MINISTRY OF HUMAN RESOURCES

TalentCorp
GROUP OF COMPANIES

Sector-Focused IAC Industry-Academia Collaboration Workshop Report Volume 1

Synergizing the Development of Malaysia's Future Talent

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Message From The Minister of Human Resources

Yang Berhormat Tuan V. Sivakumar
Minister of Human Resources

I would like to extend my sincere congratulations and commendation to Talent Corporation Malaysia Berhad (TalentCorp) for successfully organising the Industry-Academia Collaboration (IAC) workshops. At the Ministry of Human Resources, we always looking to increase the depth as well as the breadth of Malaysia's talent pool, and I cannot stress enough the incredible, positive impact that these IAC workshops have been delivering to meet our vision of turning Malaysia into a high-skilled, high-income nation.

A healthy dialogue between key stakeholders serves as invaluable Solution-focused Group Discussion (SFGD) platforms, where industry professionals and academic experts can address the challenges and identify potential solutions via the exchange of knowledge, insights and experience. This enables the Government to gather diverse perspectives while formulating policies, as the insights gained from these discussions are key in helping policymakers understand the practical implications of their decisions and make policies that are more effective, feasible, and conducive to spur economic growth.

This strategy also provides us with countless collaboration opportunities. By bringing together all representatives, we can identify areas of mutual interest and establish partnerships to address complex challenges. Collaborative initiatives such as joint research projects, internships, and technology transfer programmes play a big role in enhancing talent development and driving innovation.

The power of this synergy extends beyond individual success stories. It contributes significantly to talent retention within Malaysia, as the workforce finds ample avenues to grow and flourish domestically. Simultaneously, the allure of a skilled and adaptable workforce attracts investments from industries seeking to capitalise on this wealth of talent. In essence, the IAC workshops have become the catalyst for a dynamic and prosperous ecosystem, where industry and academia unite to build a brighter future for our nation, making it a magnet for innovation, progress, and opportunity.

In conclusion, I wish to extend my appreciation to TalentCorp for conceiving and implementing such a highly impactful programme. I look forward to the unfolding of significant achievements through forthcoming iterations of the IAC efforts to continue empowering Malaysia's talents for a brighter future to come.

Foreword by The Deputy Secretary General of MOHR

YBhg. Dato' Haji Amran Bin Haji Ahmad
Deputy Secretary General
(Policy & International), Ministry
of Human Resources

Helen Keller once said, "Alone we can do so little; together we can do so much."

That quote rings especially true for us at the Ministry of Human Resources because we have benefitted so much from our active engagement in the Industry-Academia Collaboration (IAC) workshops, which are designed and conducted by Talent Corporation Malaysia Berhad (TalentCorp). These discussions have provided us with invaluable insights, collaboration prospects, policy directives and networking opportunities, all of which converge to fortify the bedrock of Malaysia's talent development, reduce skills gaps, and improve employment policies.

Over the years, feedback gained from the TalentCorp IAC efforts have provided us with insights of the demand and supply of the Malaysian labour force, allowing us to better understand the specific needs of the workforce as well as the requirements of different sectors. Through this, we have been able to develop suitable high-impact intervention programmes that enhance the industry-readiness of young talents in Malaysia and design industry-relevant curriculums, internship programmes and vocational training programmes.

The fruitful discussions stemming from the IAC workshops have also given us a greater understanding in designing effective policies and regulations that are aligned with the needs of specific sectors while ensuring that the practicality and responsiveness to the industry's demands are always upheld to the highest standards. On top of that, the emergence of conversations surrounding environmental, social and governance (ESG) topics during these discussions allows us to better gauge the awareness on the necessity of sustainability among industry players, academia, talents and even the Government.

I believe that these efforts are now more crucial than ever as we continue pushing for transformative policies that would turn Malaysia into a new generation of talent hub in the region. To achieve that goal, the Ministry would need to develop a competent, productive, responsive and resilient human capital in the labour market to better the national productivity while increasing employability and employment rate of the local workforce to meet the national labour market needs.

I would like to thank TalentCorp for the dedicated efforts in strengthening the collaboration between industry players, academicians and professional bodies. By gathering inputs, insights and feedback from IAC stakeholders on talent matters, you have shown to provide support to the Ministry of Human Resources in our journey to continue developing the talent pool of Malaysia to the best of our abilities.

Preface by The Group CEO of TalentCorp Group

Thomas Mathew
Group Chief Executive Officer
TalentCorp Group of Companies

To continue pushing our Industry-Academia Collaboration (IAC) initiative forward to achieve greater goals, we first need to take a step back and remind ourselves again why we are here doing what we are doing. As the bridge between industry and academia, we have been receiving countless feedback regarding a severe mismatch in skills and competencies within the Malaysian workforce. The desire to address this issue became our motivation to create the IAC events to unite all parties – especially priority stakeholders – to map out new solutions for challenges surrounding talents in particular economic sectors.

I am pleased to share that in 2022, we successfully conducted 10 IAC workshops that encompassed a diverse range of sectors, including STEM, tourism, animation and gaming, electrical and electronics, medical and healthcare, fast-moving consumer goods, information and communications technology, biotechnology, logistics, and oil and gas services and equipment. My thanks to the 289 industry participants, 240 academia members, and representatives from 21 professional bodies who gave their time, feedback and energy to channel back what is needed to produce market- and industry-ready talents.

In these dialogues, we have assembled promising steps for action, arranging them into three levels of effort: minimal, moderate, and substantial. This strategic manoeuvre enables us to embrace an objective stance, providing us with practical checklists tailored to each sector. Additionally, we are poised to revisit and tackle immediate victories identified across the ten sectors, potentially bringing us forward with tangible advancements in enhancing the talent landscape within each domain.

The 6 steps that we are committed to taking are:

1. Reviewing the initiatives: We will gather all the low-effort-required initiatives identified in each sector and create a comprehensive list.
2. Prioritising the initiatives: We will evaluate and prioritise the initiatives based on their potential impact and feasibility.
3. Forming working groups: We will establish working groups that comprise representatives from industry, academia, and relevant stakeholders for each sector.
4. Allocating resources: We will determine the necessary resources, including budget, personnel and infrastructure required to implement the identified initiatives. This could involve coordinating with relevant ministries, funding agencies and private sector partners. We will then allocate resources based on the priority and significance of each initiative.
5. Developing action plans: For each low-effort-required initiative, we will develop a detailed action plan that outlines the steps, responsibilities, timelines, and expected outcomes. We will clearly define the tasks and deliverables for each stakeholder involved. This will ensure clarity and accountability throughout the implementation process.
6. Monitoring and evaluating progress: We will establish a monitoring and evaluation framework to track the progress of the initiatives.

In 2023, we aim to collaborate on 10 more IAC workshops, as well as 5 regional events in Sabah, Sarawak, the Northern Region, the Southern Region and the East Coast. These will be catered specifically to the GBS, financial, aerospace, rail and professional services sectors.

I am certainly very excited about the future of our IAC workshops, and I am confident that with your support, we can continue fostering a strong partnership between TalentCorp, the industry players, academicians and professional bodies.

MINISTRY OF HUMAN RESOURCES

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Sector-Focused Industry-Academia Collaboration (IAC)-STEM Workshop Report

With support from the Ministry of Higher Education Malaysia (MoHE), and National STEM Association (NSA)

Executive Summary

With a focus on higher education, this IAC-STEM (Industry-Academia Collaboration in Science, Technology, Engineering, and Mathematics) brief explores how best to bridge disparities between STEM graduates and industry demand for skilled STEM workers in Malaysia.

This brief highlight important questions for national key players involved in STEM-based talent development to enhance the quality of training for STEM graduates to meet the demands of a post-pandemic Malaysia. Through the IAC-STEM focus groups held with industry captains and members of the academia, a holistic STEM ecosystem for our nation requires ten (10) key domains to be addressed: 1) Policy and Institutional Structure, 2) Curriculum, 3) Teaching and Learning Delivery, 4) Professional Development, 5) Learning Support, 6) Infrastructure and Support, 7) Assessment of Learning Outcomes, 8) Partnerships, 9) Research and Evaluation, and 10) Value-added Credentials.

Envisioning a post-COVID-19 world with skilled human capital in the country, an effective STEM ecosystem is elusive and constantly in flux. To address the multiple levels of need, a one-nation approach that promotes equity and access for women to play an equal role in STEM is critical. The pandemic has since exacerbated pre-existing disparities between gender and socio-economic gaps in STEM by reducing the opportunities for many of the most vulnerable learners. Therefore, more rigorous and systematic efforts are needed to establish a responsive, equitable, and locally relevant STEM ecosystem.

What are the issues?

Current Scenario

The impact of the COVID-19 pandemic on the Malaysian economy and the labour market is significant. From bottom-up evidence, it is observed that most companies have deepened their reliance on technology during the pandemic and are more aware of digitalisation and automation today. 86% of the occupations that appeared for the first time in the 2020/2021 Critical Occupations List (MyCOL) are predominantly digital professions, all of which are STEM-related (Source: TalentCorp, 2022).

STEM is the fundamental knowledge of Science, Technology, Engineering, and Mathematics that drives technological advancements. Understanding these critical knowledge domains is essential for knowledge transformation to take place to produce indigenous innovations for Malaysia to remain competitive globally. Investment in ensuring a steady talent pool in STEM is necessary for a faster economic recovery post-pandemic and to actualise the vision of a high-income, high-tech nation by 2030. Since it is the people who power innovation, our STEM talent must be equipped with the right knowledge, skill sets, and values.

Demanded technical skills in STEM cover areas in manufacturing, telecommunications, data science, robotics, electric and electronics, and healthcare. In addition, skills in cloud computing, programming, data analytics, mechanical drawing, and automation are currently highly sought after. Knowledgeable, transdisciplinary, cross-sector talent is needed, especially in IR4.0.

Mastery of soft skills is deemed equally important by the STEM industry. For example, employability skills such as having a growth mindset, good work ethics, and effective communication, i.e., articulating ideas effectively and respectfully, are recurring issues raised by potential employers to be lacking in STEM graduates. In addition, graduates' ability to be learning-agile, resilient, and capable of working as efficient team players is also much needed by current STEM-based employers. Moving ahead, more complex non-technical skills will soon be expected of STEM graduates.

However, on a more fundamental note, there has been a steady downward trajectory in the enrolment of Malaysian students in the STEM field of study over the years. When compared to the arts field, the difference is vast. The sharp decline of students interested in STEM is attributed to their fear and lack of confidence due to the technicality of the subjects. General lack of awareness of the importance of STEM, poor English proficiency, limited and outdated learning infrastructure that is less appealing to students, insufficient teaching and learning materials, and inadequate time allocated for STEM lessons in schools all contributed to this decline.

Policy-related issues on STEM in the context of Malaysian higher education

- The different roles of our local universities are often overlapped and misinterpreted by many. For example, research universities (RUs), technical universities (MTUNs), and Focus Universities fundamentally have different

Demanded Future Soft Skills in STEM-based Workforce

*Volatile, Uncertain, Complexity and Ambiguity

missions and visions, and their curriculum, learning delivery, and assessments are designed based on these specific roles that many are unaware of. Subsequently, allocated budgets for improving STEM outcomes are not utilised appropriately according to these differentiated functions.

- STEM undergraduates need an effective and efficient learning model for acquiring updated industry-relevant skills. At present, efforts are disjointed between higher education policymaking in teaching and learning and the actual teaching and learning processes that take place in university classrooms.
- There is an apparent gap between the existing STEM curriculum offering in higher education and current domain knowledge in STEM (e.g., new oil and gas products) that needs to be urgently addressed.
- Graduate students and lecturers are not assessed on their ability to get buy-in from the industry and community. Furthermore, university academics generally use the time during their industry attachment to complete academic-aligned tasks rather than furnishing themselves with industry-relevant skills and establishing meaningful network collaborations with the industry.
- On the other hand, it is agreeable that most of our nation's industries are low value-added rather than research-driven; hence indigenous intellectual properties are still scarce.
- Existing STEM policies are not communicated effectively to all stakeholders. As a result, while research institutions invest in producing STEM innovations and inventions, it remains unclear who is responsible for commercialising these research products and the steps needed to market them effectively.
- There is also a general lack of adequate and systematic measures of investments made toward STEM initiatives. Therefore, when faced with situations where funding becomes scarce, a sustainability plan is needed to ensure that STEM initiatives in place are not halted.
- There are far too many agencies playing the role of high technology industry establishments but far too little focus on planning to sustain the growth of such industries in the country.
- The unattractive salary offered due to the lack of industry-relevant and critical thinking skills of STEM graduates, as perceived by the industry, is also a continuous challenge in meeting job demands. Overclaiming STEM and digital skills among graduates make it hard for industry employers to make the right offer and hiring decisions.

STEM Curriculum in Universities

- In a recent national survey, 3000 Malaysian students misperceived STEM as just an academic subject and not as a way of life. Students are generally not aware of what STEM is and do not think championing STEM is essential for the country to move forward and be at par with the rest of the world.
- A persistent issue is the inappropriate overloading of the STEM curriculum in primary schools, focusing more on superficial learning outcomes rather than building a solid conceptual understanding of STEM early on. This lack of conceptual mastery creates carry-over effects into higher education and subsequently into the workforce upon graduation.
- Due to the highly structured curriculum since school, students generally find it challenging to create and solve unstructured problems novelly, resulting in continued reliance on existing non-indigenous technologies until today.
- STEM students are also noted as lacking in their ability to connect knowledge from other domains and effectively communicate their opinions. More specifically, students lack the skills of visualising or hand-sketching concepts and ideas, possibly due to the schooling system they were trained in, which does not promote these relevant skills.
- For decades, the entire STEM curriculum and instruction ecosystem have been out of sync. There appears to be no clear understanding of the roles between the involved ministries, industries, society, and academia.
- The pandemic has further exacerbated existing efforts to provide community engagements on everyday STEM knowledge and skills to promote STEM enrolment at school and university levels, and momentum is yet to be re-established post-pandemic.

