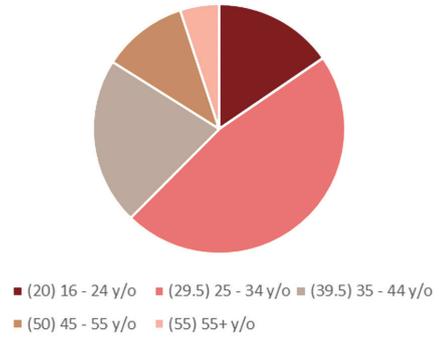


Demographics of Survey Participants

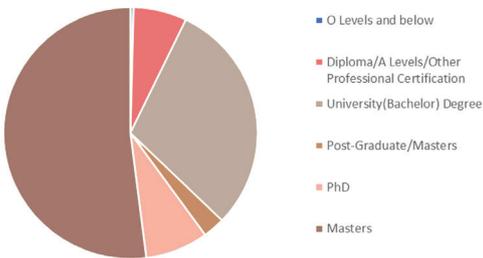
Gender



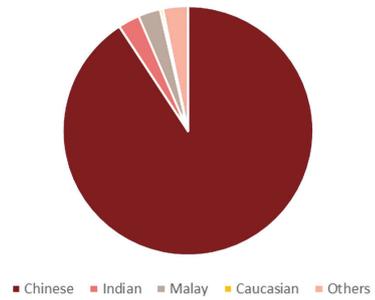
Age Group



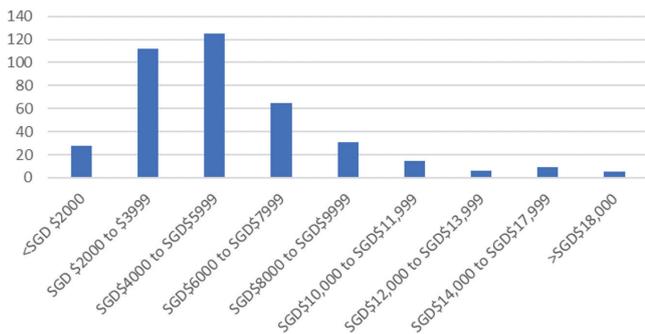
Highest Educational Qualification



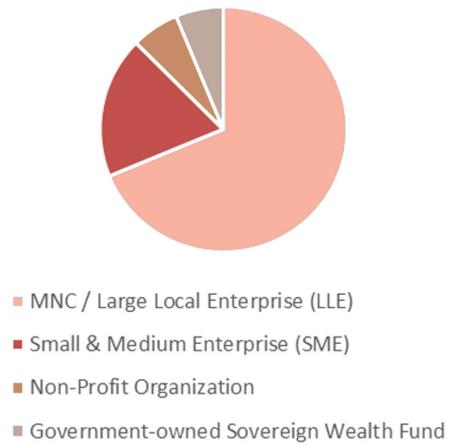
Race



Gross Monthly Personal Income (before tax/CPF)



Company Type



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ntuc

National Trades Union Congress

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