Teaching and Learning of STEM in Higher Education

- Current levels of knowledge and readiness among STEM lecturers are generally still heavy focus on theoretical at a conventional level.
- Similar to learning processes in other domains, higher education teaching and learning in STEM is still too focused on closed-book assessments and an exam-based learning system.
- Efforts to focus on meaningful learning experiences for the students are still deficient in many areas of STEM courses. Most courses are delivered with a focus on acquiring procedural knowledge to ace exams rather than teaching and learning processes that promote conceptual mastery.
- In certain STEM domains (e.g., astronomy), data are not readily available or easily accessible to instructors and students, retarding efficient learning processes.
- Students' passions do not always align with the skills they acquire through university teaching and learning processes, and current programme offerings not necessarily cater to students' unique interests and talents.
- University STEM instructors generally do not provide ample time for student consultation as they are occupied with other academic duties.
- Beyond formal STEM curriculum, STEM activities mainly focus on the more privileged. Moreover, they are offered primarily in urban areas, creating a knowledge and domain understanding gap between different socio-economic groups.

Assessment of STEM Learning Outcomes

- Current assessments for non-STEM domains do not integrate STEM skills, and as such, STEM learning outcomes are solely assessed via STEM-based courses.
- Higher education institutions focus heavily on assessing theoretical knowledge and understanding rather than applied STEM knowledge. Most challenges encountered in work settings are beyond educational textbook.
- Current assessments of STEM skills in higher education are deemed inadequate for the high-value-added industry, which is still very low in Malaysia.
- Notedly, Malaysian industry players are reluctant to invest adequately in talent development in collaboration with universities.
- While industrial placements are an effective means of authentically

assessing students' STEM skills, industry assessors for STEM in tertiary entities are still lacking.

- University academics' lack of ample exposure to STEM developments limits their knowledge transfer to students, resulting in deficient assessment methods.

What has been done?

Policy on STEM in the Context of Higher Education

- More opportunities for industry placements have been afforded through subsidised costs by the ministries, where graduates demonstrating good performance will subsequently be absorbed into the industry.
- Cradle (an agency under the Ministry of Science, Technology & Innovation (MOSTI)) currently supports graduates who have developed fundamental ideas into commercialised products with funding for MYR500,000.00.
- The Ministry of Agriculture provides training and funds for graduates interested in exploring modern farming by matching them with successful local farmers.
- The Malaysia Digital Economy Corporation (MDEC) and Malaysian Research Accelerator for Technology and Innovation (MRANTI) encourage graduates with entrepreneurship skills to join their attachment programmes by providing seed money to establish start-up companies.

STEM Curriculum in Universities

- Universities are constantly reviewing their curriculum and updating their STEM content. Future-ready, IR4.0-infused curriculum is already in place, covered in both core and elective courses of STEM-based university programmes. Content and generic skills are emphasised via a more fluid curriculum focusing on hands-on and theoretical mastery of STEM.
- The 2u2i programme championed by the Ministry of Higher Education's Division of Academic Excellence now affords university students placement in the industry within their academic training period.
- Universiti Teknologi MARA (UiTM), for instance, is now offering a new course specifically on STEM and promoting lecturers and students to conduct STEM-based research.
- The Ministry of Higher Education's SULAM (Service Learning Malaysia – University for Society) initiative encourages students to participate in community projects, including STEM initiatives.
- Universiti Kebangsaan Malaysia (UKM), through its Faculty of Education, has introduced the Bitara STEM programme nationwide.

Teaching and Learning of STEM in Higher Education

- Higher education institutions actively promote heutagogical learning approaches - a student-

centred instructional strategy that emphasises the development of autonomy, capacity, and capability among university students.

- Project-based learning in STEM courses allows for connecting knowledge from other domains. Inquiry-based approaches encourage students to ask meaningful questions as part of the learning process.
- More recently, work-based learning has also been introduced within STEM areas. However, this requires further concerted efforts by the government, universities, and industries to concretise its implementation further.

Assessment of STEM Learning Outcomes

- Problem-solving skills are widely taught within critical thinking subjects across all universities.

- There are significant efforts to improve authentic, alternative assessments in STEM in Malaysian higher education institutions. UKM, in 2019, for instance, kick-started the initiative to translate, transfer, and transform STEM knowledge by assessing its students via outcomes on intellectual properties, books, and participation in innovation competitions and exhibitions.

What can be done?

ACADEMIA

Pairing and Matching of Students' Skills and Interests to the Industry The psychosocial aspects of students are frequently side-lined. By considering individual differences in personality and socio-emotional skills, matching students and industries with shared interests and sought skills will be more manageable.	Low Effort Required
Universities to Design Future-Ready Curriculum That Uses Student-Centric Approach STEM programme owners should design future-ready curricula delivered via a student-centric approach that focuses on enhancing critical thinking skills. It is crucial to train STEM students to be inquisitive in finding novel solutions on their own, which will be highly dependent upon how a situation can best be analysed.	Low Effort Required
University Courses to Include Enhancing Communication Skills Students should also be trained in "freehand sketching" and practical communication skills that are lacking. Investments should be made to increase the assessment percentage of these relevant skills.	Low Effort Required
University Courses to Include Design Thinking While some STEM graduates possess ample knowledge and skills in their jobs, they lack a professional's more refined skills. Programmes focusing on design thinking will nurture empathy and afford students to view challenges from multiple perspectives.	Low Effort Required
STEM Graduates to be More Visible on Digital Platforms STEM jobseekers may also participate in digital platforms to demonstrate their involvement with university and society programmes. Visibility in professional networks (e.g., LinkedIn) can effectively showcase their strengths, talents, and experiences.	Low Effort Required
STEM Graduates to Obtain Additional Skills Training Prospective STEM job seekers should strive to obtain additional training beyond their standard university curriculum to remain in demand for the job market. Training ought to include a) planning and management skills, b) occupational safety, health, and environmental training, c) non-technical work training or industry-ready training involving relevant soft skills, and d) specific job-related in-demand skills training (e.g., green energy manager training).	Moderate Effort Required

University Courses to Include Knowledge, Skills and Abilities (KSAs) in Demand by Industries Universities should have a working model or dedicated courses to bridge the gap between existing curricula and domain knowledge demanded by industries.	Moderate Effort Required
Higher Education Providers to Integrate STEM Courses in All Fields Universities and other tertiary education institutions should integrate STEM courses within their non-STEM academic programmes.	Moderate Effort Required
Universities to Have Digital Subjects and Projects with Real-life Issues A review of the programme curriculum should consider including digital subjects and projects that focus on real-life issues within the communities.	Moderate Effort Required
Universities as STEM Resource and Training Centres Universities can serve as the nation's STEM resource centres and training hubs.	Moderate Effort Required
University Instructors to Include Real-Life Problems in Teaching STEM students would greatly benefit from more hands-on projects that speak to their interests as coming from the younger generation. Generations Z and Alpha students are better engaged in learning materials when they can connect classroom learning with real-life applications and how they can play a role in society with the knowledge learnt. Therefore, passion-based and personalised-based learning approaches should be further considered in STEM curriculum delivery.	Moderate Effort Required
University Instructors to Implement Purpose-driven Teaching University instructors are encouraged to commit more time to engage students in more meaningful tasks rather than religiously being tied to covering the course syllabus. Successively, more inquiry-based, purpose-driven teaching methods should be implemented within university STEM classrooms.	Moderate Effort Required
Future Skills To be Evaluated as Part of the Learning Process Assessments should be designed at par with the advancements in redesigning curriculum in that future skills should also be considered part of the learning evaluation process.	Moderate Effort Required
Enhancement of Academicians' KSAs to be Industry-relevant University academics should be encouraged to engage meaningfully with the industry for upskilling and reskilling without the burden of other academic tasks simultaneously. Productive industry attachments would ensure on-demand STEM skills get embedded within their instructional processes to students on campus.	Moderate Effort Required

Aligning Institution Mission Statement with STEM Future Demand University mission statements should be reviewed to align with current and future STEM demands. For instance, Universiti Putra Malaysia (UPM) graduates should be able to champion food security issues, agricultural technologies, and how to deal with climate change by innovating new means of preserving agricultural produce.	Significant Effort Required
University Resources to be Allocated Based on Current Needs The utilisation of university resources invested by the government should reflect the community and industry's need to develop a sustainable 21st-century lifestyle for Malaysians moving forward.	Significant Effort Required
Conceptual Model of University-Industry Collaboration to be Enhanced The Technology Transfer (TT) conceptual model of university-industry collaboration can be further enhanced. While academia's strength lies in research, the industry should generate product development. A solid partnership between the two may result in the benefit of students being able to experience first-hand conception of production processes.	Significant Effort Required
Multi-Stakeholder Collaboration to be Enhanced Academic collaboration between the education and science ministries, industries, educators, and relevant NGOs to develop a locally relevant real-world bank of problems will enhance student STEM learning experiences. Moreover, this collaboration will improve their preparation to meet industry demands rather than solve theoretical textbook issues.	Significant Effort Required

INDUSTRY

Industry Partners to be Actively Involved in Developing and Designing of University Curriculum Industrial planners should be officially and actively involved in developing and redesigning the STEM curriculum for the university to ensure industry needs are met. From early on, interventions from the industry could help address talent mismatching issues within the safe space of an academic setting.	Moderate Effort Required
Current Curriculum Structure for Industry Placements to be Reviewed The current curriculum structure for industry placements should be reviewed to promote more productive and meaningful attachments rather than the present touch-and-go basis. Industries, for instance, could hire research students to develop in-house research and development centres, promoting the birth of indigenous technologies. A redesigned internship or industry placement within the STEM programme curriculum will provide students with much-needed exposure as they work on real case studies.	Moderate Effort Required

Exposure of Authentic Working Culture to Students Support from the industry can also inspire the younger generation towards authentic working culture. Furthermore, this exposure can result in students adjusting their expectations toward work and the expected pay scale.	Moderate Effort Required
Industries to Offer Use of Machinery and Equipment for Students to Experience Industry players could offer access to industrial machinery and equipment for students to experience as up-to-date tools could not be afforded by most academic institutions to acquire and maintain.	Significant Effort Required
Industry Professionals to be able to Teach at Universities to Enable Industry-Related Content Sharing Professionals could also be hired from the industry to provide up-to-date industry-related content to students. In addition, part-time lecturers and adjunct professors from the industry can be welcomed to demonstrate real-world applications of theoretical knowledge in the industry.	Significant Effort Required

OTHER STAKEHOLDERS

Promotion of STEM Disciplines and Future Careers at an Earlier Stage to Parents As parents are significant predictors of student enrolment in STEM, the increment of parental awareness should be further enhanced.	Low Effort Required
Promotion of STEM Disciplines and Future Careers at an Earlier Stage to Students Personally relevant technical talks to high school students can be conducted to encourage enrolment in STEM subjects.	Low Effort Required
Promotion of STEM Disciplines and Future Careers by Successful Icons Promoting more successful icons in STEM, especially those who are financially successful, through roadshows and public talks, may attract more parents to encourage their children to take up STEM disciplines.	Low Effort Required
Promotion of STEM Disciplines by the Media The local media should play their role in increasing offerings of interactive and personally relevant STEM content that would engage the masses.	Low Effort Required
Promotion of STEM Disciplines to the Community A country-wide STEM-based magazine anchored by the National STEM Association (NSA), for instance, can be a great approach to opening up the field by involving a broader, more relatable community to prospective students.	Moderate Effort Required

Building of STEM Talent Pipeline by Developing the 'Right' Experts The industry and government must acknowledge STEM graduates to help steward the country's progress in Science, Technology, and Innovation (STI). Thus, the Malaysia Public Service Department should closely monitor approved lecturer specialities they sponsor to match the universities' and future industry needs.	Moderate Effort Required
Mastery of STEM Fundamentals During School Years To make STEM programme outcomes even more successful at the university level and upon entry into the workforce, mastery of students' conceptual understanding of STEM subjects should begin at school.	Significant Effort Required
Industry-Academia Collaboration to be Forged Early On The industry-academia collaboration will not be wholesome without the active role from the school level. Therefore, the Higher Education Ministry will need to work hand in hand with the Education Ministry.	Significant Effort Required
Strengthening of University Curriculum by Collaborating with Other Ministries and Agencies Working with other ministries will allow the Ministry of Higher Education to plan and strategise curriculum design and delivery for Malaysian higher education institutions.	Significant Effort Required
Ensuring Alignment of University Curriculum with Industry Skill Demands by The Malaysian Qualifications Agency (MQA) The MQA can ensure that the curriculum offered by Malaysian universities meets industry skill demands in STEM.	Significant Effort Required
Obtaining Professional Certifications to Complement University Education STEM graduates should be expected and encouraged to obtain professional certifications upon completion of university training to further polish and demonstrate their acquired technical skills. A country-wide online assessment anchored by the MQA could potentially ensure the smooth running of this process. Professional certification (e.g., in the Japanese language) obtained via micro-credential learning can go a long way in furnishing Malaysian STEM graduates to be prepared for global talent.	Significant Effort Required

Way forward

Advocating equity and access for Malaysian women in STEM

The current worldview and work culture are still dominated by men and need to change. Cultural and mindset shifts need to occur so that women are no longer seen as unfitting for STEM jobs. Successful women-to-women mentoring and coaching programmes could further help break gender stereotypes about STEM being a male-dominated discipline.

Cultural barriers need to be overcome by encouraging girls early on to be significantly involved in technical activities such as playing with building blocks. For one, mass and social media can actively promote and empower women in STEM, where more female role models are highlighted. Awareness programmes on women supporting other women should be doubled to improve the mindsets of women themselves to be kinder and supportive of each other.

More importantly, the facilitation of women returning to the STEM workforce after taking career breaks should be urgently addressed. A female- or mother-friendly STEM ecosystem – a healthy ecosystem where women can still prioritise duties of nurturing their families and one that upholds the spirit of work-life balance should be considered for a more equitable workforce moving forward.

Continued awareness of the significant role of women in STEM could be effectively communicated via industry-academia community engagements to promote successful female roles in STEM and women STEM-based entrepreneurs.

A one-nation approach to propel a more holistic STEM ecosystem in Malaysia

A one-nation approach via a university-industry-government collaboration on a holistic STEM talent development plan could potentially be the best method to establish a more locally relevant, thriving STEM ecosystem in Malaysia.

Going forward, there are noteworthy methods to support the development of a viable STEM ecosystem in Malaysia:

- The one-nation approach should be fully embodied by all parties involved – from schools, communities, industries, academia, and ministries, from policymaking to implementation.
- Malaysia needs to work in an integrated, transdisciplinary collaborative system and no longer work in silos. As such, a strategic plan must first be established and followed through.
- Niche areas that address relevant local and global problems need to be further worked upon together. For example, the government-university-community-industry ecosystem can be built with appropriate talent development when a common purpose, needs,

and capabilities are pooled together (Source: Nurturing a vibrant and sustainable RDICE ecosystem by Mahendhiran Nair).

In addition, STEM talent should be identified early on at the school level. There needs to be a more effective mechanism in identifying academically inclined students from those technically inclined to offer more personalised talent coaching from a young age. In terms of teaching and learning delivery, more emphasis should be given to mastery of conceptual understanding from the school level. The focus has been on developing skills without students mastering fundamental STEM concepts, creating significant knowledge gaps between schools and universities and universities to industries. Teacher and lecturer knowledge gaps are also apparent; therefore, a sustainable effort to upskill and reskill in-service STEM educators of all levels is highly needed.

The full benefits of the 10-10 Malaysian Science, Technology, Innovation and Economy (MySTIE) Framework to the Malaysian economy will only be actualised if there is strong collaboration between university-industry-government, especially in prioritising the community and working together toward a more holistic talent development for future technologies.

Acknowledgement

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Further Reading

10-10 Malaysian Science, Technology, Innovation and Economy (MySTIE) Framework. http://www.akademisains.gov.my/10-10-mystie/

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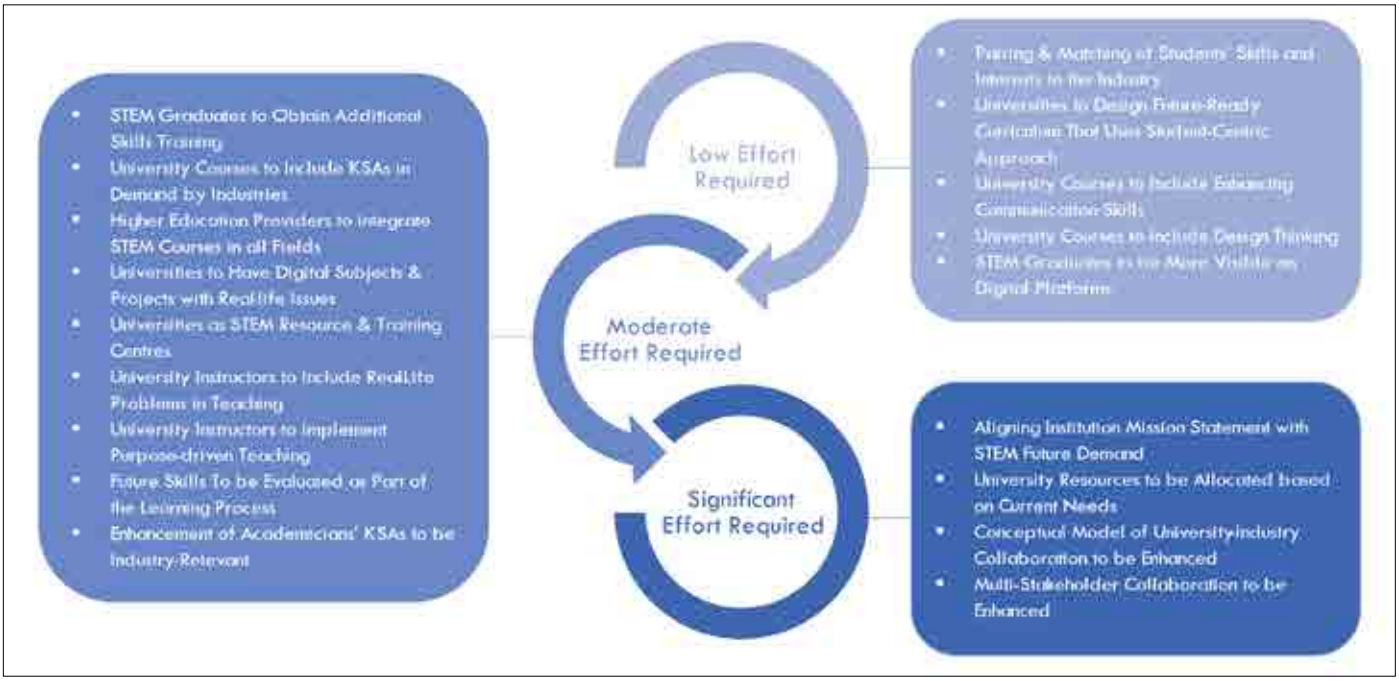
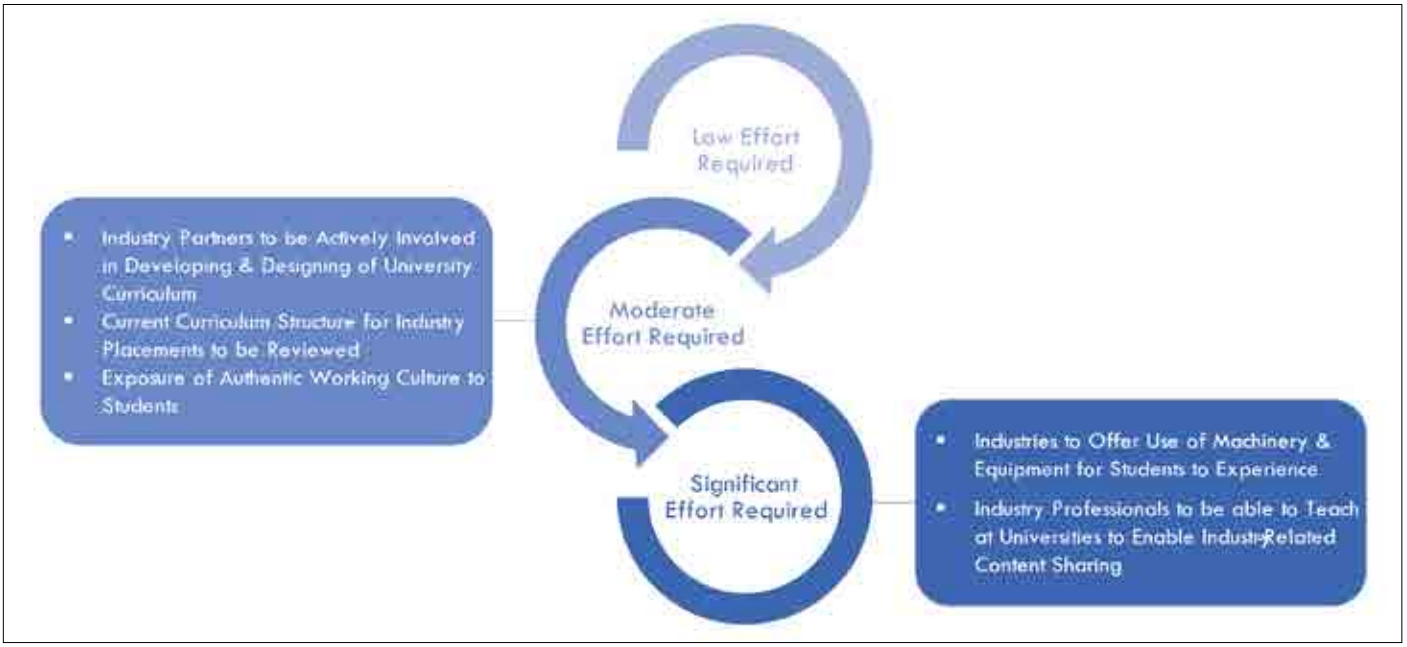
Appendix: What Can Be Done

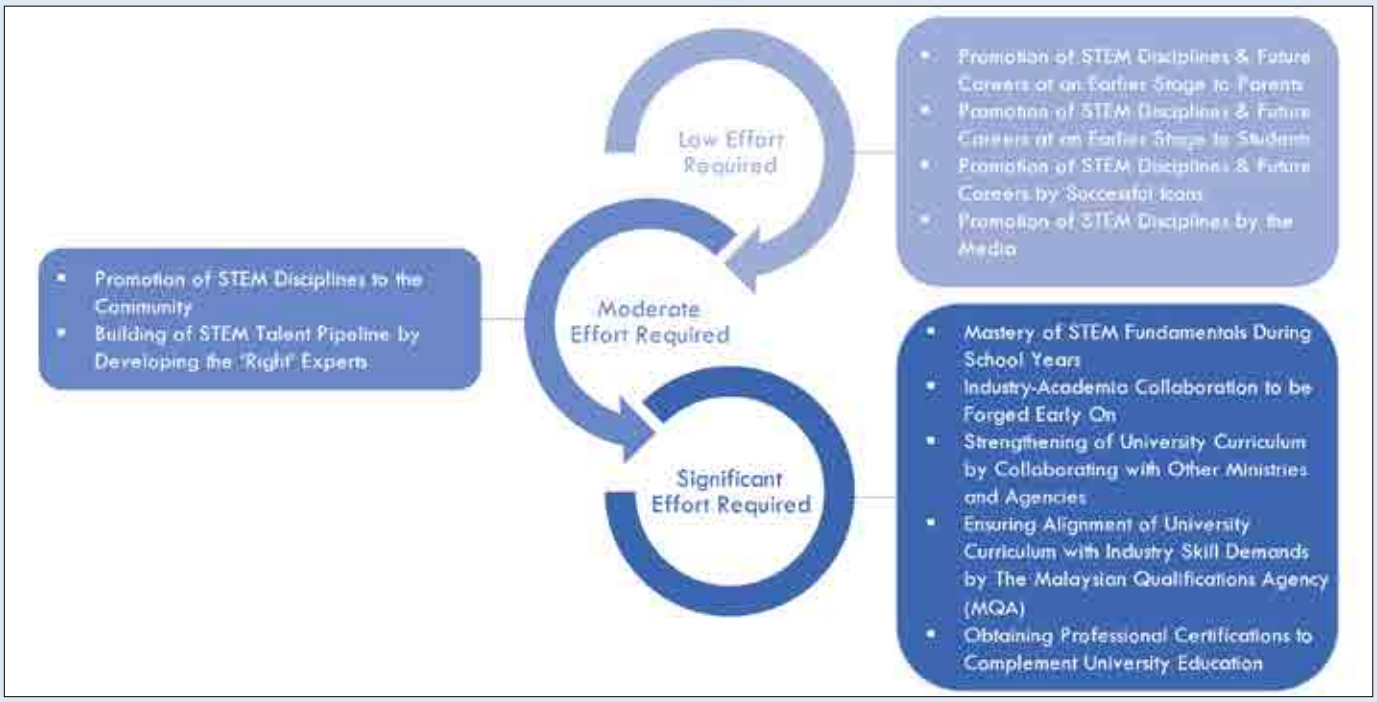
Academia



Industry



Other Stakeholders



Appendix: List of Participants

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Name	Designation	Organisation
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Assoc. Prof. Dr. Zaiton Abdul Majid	Dean	Universiti Teknologi Malaysia (UTM)

MINISTRY OF HUMAN RESOURCES

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Sector-Focused

Industry-Academia Collaboration (IAC)-Tourism Workshop Report

With support from the Malaysian Association of Hotels and Tourism Educators Association of Malaysia.

Executive Summary

With a focus on higher education, this Industry-Academia Collaboration in Tourism (IAC-Tourism) brief explores how best to bridge disparities in talent demand and supply in the Malaysian tourism and hospitality (ToH) industry.

This brief highlights important questions for national key players involved in tourism and hospitality-based talent development to enhance the quality of training for its graduates to meet the demands of a post-pandemic Malaysia. Through the IAC-Tourism focus groups held with industry captains and members of the academia, rebuilding a holistic ToH ecosystem post-pandemic for our nation requires four key drivers to be addressed: 1) government response in managing revenue gap, 2) technology innovation via greater digitalization and environmental sustainability, 3) local belongingness, and 4) efficiently adjusting to a new normal.

Employment in the Malaysian tourism-related industry accumulated around 3.4 million employments, accounting a steady 23.1 percent of Malaysia's total workforce (DOSM, 2020). However, COVID-19 hit the world hard, with both international and local tourism severely affected with a decrease of over 80% during the multi-wave lockdowns. In 2020, tourism receipts in Malaysia declined by 71.2%, reflecting a -17.1% growth in GVATI[1] and a -72.0% growth in TDGP[2]. The Visit Malaysia 2020 was also cancelled which caused an estimated loss of MYR100 billion in the tourism sector. Before international borders were reopened recently, domestic tourism helped soften the blow, at least partially, and the Malaysian government had taken immediate action to restore and reactivate the sector while protecting jobs and businesses. The country is also now developing measures to build a more resilient tourism economy post-COVID-19. These include preparing plans to support the sustainable recovery of tourism, promoting the digital transition and moving to a greener tourism system, and rethinking tourism for the future. Even so, there is a drop in the overall enrolment of students in ToH programs at the university and college levels as the younger generation continues to find the industry unattractive and uncertain. Therefore, there is a dire need for both the industry and academia, along with other stakeholders to find a panacea that would allow for the industry to not only reboot but successfully regain its traction in post-COVID-19 Malaysia.

What are the issues?

Current Scenario

In the last two years, tourism-dependent economies are among those harmed the most by the pandemic. Before COVID-19, travel and tourism had become one of the most important sectors in the world economy, accounting for 10 per cent of global GDP and more than 320 million jobs worldwide. The global pandemic, the first of its scale in a new era of interconnectedness, has impacted 100 million jobs, and many micro, small, and medium-sized enterprises. Tourism-dependent countries like Malaysia felt the brunt of the negative impacts of the crisis where contact-intensive services key to the tourism and hospitality sectors were disproportionately affected. Although the country still benefitted a total of MYR12,688.2 billion in tourist receipts (Central Bank of Malaysia Annual Report, 2020), border closures and the implementation of the Movement Control Order since March 2020 to curb further outbreaks of COVID-19 has restricted movement of travellers resulting in a total of 85.3% decrease from the previous year. In total, Malaysia received only 4.33 million international tourists in 2020, a steep 83.4% decrease compared to the same period in 2019. Growth performance among tourism sub-sectors have recorded double-digit negative growth particularly for travel agencies (-66.7%) and accommodation services (-54.6%). Disruption in demand led to an overall decline in internal tourism consumption by 71.2 percent compared to the growth of 6.8 percent recorded the previous year. Inbound tourism expenditure plunged a further 84.6% to MYR13.7 billion (2019: MYR89.4 billion). All tourism-related products showed a downward trend with a substantial negative growth. While showing promising signs of recovery as the world has now regained some normalcy, the outlook for the Malaysian tourism industry remains uncertain unless there is a seismic transformation to address the digitalization and sustainability needs to be demanded from this industry to survive any BANI situation moving forward.[3]

The 2020/2021 Critical Occupation List registers four occupations in the ToH industry that were mentioned in the consultations with industry stakeholders: Finance Managers, advertising and marketing professionals, Sales and Marketing Managers as well as Mechanical

1 GVATI: Gross Value-Added of Tourism Industries
2 TDGP: Tourism Direct Gross Domestic Product

3 BANI: Brittle, Anxious, Non-linear, Incomprehensible. A framework that explains complex changes such as those triggered by the COVID-19 pandemic.

Engineering Technicians (TalentCorp, 2022). During the engagement, it was argued that existing talents in finance management mainly lack relevant credential skills and relevant job experience in the specific ToH industry or company. Some of the current Malaysian talent pool in the ToH finance management expect unreasonable compensation packages that are beyond the market rate. For advertising and marketing, ToH companies are looking for candidates and available talents who have storytelling abilities to improve marketing campaigns to attract more sales or customers. Storytelling skills are also deemed necessary to help upsell products and services to the customers. Talents should also be familiar with the latest digital marketing trends and technologies. Many of the existing talent pool is not familiar or adept with this demand. Ample graduates have been produced by universities and colleges for sales and marketing managers. However, most graduates lack the creativity to drive sales and marketing for the ToH industry, as creativity comes with experience. These talents are also required to be good at digital marketing, a skill increasingly in demand today. The ToH industry also highly requires skilful mechanical engineering technicians. Unfortunately, the industry is not a top choice for qualified talents to consider building their career.

The 2020 Environmental Scan Report on Tourism highlights the shift in workforce trend for the ToH industry in that it faces both a "digital" opportunity and risk. As technology-driven productivity becomes the focus of most business owners in the ToH industry, new skills are required to be mastered by the workforce as the ToH industry increasingly relies on technology. Technology-driven services in the ToH support greater personal control, increase streamlining of operations, allow for smart energy saving, provide real-time location information and eases maintenance and repair processes, all of which make jobs easier and more productive.

Mastery of soft skills is deemed of utmost importance by the ToH industry. Satisfied customers are at the core of any ToH business as they provide the funds that allow the business to remain profitable and reinvest in its infrastructure. Understanding customers' needs and being able to deliver a positive customer service experience is crucial. In the hospitality and tourism business, each day can involve contact with people of a variety of backgrounds, ages, nationalities, and temperaments. Thus, ToH talents need to be able to communicate in a way that represents the business while at the same time speaking to customers in a way that they can understand and relate to. This also includes good mastery of multi-languages, which increases a talent's value as an employee as speaking using clients' language enables one to establish a more intimate relationship with them which promotes customer satisfaction and loyalty. Compared to other professions, ToH jobs often demand that employees work odd hours, at night and on weekends. It is also necessary to be able to flexibly switch rapidly from one task to another as the situation may arise. Moving forward, the ability to be culturally aware beyond one's cultural norms is crucial to building a successful career in this sector as customers will not always share the same values, belief systems and perceptions and helping them feel comfortable is key in the ToH industry as the primary goal is to turn customers into repeat customers to sustain the business.

Issues on Tourism and Hospitality talent demand and supply in Malaysia

Internal Issues

- There is an apparent low conversion rate of ToH graduates into the industry. Malaysian students generally have a low interest to pursue a career in this sector.
- On the other hand, the low initial pay offer does not match with talent's qualifications, exacerbating the talent pool supply further.
- There is a gap between industry and academia internship requirements which puts ToH students at a great disadvantage. Low allowance during internship makes the career appear unattractive as the work demands are high.
- ToH graduates also demonstrate poor mastery of information technology skills.
- Currently, there are no professional bodies to oversee the performance of the industry. Therefore, relevant insights needed by academia to adjust its curriculum and training delivery are generally lacking.
- There is also a disjoint between the STEM and ToH industry players in that a lot of valuable data has been collected in the ToH but

Figure 1: Highly sought soft skills employers are seeking in tourism and hospitality candidates

was scarcely analysed to provide significant insights.

- Therefore, there is a need for graduates of ToH to be adept in IR4.0, engineering, and data science knowledge moving forward.
- ToH graduates are also deemed to benefit from training in both the arts and sciences as the skills required in the ToH job market require a combination of both.
- There is a lack of local professional talent involved in ToH careers within their local communities hence a lesser sense of belongingness to remain in the job.

Uncontrollable Factors

- The Gen-Z and Millennials" perceptions towards work and career expectations are different from older generations as generational priorities have shifted from being sufficient to earn a living to focus on improved quality of life because of the social revolution. However, careers in ToH do not seem to provide what is being sought after by the younger generation of qualified talents who generally seek careers that offer greater flexibility in terms of working hours and room for growth.
- There have been low return rates to the ToH because of terminations, layoffs and unpaid leaves during the pandemic as these talents have found their way of surviving beyond their careers in ToH.

External Threats

- The attractiveness of other industries makes it hard for the ToH industry to scout highly qualified talents.
- Other industries have mainly embraced more flexible working environment options and affording working from home opportunities, all of which the ToH industry could not offer.
- Low outside tourist arrivals expected until 2024 make the ToH appear unconvincing for talents seeking stable job opportunities.

What can be done?

Figure 2: Demanded value-added credentials beyond academic qualification by the sector

ACADEMIA

Provide real-world experience and skills by interning or training with the industry Universities should provide students with the opportunity to visit ToH industry players at the workplace before going for industry training	Moderate Effort Required
Incorporate STEM and STEAM elements in ToH curriculum As more and more industries become highly transdisciplinary, curriculum offerings of ToH-based programs should consider infusing content from the technological sciences to match the current and future demands of the ToH market.	Moderate Effort Required
Fully embracing the spirit of service-learning implementation Instructors moving forward should treat service-learning requirements as golden opportunities to hone students' real-world skills further. With proper internalization of the spirit of service-learning implementation, students will be able to engage with the community meaningfully, identifying problems faced by the community and finding solutions by inculcating knowledge learned in the classrooms.	Moderate Effort Required
Provide ample time for industry players to help with curriculum review Industry panels should be involved from the start of curriculum review and be given ample time to critically analyze curriculum offerings for them to provide more meaningful insights. Most of the current practices involve industry panels only on a touch-and-go basis.	Moderate Effort Required

INDUSTRY

Industry to offer a more structured learning path The ToH workforce should be provided with on-the-job training with credit and working experience. Training must include ways to address customers' problems quickly and independently without heavy reliance on managers as mini-crisis management skills are still generally lacking.	Moderate Effort Required
Proactively involved in the curriculum review process Industries are oftentimes invited as expert panels during the curriculum review process. However, most panels fail to zoom out and provide insights into the bigger picture of the current situation of the industry, but rather, focus more on their specific problems and challenges.	Moderate Effort Required
Open to hiring a more diverse background The ToH should be more open to hiring talent from other demographic segments e.g., single parents, retirees, part-timers, indigenous people or parolees.	Moderate Effort Required

Offer more structured career paths to regain trust As the industry continues to struggle to hire and retain qualified and skilled talent in the industry, more structured career paths and fast-track promotions ought to be considered to regain trust.	Significant Effort Required
Improve offerings on Edu tourism, ecotourism, and health tourism locations More options for Edu tourism ought to be developed and promoted in line with current school and university pedagogies embracing experiential and competency-based approaches in their instructional processes.	Significant Effort Required
Recognize multiple roles for tourist guides In line with technological advancements, tourist guides should be allowed to work on packaging tasks e.g., bookings and advertisements, engage in direct marketing to promote their area to tourists, and be allowed to work alongside hoteliers as unofficial tourism ambassadors. Tourist guides may also aid in providing hotel staff with relevant background information to pass on to customers.	Significant Effort Required
Industry to aid universities in promoting awareness of careers in ToH Previously, hoteliers came to schools to provide promotional talks on the field. This exercise should continue to provide early exposure to prospective young talents to be interested and passionate in making ToH their choice of career especially those from the local communities. Suggestions can be made to schools to establish a "Tourism Club" as part of their extracurricular to nurture students' interest to pursue a steady career in ToH.	Significant Effort Required

OTHER STAKEHOLDERS

Entrance incentives and loyalty bonuses Government incentives and programs to provide support for the ToH industry players with grants and tax rebates.	Moderate Effort Required
Incentives or tax deductions for internship allowance As internship allowances provided generally do not match up with the required work expected of a trainee, incentives or tax deductions ought to be considered to increase the appeal of the ToH job market to prospective talents. However, to note, the National Structured Internship Programme (MySIP) spearheaded by TalentCorp has been providing structured internship experiences with MySIP-endorsed companies since 2012. MySIP endorsed companies paying a minimum of RM 500 internship allowance are eligible to claim for double tax deduction for all related expenses incurred on the interns.	Moderate Effort Required

Qualifications Agency to reconsider more flexible options for certification Most university program offerings are bounded by strict regulations set by the governing qualifications agency to maintain quality and ensure that program protocols are adhered to in training qualified graduates. However, a reconsideration of more flexible pathways especially in recognizing qualified instructors without the default qualifications will benefit all parties greatly.	Moderate Effort Required
Clear guidelines and procedures for industry players to follow Ministry is suggested to come up with a formal committee to tackle and operationalize the tabled issues	Significant Effort Required

Way forward

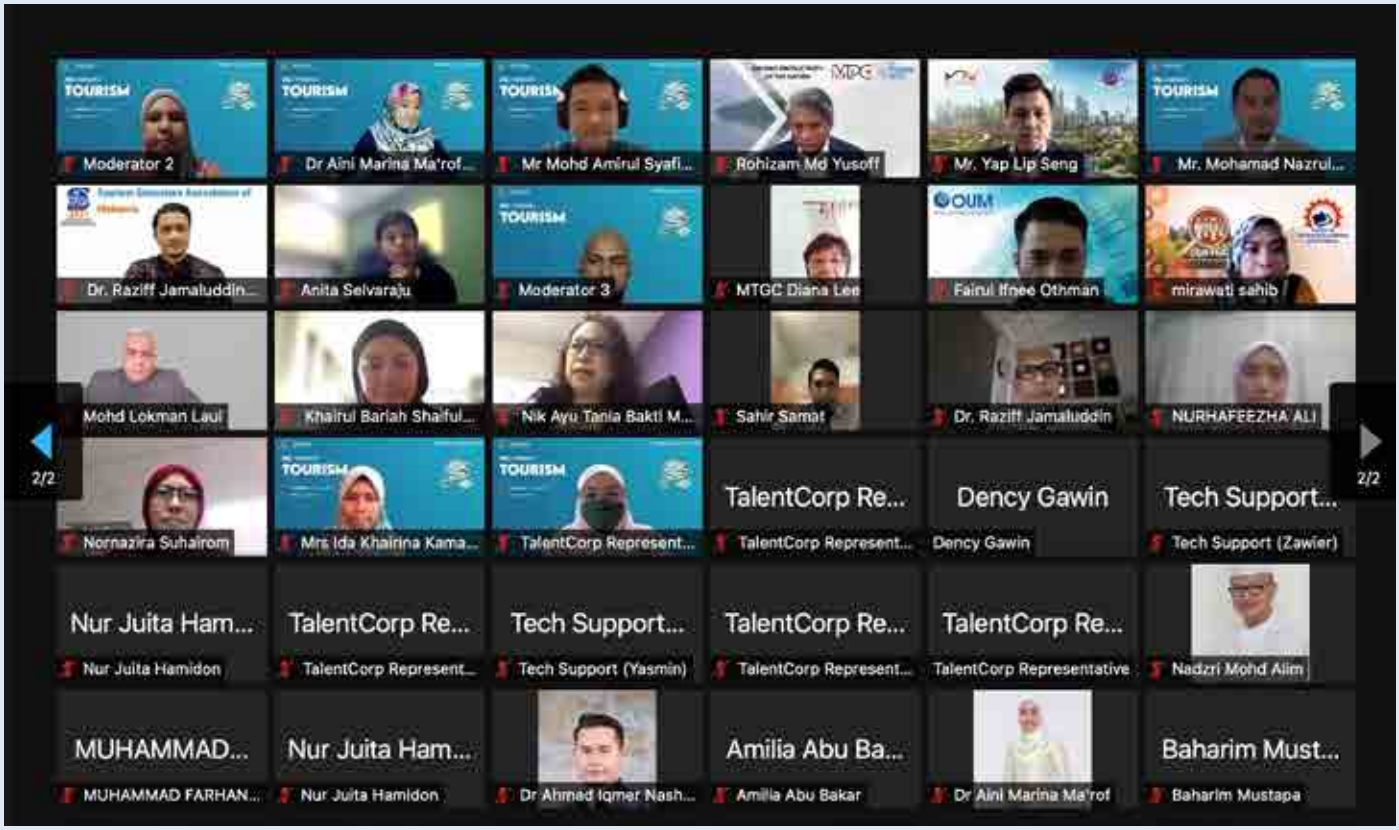
Promoting industry-academia partnership in enhancing talent demand and supply

Although academia is aware of its role in terms of knowledge creation and training of talent, the general perception remains that universities are ivory towers and do not relate to everyday practical realities and business practices. As such, the transfer of academic knowledge into the ToH industry and vice versa has been a concern for academics and industry players alike. In times of continuous technological, socio-economical, and regulatory advancement, academic researchers, and industry practitioners in many sectors (IT, engineering, medicine etc.), have embraced cooperation to promote bidirectional knowledge sharing but the tourism and hospitality industries are lagging in this area. As a start, university educators and curriculum designers need to encourage input from the industry to ensure graduate attributes at both the program and university level align with the talent needs of the industry. It is recommended that the industry have a presence on academic advisory boards, ToH lecturers consider the recruitment of adjunct professors who hold senior industry positions to review the curriculum considering industry needs. Regular networking events that encourage formal and informal discussions around tourism and the hospitality curriculum are also recommended.

More thought needs to go into the impact of student placements and internships on their views of the industry. These work experience opportunities serve as a promotional tool for the sector as they provide the student with a "preview" of life in the industry. Internships should not be viewed as a means of "cheap labor" and efforts need to be made to ensure students are engaged and inspired by their experience. It is recommended that students should be placed in positions that allow them to gain broad practical insight across several departments/sectors as opposed to being restricted to one area that is unlikely to provide a fulfilling experience. Providing students with the opportunity to apply their existing knowledge to real-world situations is also recommended.

Tourism industry leaders need to map marketable career paths that can be promoted by universities to careers advisers, parents, and current students. This is necessary to ensure we continue to attract young talent, justify the viability of tourism programmes in universities and reduce the "leakage" of skilled graduates who choose to enter other industries.

When considering the dialog that took place at the 2022 industry-academia collaboration meeting for the tourism and hospitality industry, the need to improve collaborative working relationships between educators and practitioners was clear. It is hoped that the discussion has been able to provide some direction for the broader ToH community concerning talent development and knowledge sharing.



Acknowledgement

The IAC-Tourism 2022 was supported by the Malaysian Association of Hotels and Tourism Educators Association of Malaysia.

Further Reading

Environmental Scan for the Tourism Sector in Malaysia 2020:
https://www.ilmia.gov.my/images/newsandevents/2020ConferenceFutureOfWork/Pembentang1_.pdf

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MINISTRY OF HUMAN RESOURCES

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Sector-Focused

Industry-Academia Collaboration (IAC)- **Animation & Gaming (AG)** Workshop Report

With support from the Ministry of Higher Education Malaysia (MoHE), Malaysia Digital Economy Corporation (MDeC), and Toon Boom.

Executive Summary

With a focus on higher education, this Industry-Academia Collaboration in Animation and Gaming (IAC-AG) brief explores how best to bridge disparities between animation and gaming talent demand and supply in Malaysia.

This brief highlights important questions for national key players involved in animation and gaming-based talent development to enhance the quality of training for AG graduates to meet the demands of a post-pandemic Malaysia. Through the IAC-AG focus groups held with industry captains and members of the academia, a holistic AG ecosystem for our nation requires six (6) key drivers to be addressed: 1) Policy and Government Support, 2) Anchoring Companies to Develop Regional and Global Collaborations, 3) Financing Initiatives, 4) Regulating Provision and Use of Facilities, Infrastructure and Technology i.e. internet accessibility and speed, 5) Cultivating and Promoting a Positive AG Community and Culture, and 6) Continuous Research and Development.

During the pandemic, consumers moved dramatically toward online outlets, which resulted in companies and industries needing to respond. While several industries struggle to stay afloat due to the physical restrictions in place, animation and gaming studios have been resilient, where most have been able to maintain optimal efficiency during the multi-wave lockdowns, further demonstrating that this industry can thrive without being tied to the need to be in a physical space to be productive. However, the increased demand for animated and gaming content due to the sharp rise in the streaming services and mobile gaming market creates a significant gap in talent supply within Malaysia and beyond. According to Malaysia Digital Economy Corporation (MDEC)'s chief executive officer, Mahadhir Aziz, the animation industry will continue to grow with its current global market size is estimated to be worth US$298.2 million this year and is forecasted to reach US$519.6 million by 2028. Therefore, it is imperative for the creative and animation industry to continue its momentum due to the growth of streaming platforms worldwide, bringing more opportunities for all studios.

What are the issues?

Current Scenario

In the 2020/2021 Critical Occupation List (MyCOL), 86% of the occupations that appeared for the first time were predominantly digital professions, including new occupations in animation and games (TalentCorp, 2022). There is a particular demand for professionals in the animation and visual effects, digital games and esports, driven by the growing investments in the creative multimedia industry as well as other industries, including theme parks and attractions and advertising and communications.

Demanded technical skills in animation and visual effects include modelling software skills (e.g., 3Ds Max, 3D Coat, Cinema 4D, and Blender); mastery of 2D software (e.g., Photoshop and Illustrator); compositing visuals, and model optimisation. Core skills expected out of qualified game designers include game conceptualisation and game design, level design, prototyping and scripting, narrative design and game writing, content design, analytics and user behaviour and design documentation. Game programmers, on the other hand, are expected to master skills in coding and programming, software design and architecture, domain-specific programming e.g., AI, Graphics, or Networks, debugging and bug-fixing, as well as profiling and optimisation. There are also hidden technical skills that are highly valued by the creative industry, including the ability to master the performing arts, especially in acting and the game arts.

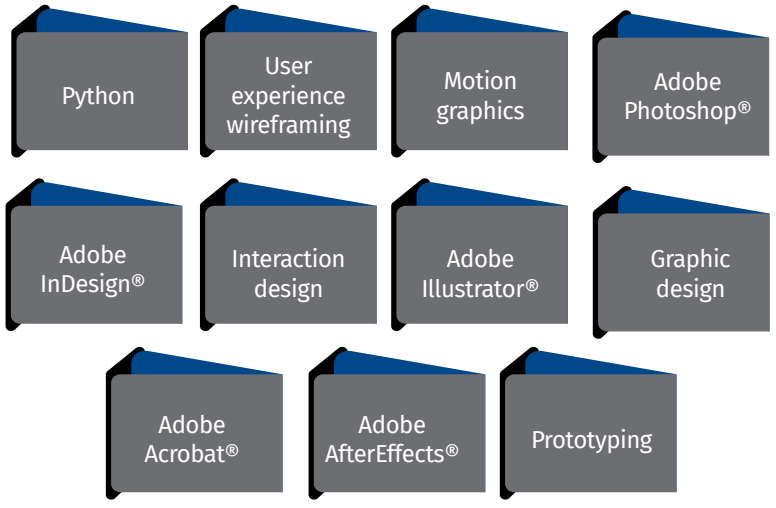

Figure 1: Highly sought technical skills employers are seeking in animation designer candidates

Knowledgeable, multi-skilled local talent is much-needed, especially in the Metaverse i.e., the future of the Internet.

Mastery of soft skills is deemed equally important by the AG industry. For example, mastery of the fundamental four Cs – communication, creativity, critical thinking, and collaboration – has still been deemed a necessity. Mastery of emotive communication skills is especially crucial, as an animator or game developer's job is to connect the viewer or player through their designs and effects. In addition, organisation skills, attention to detail and high self-regulation skills are also much needed by current animation and gaming-based employers. Moving ahead, animation and gaming graduates are expected to be highly self-motivated to develop the initial project from scratch while collaborating efficiently with colleagues or clients to incorporate constructive feedback.

Due to the past multi-wave COVID-19 pandemic and endemic situations, although we are back to normal, being adaptive to being adaptive to the work-from-anywhere model becomes the key for all industries to remain successful in the long run. As events, networking and educational services are increasingly offered in hybrid mode moving forward, the past two years have also shown a steady increase in demand for home entertainment, live streaming services, esports and mobile gaming, with faster delivery times of content and game updates expected from the providers. Subsequently, these platforms face increasing pressure to attract and retain subscribers through original content, as viewers freely 'churn and return' or try other competing services.

Nevertheless, animation and gaming studios that work on developing and producing these contents have been remarkably resilient, maintaining optimal efficiency during the pandemic. This could be attributed to the flexibility and autonomy that comes with remote work, which studio employees value. Regardless of the remote working mode, their creativity and collaborative efforts were not hindered as opportunities for animators and game developers to interact and work together globally increased rather than previously being centred in their respective cities, restricted within the spaces of their animation hubs.

Figure 2: Top soft skills in animation and gaming

With international collaboration from studios worldwide, current technological advancements further allow artists to be more experimental to tell compelling stories, propelling advancements in the industry. As a result, the animation and gaming industry has become fast-growing. With the global demand for family-friendly and adult-oriented gaming and animation content, this upward trajectory is not likely to slow down.

However, while accessing outside talent is now plausible with the hybrid working mode, studios are continuously challenged by the high demand for animation and gaming projects largely due to the lack of available talent. In the pre-production process of the 3D animation pipeline, for instance, initial aspects of an animated film are established. This process includes concept creation, storyboards, rough script reels, and character creation. However, to date, pre-production talents such as storyboard artists are especially hard to source and even more so for those of technical profiles, e.g., riggers. The current talent pool also lacks technical mastery and the much-needed soft skills. Consequently, more studios are involved in providing education and training, offering training courses and certifications on their own to meet their in-house demands.

However, AG programmes in the local universities still see students entering their programmes with prior academic qualifications that are generally below the required expectations to excel in them. This is so as students with better academic qualifications tend not to opt for

the creative industry as their field of choice and are more inclined to study subjects with more tangible, predictable career options, such as medicine and law. For the creative arts students who are currently enrolled and those who have graduated, there is also a distinct lack of overall creative thinking skills as AG students tend to be trained in procedural skills, such as programming, and hence are better at demonstrating mastery of technical skills but struggle in yielding captivating animation and game storyboards due to the overall lack of creativity in the content creation processes.

Policy-related issues on Animation and Gaming in the context of Malaysian higher education

- Regardless of the solid government support for the creative arts industry in Malaysia, there is still a dire need for cross-sector collaborations, especially regarding talent development and upskilling. The academia finds it challenging to invite industry players to be genuinely involved in sharing industry expertise. Practical results are then hard to obtain as academics typically train students via hypothetical scenarios, focusing more on mastery of theoretical grounding.
- Due to the lack of a systematic collaborative effort between academia and the industry, there is an apparent gap in bridging students with the relevant industry players. Early exposure to experiences beyond the academic setting will provide more meaningful learning experiences for AG students as they can directly connect theoretical knowledge learned within their courses with real-life problems and applications.
- Industry experts, on the other hand, are hindered from sharing their expertise directly with students as university teaching requires specific official academic qualifications, which these experts typically do not possess. An investment should be made to consider different pathways of welcoming industry experts to help full-time academic staff in the instructional and learning assessment processes.
- Similarly, academics are bounded by qualification agency regulations that may often restrict certain decision-making processes to involve industry professionals, albeit beneficial to all parties involved.

Issues in Animation and Gaming Curriculum in Universities

- Universities are generally tied to official regulations and therefore are not flexible for immediate changes in their curriculum offerings. Therefore, keeping up with an industry that is fast evolving, such as that in the creative arts, is often challenging.
- In the Metaverse, rush and solidity are important. However, since there are issues in the fluidity of academia to flexibly change their curriculum accordingly, universities will either opt for a general approach or become highly focused on developing a narrow skillset due to time constraints.
- This results in AG students displaying a general lack of updated software skills and the art of proper animation techniques.
- Since programmers are the backbone of any animation project, more programming in animation courses is required for AG talent to be able to carry out tasks beyond the system alone. Visual programming is especially needed, but training is still scarcely offered comprehensively.
- While there is a need to be multi-skilled across disciplines in the creative arts industry, the arts and sciences disciplines are still offered as highly divided programmes in universities. It is high time universities consider blurring the boundaries between the two in their programme offerings.
- There is a general lack of updated facilities and tools needed to demonstrate new updates in the curriculum. This then creates the gap in the skillset required by the industry, which then calls for the industry to retrain or provide in-house training to the talents they hire.

Issues in Teaching and Learning of Animation and Gaming in Higher Education

- Current levels of knowledge and readiness among AG academics are generally still at a conventional level.
- Conventional teaching and learning methods are still largely in place, and there is an apparent lack of mastery of updated programming language and skills

on the part of the university instructors. Outside experts from the industry may be called in to demonstrate real-life use of the technical skills, and academics shall engage in continuous upskilling to remain relevant and up to date.

- Lack of funds perpetually hampers Academia from acquiring the latest technological advancements and training, which subsequently affects the overall quality of the instructional process.

- Learning through failure is an essential part of talent growth. It is therefore deemed ineffective by many for academics to teach students specific tools and skills, especially on a hypothetical basis, but rather, bringing in professionals from the industry to help with talent development training would be more beneficial, especially in bringing in real-world scenarios and case studies into university classrooms.

- Many practitioners, on the other hand, want to help to teach. However, more flexible pathways are needed for these industry players to formally upskill to a qualification equivalent to a Master's level and above, as our current higher education system is still tied to qualification agency requirements for recognition of certifications.

Issues in Assessment of Animation and Gaming Learning Outcomes

- In dealing with the Metaverse, assessment of learning, especially that of the creative arts, will have to be further reviewed and should cut across individual subjects as the discipline becomes highly transdisciplinary, ranging from arts to computer science, engineering, psychology, and the cognitive sciences.

- Qualifications in the creative arts come in many forms – certificates, diplomas, and higher academic degrees. However, there is reason to believe that industries do not make hiring decisions based on official qualifications but rather have their personal hiring preferences. An investment in ironing out academia-industry expectations about desirable qualifications will go a long way in maximising efforts in developing talent that will eventually match the job market.

- Blockchain developers are still scarce in Malaysia and more so in the creative industry. With blockchain technology, creators are able to tag content with specific metadata (data about data), which, on top of acting as additional copyright information, can improve the discoverability and shareability of that piece of content and create opportunities for other creators to build on top of the work. Furthermore, in the creative economy, blockchain can redefine how artists are renumerated by acting as a platform for creators of intellectual property (IP) to receive value for their work. However, most AG graduates are deemed to be a "Jack of all trades, master of none" when it comes to these emerging critical skills, and therefore, assessments should focus on their acquirement and mastery.

- Paper-based exams ought to be minimised for students of AG. An investment should be made in increasing the technical assessment of students' hands-on skills.

- Portfolios can serve as an excellent assessment tool, but the quality of AG student portfolios seems highly dependent on individual institutions. Universities with solid curricula tend to have graduates with good portfolios and vice versa.

What has been done?

Policy on Animation and Gaming in Malaysia and the context of the Malaysian Higher Education landscape

- The Digital Content Ecosystem (DICE) policy led by the Malaysia Digital Economy Corporation (MDEC) serves to further strengthen the local digital content industry and ultimately positions the nation as a leader in digital content creation and production. The policy focuses on attracting investments, building local talent and companies, and strengthening the ecosystem through government and private sector partnerships. It also aims to advance research, IP creation, commercialisation, branding and marketing capabilities to improve its export potential. Equally important, this policy also looks at Best Practices to promote a healthy animation and gaming environment for all users.

- In line with this policy, government-backed initiatives have been implemented to foster the growth of the animation and games industry, including financing, training, incubation, business connection, and market access. In fact, through MDEC, there has been constant production support and funding from the government since 2009. Among the initiatives include Kre8tif!, which aims at developing the creative content industry in Malaysia; Level Up, a leading communications hub for the development of the gaming industry in Malaysia and Southeast Asia; and Digital Content Creators Challenge (DICE UP), a platform for leveraging local talent in the creative field to be promoted and commercialised to international standards.
- The government also recognises the animation and games industry as a key economic segment to attract foreign investments.
- The strong government support in financing further provides a conducive ecosystem for animation and game start-ups for AG graduates. The Digital Content Fund, channelled through MDEC, for instance, is an allocation fund by the Malaysian government to assist companies and the production of local creative content in development production or other digital content in animation and gaming applications. On top of this, there are also other initiatives to consistently promote more local content on the international stage, such as the Digital Multimedia Content project, Film Incentive, and the Perkasa Modal Insan programme.

- The Malaysian government, via the Malaysian Investment Development Authority (MIDA), has also managed to attract big-name foreign investments. The country is now an incubator for the top small and medium game start-ups to collaborate, support and accelerate business growth.
- Several Malaysian studios have built a global reputation for developing original IP games and providing outsourced development for the biggest international publishers. Among these include CodeMaster's Studios, Liquid Rock Studios, Les Copaque (LCDGI), Streamline Studios, Lemonsky, Gameka, and Passion Republic,
- to name a few. Phoenix Game Studios and GameBrains were pioneers in the region, with GameBrains having developed games for PlayStation and Game Boy, and Phoenix Game Studios created one of the first Massively Multiplayer Online Role-Playing game or MMORPG.

Game companies such as Bandai Namco and Pole To Win, on the other hand, are recent global industry leaders that have also taken root in Malaysia.

- The 2U2I initiative by the Ministry of Higher Education Malaysia provides opportunities for students, especially in the creative arts, to experience the best of both worlds. However, the quality of training is highly dependent on the company or studio these students were matched with. A good match will benefit students in mastering conceptual knowledge and practical skills and vice versa.

Animation and Gaming Curriculum in Universities

- Malaysia is the outsourcing and IP creation powerhouse for the growing game market supported by the talent pipeline through academia. (MDEC Game Industry Report, 2021).

- Despite the identified issues, the Malaysian tertiary education system has been providing a solid foundation for producing talent. Malaysia's The One Academy was ranked 10th Best Game Design School in the Rookie Awards 2019, where they bagged four awards (MDEC Game Industry Report, 2021). Currently, approximately fifty (50) Malaysian institutions of higher learning are providing animation and game-related courses. These institutions include Universiti Tunku Abdul Rahman, Limkokwing University of Creative Technology, Management and Science University (MSU), and Malaysia Multimedia University (MMU). MMU was one of the first universities in the region to offer a degree in Games Development. It successfully created a new wave of game creators who are fast becoming the leading players in the industry.

- To date, Akademi Seni Budaya dan Warisan Kebangsaan (ASWARA) has a clear niche in games art and animation and offers state-of-the-art courses. However, the offerings are not yet widely known. The institution also welcomes students via the Accreditation Of Prior Experiential Learning (APEL) route of entry, valuing students' past relevant experiences.

- The Asia Pacific University covers technical and non-technical gaming skills, focusing on mastery of fundamental concepts.

- On the other hand, on the part of the industry, Animatic Studios is currently providing in-house training for fresh AG graduates to compensate for the lack of critical skills needed to fulfil available positions.

- However, to date, there is an insufficient talent pool for character riggers whose fundamental role in the creative process is to help create believable movements that abide by the laws of anatomy, physics, and real-world experiences in a virtual environment. As of today, this skill set is still not covered in any school syllabuses. There is also no clear path to the acquirement of this critical skill. The Asia Pacific University, fortunately, is currently offering a course in this field as an elective as a first step moving forward.

- The 2U2I programme, along with the Ministry of Higher Education's newly launched EXCEL initiative – the Experiential Learning and Competency-based Framework – provides better pathways for students to thrive further in the creative arts industry with more flexible modes of learning to choose from (see EXCEL framework, Bahagian Kecemerlangan Akademik, Jabatan Pendidikan Tinggi, 2021).

- Training students to acquire transdisciplinary knowledge requires collaboration between disciplines to create a cohesive curriculum in which students collaborate to solve multifaceted problems. In the context of AG students, a transdisciplinary mastery of both economics and blockchain, for example, is especially pertinent in the era of Web 3.0.

Teaching and Learning of Animation and Gaming in Higher Education

- Delivery of soft skills is often embedded within the AG curriculum. At ASWARA, for example, some courses require personality tests to be taken so that students learn to work efficiently and respectfully in groups with members with differing dispositions while honing their communication and pitching skills.

- Along the same vein, the Asia Pacific University also stresses group work during the earlier years for the same reason.

- Higher education institutions have taught 2D animation for

over ten years, and it remains in current syllabus offerings up till today. Its relevancy moving forward, however, calls for a re-evaluation.

- Students are exposed to numerous technical skills deemed necessary and fitting for an AG graduate, including producing augmented reality content and 2D and 3D animation. However, although not explicitly required, storytelling and drawing skills still need honing as these were identified as critical "hidden" skills but generally lacking among AG graduates. A 3D animator who knows how to draw well and establish clean silhouettes is better able to understand weight and anatomy than 3D animators who do not possess drawing skills. Drawing can also be very helpful in the planning stages to experiment with different poses on paper, which is quicker than posing characters directly in 3D applications, and when working through the animation early on. Storytelling skills, on the other hand, are thought to be the most crucial element of animation as it is the most powerful human communication. A gripping story is key to transforming ordinary facts into a coherent narrative that instantly immerses the audience and engages them emotionally. A good story can make or break a business, but arguably, this skill is the least talked about in animation in favour of coverage on the more technical skills.

- On a more positive note, capstone and incubator projects have started to involve a three-way partnership between students, academics, and industry professionals. Start-up companies have been established as a result of this partnership. Examples include UPM's InnoHub, USM's StartUp, UMK's Creative Accelerator Centre, and APU's centre, which focuses on animation.

- University academics demonstrate high levels of theoretical competence and to a certain extent, technical skills mastery, but they generally still struggle in the professional skills to flexibly adapt to sudden changes in delivery modes of instruction, especially in times of uncertainty such as that induced by the COVID-19 situation.

- To address this gap, universities across the country have conducted numerous upskilling programmes with aides from MOHE's Department of Academic Excellence.

- Several universities have also compensated for their shortcomings in practical expertise by welcoming industry players to play a more significant role in the curriculum delivery process. For instance, UMK, as a public university championing in development of entrepreneurial talent, is now appointing industry players as university fellows, and APU has an established Industry Advisory Panel (IAP) for their curriculum and programme review as well as for mentorship endeavours.

What can be done?

ACADEMIA

Universities to enhance future-ready curriculum delivery that focuses on meaningful learning experiences

Moderate Effort Required

The AG workforce should consist of both technical and business skillsets to run an animation and gaming studio and make it profitable as well as sustainable. Expertise in technical skills (e.g., storytelling) and production (e.g., project management, legal, business management, sales, and marketing) can only be developed from a curriculum delivery that provides exposure from training in workshops, masterclasses, and apprenticeships.

With the time constraints in developing market-ready talent, the academia and the Ministry of Higher Education will need to prioritise courses that would bring the most out of AG graduates by furnishing them with critical artistic skills which could go a long way. Such courses should include honing skills of character riggers and "hidden" fundamental skills such as storytelling and drawing. Course offerings, especially those irrelevant to talent development, should be reconsidered to make way for more pertinent, value-added subjects. Micro-credential courses and buffet-style course offerings should also be considered further.

Universities to provide hands-on training using state-of-the-art tools and instruments

Moderate Effort Required

As production processes get digitised, one step towards being the right fit for the job is hands-on training. Allowing students to experience using existing tools and instruments in the industry will equip them with a competitive edge in the job market. One such training can be afforded by having AG students paired to do entry-level work for a company or as a freelance artist providing images for businesses where students are exposed to working on real life projects involving multimedia, animation, drawing, and computer-aided designs to prepare to work in the industry.

Provide meaningful work-based learning opportunities for students

Moderate Effort Required

Malaysia still lacks real creative technical expertise. Students should not only be able to hand-write animation but must master at least modelling and animation skills. Final-year project outputs can be enhanced by having mentors in different areas of the industry. Better still, for meaningful research projects to be undertaken by the student and internship months to be optimally benefitted by all parties, universities ought to work hand in hand with industry mentors to establish the trajectory and scope of each research project and skills to be mastered during internships.

Staff exchange programmes between universities and studios to minimise gaps between theory and practice

Moderate Effort Required

Regular sharing of information between schools and animation companies is necessary to avoid mismatched curricula and practical skills. Staff

exchange programmes where animators or managers can give talks, lectures or even hands-on showcases would be good practices.

This industry-academia support can also serve as a scouting exercise for the participating companies.

Research and development with industry partners Although Malaysian AG researchers have published numerous animation and game-related research papers, research and development for new technology are considerably lacking.	Moderate Effort Required
Collaboration with other higher learning institutions at the inter-country level to share higher-skilled talent Most Malaysian talents in the animation industry are on the creation side. For higher levels of production (i.e., IP creations and fully animated movies), specialists who have an in-depth mastery of content knowledge and experience in production control, merchandising and related areas are crucial but still lacking. Specialisation during university training can help with skill-building, but not all schools provide equal training as some are better than others in their course offerings and specialisation development. Therefore, student exchange programmes or collaborative training with international or renowned institutions ought to be considered.	Significant Effort Required

INDUSTRY

Industry partners to be actively involved in developing and designing professional certification Industrial planners should be officially and actively involved in developing and designing professional certification beyond official academic qualifications offered by the universities where they may also serve a more official role as committee or advisory members for development of the certification. Such value-added certification may include multi-level tradigital skills in animation and gaming – the melding or combination of traditional and computer-based (digital) methods used to create something new, game and interactive multimedia design, as well as 3D and Computer Generated (CG) gaming advanced certifications. This is because skills in the creative industry are fast-evolving, and because of such, graduates need to regularly upskill themselves via continuous professional development courses to remain relevant in the job market.	Moderate Effort Required
Industry partners should be willing to shoulder a shared responsibility in developing market-ready talent Industry players are more adept at identifying the needed skills, and for the most part, they are equipped with far better facilities. Shared resources and expertise right from the beginning, especially in serving as guest lecturers and playing a significant role as project mentors, will position Malaysian AG graduates to much greater advantage. Industrial representatives could also officially serve as co-supervisors for industrial final-year projects, as adjunct lecturers to AG students, and even as mentors to university lecturers in need of constant upskilling.	Significant Effort Required

OTHER STAKEHOLDERS

Providing digital content support Government incentives and programmes to provide support for digital content where MDEC takes the helm as the central managing body for partnerships and delivery through co-pro partnerships, development programmes and development grants. Support may also come in the form of thought leadership and regional cooperation to connect industry, government, and partners.	Moderate Effort Required

Regulation of provision and use of technology for more efficient development of the AG industry The provision of broadband, application software, computer graphics hardware and any related paraphernalia need to be friendlier and more affordable to create a thriving yet legally abiding community. Reasonably priced software will encourage the purchase and minimise the use of pirated materials. The Malaysian government or trade organisations can assist by individually or collectively negotiating with technology providers for fairer prices or bulk orders on behalf of the industry community.	Moderate Effort Required
Early intervention at the school level to promote careers in the creative industry **Schools can help promote appreciation for the creative arts as a viable career path for students by embedding relevant intervention and promotional programmes within their curriculum and extra-curricular activities.**	Moderate Effort Required
Improving financing initiatives IP lending or IP-backed financing from bank loans and venture capitalists is still difficult to obtain for most animation and game companies.	Significant Effort Required
Improving infrastructure and facilities (i.e., internet connectivity and speed) There is high internet penetration across the country, but there is a need to continually improve internet accessibility and speed, i.e., 5G.	Significant Effort Required
Building a strong AG community within a designated area that is supported by both the public and private sector A specialised environment for networking, mentoring, learning and production can catalyse creativity, especially for amateur content creators. Such virtual platforms can also work as showcase areas for local creators' works, incubators of new content, and accelerators for potential companies and/or talents.	Significant Effort Required
Developing regional collaboration to take on bigger projects or build stronger IPs The AG ecosystem building can go beyond the country via regional collaborations by setting up an inter-country production committee to look into the production of significant IPs within the region and beyond. Collaborative endeavours will afford Malaysia to crowdsource financiers, international project teams, and marketing engines that would have otherwise been challenging to secure within the country. Ample resources and potentially larger funding will, in turn, allow for more large-scale projects with huge budgets to take place.	Significant Effort Required

Way forward

Promoting industry-academia partnership in narrowing the gap in talent demand

While upgrading facilities within institutions and acquirement of the latest tools and software could significantly improve instructional processes, budget restrictions often hinder this dire need for improvements. Early engagement between academia and the industry via early internship programmes for the students may compensate for this gap, which may also foster greater benefits for all parties involved. A central, updated database or a virtual hub listing companies and studios within the country will allow for greater matching possibilities for effective internships to take place. Pairing studios and educational leaders with the most advanced 2D and 3D animation software, for instance, may create a partnership that ensures long-term success. The academia may also welcome structured learning modules and student supervision from the industry as the industry are more adept at identifying changes in the market demand. Alternatively, short industrial attachment during mid-semester breaks before final year placements could provide the much-needed field experience for AG students to hone their developing skills.

The industry, on the other hand, should be willing to sincerely commit to accepting students and display a shared responsibility in producing talent that they have been envisioning together, including financial implications that may arise as a result of this partnership. To address the seemingly disjointed pipeline in building talent, more "*Teh Tarik*" (informal) sessions between the industry and academia ought to take place, leading to more significant steps for changes.

Boundaries between subdisciplines are often blurry within the creative arts. Transdisciplinary learning involving solid partnerships from both the academia and industry should be more welcomed with the courses, departments, and programmes, should all no longer be offered or housed in a silo, with the content delivered exclusively by the academics, but rather, they should also involve industry professionals as well moving forward.

Ease of doing business, talent and development, market and access, and funding are the main pillars of improving the creative industry ecosystem

The animation and gaming industry is growing organically in Malaysia. The country, alongside neighbouring Singapore, is enjoying a higher state of creative technology as compared to the rest of the Southeast Asian region because of solid local government support. Malaysia can attract more international projects moving forward as the government continues to play an active role in securing international companies to set up studios locally, allowing for the transfer of technology and knowledge to the local communities, which subsequently affords local companies to penetrate and thrive in the international animation and gaming market.

Cultivating a positive AG community and culture in Malaysia

As our nation focuses on accelerating its digital economy growth via the creative arts industry, cultivating and promoting a positive AG culture becomes even more critical. This aspiration can be systemically achieved through academia and industry working systematically, shouldering shared responsibilities. With a positive, professional, and invigorating work environment working as a creative talent, a programmer, an animator, or a game artist, it is hoped that this industry will gradually be accepted and respected as a valid career goal to look up to in a society that generally stereotypically values the hard sciences more than the creative arts.

Acknowledgement

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Further Reading

Southeast Asia Gaming Industry Report 2021:
https://mdec.my/wp-content/uploads/MDEC_13992-SEA-Game-Industry-Report_Inner.pdf
Southeast Asia Animation Report 2018:
https://mdec.my/wp-content/uploads/SEA-layout-20180815.pdf

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Appendix: List of Participants

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Ahmad Akmal Bin Ahmad Zaini	Chief Executive Officer (CEO)	Les' Copaque Animation Academy (LCAA)
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Name	Designation	Organisation
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Lai Yong Geat Jack	Programme Leader, Lecturer	Asian Pacific University of Technology & Innovation (APU)
Ts. Marzuki Bin Abdullah	Lecturer	Akademi Seni Budaya Dan Warisan Kebangsaan (ASWARA)
Mohamad Farhan Mohamad	Lecturer	Akademi Seni Budaya Dan Warisan Kebangsaan (ASWARA)
Mohamad Rafiuddin Mohd Noor	Project ASIE	Dynamic Global Vision
Ts. Mohamad Razeef Shah Mohmad Rafik	Senior Lecturer	Universiti Teknologi MARA (UiTM)
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Name	Designation	Organisation
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Zulkifly Amirudin	Assistant Animation Director	Lil Critter Workshop

MINISTRY OF HUMAN RESOURCES

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Industry-Academia Collaboration (IAC)- **Electrical & Electronic** Workshop Report

With support from the Ministry of Higher Education Malaysia (MoHE), Malaysia Semiconductor Industry Association (MSIA) and Kulim Industrial Tenants Association (KITA)

Executive Summary

With a focus on higher education, this Industry-Academia Collaboration in Electrical and Electronics (IAC-E&E) brief explores how best to bridge disparities between electrical and electronics talent demand and supply in Malaysia.

This brief highlights important questions for national key players involved in electrical and electronics-based talent development to enhance the quality of training for E&E graduates to meet the demands of a post-pandemic Malaysia. Through the IAC-E&E focus groups held with industry captains and members of the academia, a holistic E&E ecosystem for our nation requires six key drivers to be addressed: capturing new and higher-value-added investments from existing investors, growing the technology and R&D of large local companies (LLCs) and supporting SMEs, talent development at R&D and technician and operator levels, integrating various key players into the local E&E ecosystem, adjusting to global supply and value chain shifts, as well as a more strategic industry, research, advocacy and promotion initiatives.

The E&E industry in Malaysia is facing a turning point in its development, and the US-China trade war created a unique window of opportunity which can catalyse the development of the entire industry in the country for decades to come. 36.9 percent of over RM1 trillion in exports in 2021 came from the E&E sector, making it by far, the largest driver of exports in Malaysia. It is also a disproportionate contributor to the nation's trade surplus, being Malaysia's largest product export to China, and leader in terms of productivity gains. While the E&E and its optical subsector is the largest employer in the manufacturing sector with average wages paid out to be the highest among the manufacturing industry, weaker growth of the sector would be unavoidable as the local talent pool in E&E becomes dire with root causes stemming back to the significant drop in STEM-takers at school level and a general lack of interest to pursue available careers in this field. Remedies need to quickly be put in place to avoid missing out on trade opportunities and maintain the country's reputation as a prestigious and reliable producer of E&E products, which if tarnished, would cause a significant dent in Malaysia's economic growth given the country's substantial financial reliance on this industry.

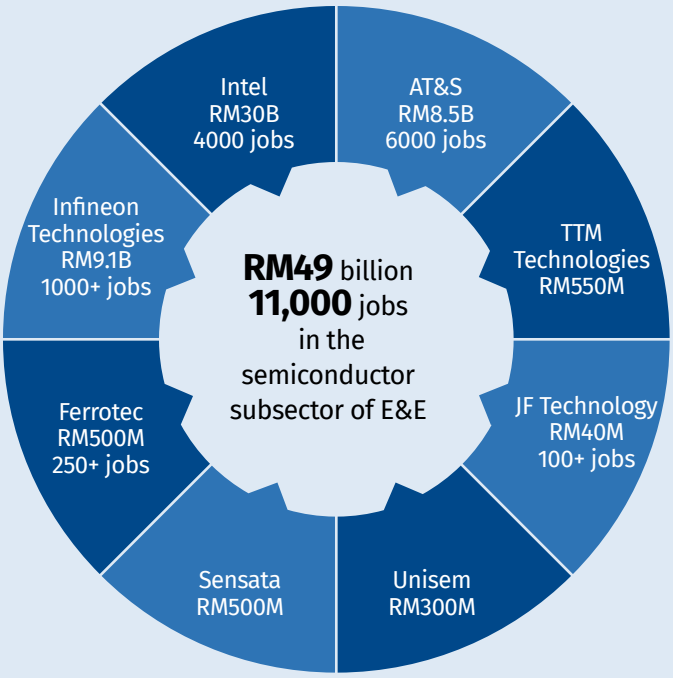
What are the issues?

Current Scenario

The COVID-19 endemic has contributed to a surge in the demand for semiconductors, resulting in a global shortage of the multi-billion-dollar trade. There will be continued demand from the well-trusted Malaysian chip-production industry driven by the growing investments made by giant technological leaders in Asia with investment plans totalling more than USD550B (Malaysia Semiconductor Industry Association (MSIA), 2022). In 2021, regardless of the challenges posed by the endemic, the E&E has steadily contributed RM456 billion in exports – an increase of almost 20 percent from 2020, comprising 56 percent of the Malaysian trade surplus, which also reflected an increment of 12 percent in labour productivity growth. It contributed RM95 billion (6.9 percent) to the country's gross domestic product, 590,000 (3.8 percent) jobs, and a total of RM148 billion in investments which came with an increment of 2,800 new jobs, a steep increase from only RM15.6 billion of total approved investments the previous year (MSIA, 2022).

The sector also contributes significantly to high-value jobs. The Malaysian E&E industry is deeply engaged in technological and knowledge transfer activities, an active manager of the global supply chain and Global Business Services (GBS), a key player in design and development initiatives and sharing of regional and global leadership experiences. To date, approximately 18-20 percent of tertiary education graduates work in the E&E. With investments totalling RM49 billion, the semiconductor trade in Malaysia offers 11,000 jobs in 2022 and is expected to increase along with the increment of new investments in upcoming years. However, the local talent pool in E&E is dire with root causes stemming back to the significant drop in STEM-takers at the school level. This shortage, if not addressed immediately, will result in larger economic drawbacks for Malaysia, given E&E's steady status as one of the largest financial contributors to the country.

Sector-specific skills can help graduates elevate their competitiveness in the E&E job market and proficiency in some of these specific areas can help fresh talent stand out to employers. Among the demanded technical skills in electrical and electronics top-tier jobs include a mix of software and programming proficiency, such as AutoDesk and Matlab, and knowledge of engineering



Source: Business Today, 22 Oct 2021; CNBC, 15 Dec 2021; AT&S News, 10 Jun 2021; TTM News, 25 Apr 2022; Ferrotec, 18 May 2022

methodologies. While engineering design may have a small impact on salary, this fundamental skill will help E&E talents to identify a problem precisely, explore the problem more deeply, and create more efficient ways to solve it. While not all E&E graduates need to be adept with programmable logic controllers (PLC) technology, it is beneficial for them to have a working knowledge since PLCs are integrated into a wide range of electrical equipment and devices. Test engineering is another skill that has a positive correlation with the average salary in E&E as skills in quality assurance and quality control and opportunities to make production processes more efficient are key skills in driving companies forward. Other highly sought technical skills in E&E include high-performance computing, digital signal processing, communications and control, computer networks, software engineering and artificial intelligence, detection and estimation, holography and diffractive optics, simulation modelling and heterogenous systems design, as well as wireless communications and networks.

Valued-added credentials beyond academic qualifications identified by the current IAC for the E&E sector include skills related to artificial intelligence, Internet of Things, 3D-printing, cyber security, pillars of IR4.0, green belt certifications, programme logic computing (PLC) and welding.

Technical know-how is indispensable for anyone striving to build a career in E&E. To reach their fullest potential, however, talents will need to complement their knowledge with a strong set of soft skills. These qualities make significant differences in fulfilling project objectives and achieving long-term project goals. Among the key soft skills highly sought-after in E&E are creative problem-solving, clear communication skills, and effective leadership skills. E&E experts routinely tackle complex challenges and devise inventive solutions. With each new project, new challenges arise, thus complex problem-solving is much needed

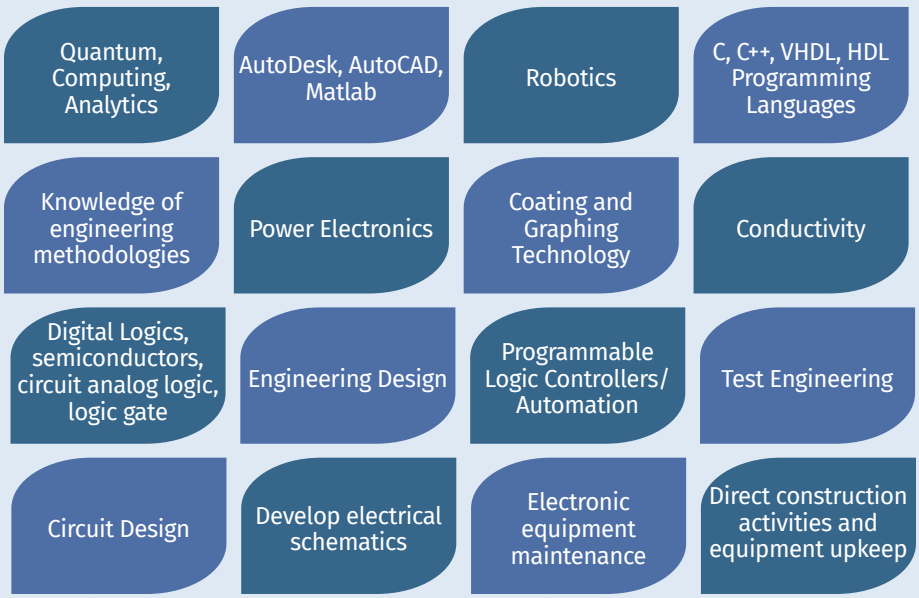


Figure 1: Highly sought technical skills employers are seeking in E&E candidates

to navigate constraints on available resources or challenges in dealing with novel interactions between multiple systems. E&E graduates should also be able to articulate their ideas with precision to fellow experts and non-technical audiences alike, with personnel of different levels within and beyond their companies. E&E experts can only make their projects successful by collaborating effectively with multidisciplinary teams. To lead effectively, talents must be able to calculate the demands of each project, make strategic choices about using resources and optimize each phase of operations thus making efficient project management skills a staple for an E&E graduate. Good mastery of spoken and written English has been deemed vital with mastery of additional languages a bonus. Moral emotions, on the other hand, would make E&E graduates sensitive to moral and ethical issues arising from the technologies they develop and market.

One fundamental skill repeatedly highlighted in this IAC Workshop is the deficient attitude and aptitude of recent E&E graduates to serve the job market. While they may fall short in work experiences, fresh talents who were successfully scouted oftentimes are those who display good-fitting work attitudes and are receptive to being trained for technical upskilling. Notably, not only do employers highlight the lack of appropriate work attitude and mannerisms, but there is also an apparent lack of enthusiasm to acquire new technical skills, abilities, and knowledge to meet specific job demands. Moreover, there is a noticeable lack of maturity in managing problems or situations and deficient displays of prosocial behaviours among recent graduates. As soft skills are mostly acquired indirectly from schooling experiences, this further warrants a systemic investigation into our education system at all levels to identify and rectify these gaps, especially on the deficiency in effective communication skills.

To illustrate the issue, Politeknik Sultan Abd Halim Mu'adzam Shah (POLIMAS) in Jitra, Kedah organized an open job interview for 700 final-year students who have completed their internships. Of the 700 students invited, only 100 students came prepared while the remaining 600 appeared unready, with no resumes and needed documents that are normally expected out of a job interview. This sentiment is resonated by representatives from the Kulim Technology Park Corporation, who further highlighted that graduates who came in for their interviews were not able to display an adequate understanding of theory and knowledge, they gave a lot of excuses and generally displayed an apparent lack of interest in proactively seeking for jobs. Of the 100 candidates interviewed, only seven were successfully offered a position. In a nutshell, our fresh talents in E&E are deemed to lack a sense of self-awareness of their strengths and capabilities as well as areas that could be further improved to increase their chances of being hired. More grimly, most are unsure of the immediate steps needed to be taken upon graduation.

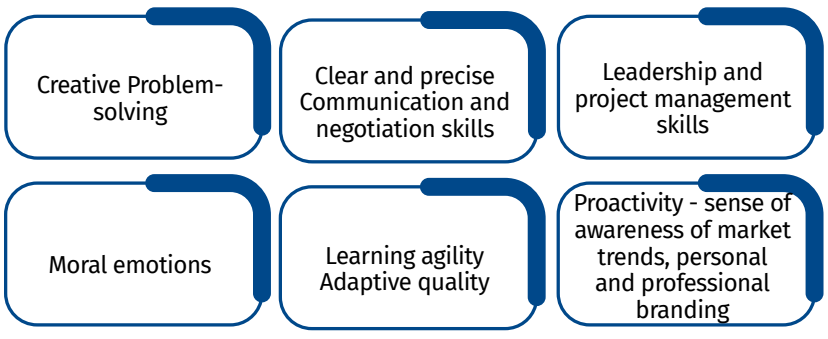


Figure 2: Top soft skills in electrical and electronics

The E&E industry in Malaysia has reached a critical stage with an immediate need for over 30,000 talents in the industry for 2022 alone, with 25 percent of the offers requiring technical expertise (MSIA, 2021). However, Malaysian small-to-medium enterprises SMEs had to decline prospects of new projects and businesses where some parties resorted to requesting state governments to put a temporary halt in bringing in new investments due to the deficient and insufficient workforce. Malaysian SMEs have never been in a more dire situation with 30 to 60 percent of their workforce having been scouted by other bigger companies, resulting in their inability to meet supply chain demands and having to decline new projects and offers.

The local talent supply for qualified engineers, technicians and other positions that meet industry standards is unsatisfactory both in terms of quantity and quality. Unhealthy talent supply and work retention environment (i. e. pinching of

talents), which are further exacerbated by the rising wage costs has positioned the entire Malaysian E&E industry at serious risk of collapsing.

Depressingly, other countries have been aggressively scouting for Malaysian talents. An estimated 1.7 million Malaysians are currently working overseas, comprising at least 500,000 high-skilled workers. On the contrary, local SMEs face fierce bureaucratic hurdles in scouting for non-local talents, as the process may take up to six months. Fundamentally, the E&E talent crisis could be primarily attributed to the fact that STEM-takers at school and university levels have significantly dropped from 60 percent to 30 percent in recent years resulting in this huge instability in the workforce. To illustrate, in 2022, UiTM Penang's Engineering faculty made 120 study offers but only 30 were accepted, a stark difference from its Hotel and Tourism faculty which is more popular and attractive among SPM-leavers. Further engagements with schools confirmed UiTM's suspicions that the current generation is generally unattracted to studying Additional Mathematics and Physics i.e. STEM-related subjects, with overall intake in the science stream declining over the years.

If the current situation is not immediately remedied, Malaysia's reputation as a global supplier of semiconductors, for instance, would be compromised. The country has made a prestigious name for itself in the design and manufacture of high-technology products. However, to date, many countries (e.g. the US, EU, Taiwan and China) have blamed Malaysia for the disruption in meeting semiconductor supply chain demands. This may then subsequently lead to the announcement of RM148 billion in foreign direct investments (FDIs) potentially falling into the hands of other countries that are more reliable. FDIs are time-sensitive in that Malaysia needs to maintain its dependable reputation in assembly and testing within the Asia Pacific region to continue to be preferred by investors. Unfortunately, the country is already experiencing missed opportunities where several projects have been lost to other countries that are vigorously taking these investment opportunities to further develop the skills and productivity of their local talents. As we continue to fail in meeting supply chain demands due to worker shortages, our local SMEs will then continue to suffer, and this retardation will in turn affect multinational companies (MNCs) and LLCs as they depend on SMEs to fulfil their supply needs.

Unlike their older counterparts, the younger generation generally no longer finds careers in E&E attractive. Further complicating the matter are the different worldviews of different workers from different generations. While the more senior Gen X are more loyal with a sense of obligation to stay with their companies throughout their entire career, Gen Y and Z workers would commonly hop from one company to another. Given the high technicality and specificity involved in producing E&E supplies, it would also be almost impossible for universities to highly customize their program offerings tailoring to narrowed needs of the industry, requiring industries to provide further training to new graduates upon hiring. Hence, a readymade talent pool is rarely available to meet specific market needs. The low retention, high turnovers and high in-house training expenses of fresh talents would all then add up to the supply chain hiccups.

In this regard, the industry will need to understand its role and capacity for employment and how best to make use of this talent pool which needs further training and

development upon hire. Companies will also need to be aware and open to the fact that crew changes will happen at an even higher rate soon. Thus, an investment should be made looking into a workable framework for striking the balance between how much to put into staff in-house training for fresh talents and dealing with the high turnover rates without hurting the company's growth trajectory. Industries, like government ministries offering scholarships for training, may consider contract bonds for workers who have received a considerable amount of training before being allowed to leave to join another company.

While efforts to promote STEM uptake have never been side-lined by the Education Ministry and MOSTI, the ranking system exercised in Malaysian public schools remains in effect. This highly dictates how education personnel at the field level operate to achieve the targeted ranks as appraisals, recognitions, and financial budgets are determined by the ranks attained. While this may not be blanketed across the board, there have been notable instances of teachers encouraging students to avoid subjects that are deemed hard to excel i.e. mostly STEM-related to maintain good ranks.

Policy-related issues in the context of addressing the Malaysian E&E talent shortage

- A consistent area of industry feedback in the current IAC is the talent shortage in the E&E sector both at the top and bottom ends echoing TalentCorp's study from a decade ago (TalentCorp 2012).
- Linked to the local talent issue are the demand for foreign labour and the bureaucratic hurdles in employing non-local labour.

Issues in E&E Curriculum in Universities

- Previous university curriculums were notably more successful in producing market-ready top-tier E&E jobs such as electrical and electronic engineers. Therefore, there is a need to be open to learning, unlearning, and relearning what went right in the past and what is currently going south with current curriculum offerings.
- STEM was more famous among parents and students back in the 1990s and 2000s as compared to the current generation who no longer holds on to the mentality that university degrees will land them their dream job and earn them a lot of money. As a result, not only are STEM uptakes decreasing and threatening the future of work in Malaysia, but college enrolments are also seeing an overall decline due to this mindset shift towards work and earning money.
- Excessive innovations in curriculum offerings may not necessarily improve learning experiences and outcomes and the over-promotion of micro-courses and micro-credential learning pathways may have resulted in surface learning (and a master of none) among current talents. Most talents from the previous generation have been observed to have a better mastery of technical and theoretical skills compared to fresher talents of more recent generations.
- It has been noted that there is a decline in demand for E&E graduates from research universities (MRUN) as opposed to talents from technical universities (MTUN) as the older, more traditional MRUN universities take longer routes in their curriculum review approval processes. MRUN universities, therefore, use longer curriculum cycles before updates can be inserted into their next curriculum offering, potentially making their graduates not up to date with in-demand skills.
- There is a notable lack of resources for training on IC design. Public institutions provide limited IC design server which currently still needs to be shared among institutions like UPM, UiTM and others.

Issues in Teaching and Learning of E&E in Higher Education

- The standard 6-week internship period exercised by many E&E academic programs is insufficient to foster significant relationships with a company to become a prospective employer.
- There are varied opinions in the current IAC as to the appropriate timing of field placements. Some experts were of the view that multi-year internships conducted from early on would be beneficial for all parties – the students, academics, and the industries – to forge meaningful collaborative efforts together. Some others opined that field placements conducted at the very end of the academic program will allow students to better transition into the companies for full-time employment. Nonetheless,

not all companies offering field placements will have the capacity to hire all their interns.

- In this regard, Malaysian universities have been following the Washington Accord in that students are required to go back to their universities after field placements. UiTM has been challenging this practice and making efforts to push for a change to follow the Dublin and Sydney Accords where internships are more interestingly and meaningfully conducted at the end of the learning period. Should this be successful, the change is expected to take place in March 2023.

What have been done?

First Solar's successful hiring of local fresh talents

First Solar, a leading global provider of comprehensive PV solar solutions with advanced module and systems technology has been in Malaysia since 2002. It previously faced challenges in hiring 5000 headcounts to run its operations and resorting to foreign workers. After the endemic, the industry is ramping up and requires an immediate workforce. With TalentCorp releasing a report on 250,000 unemployed graduates, it saw this as an opportunity but would also need to come up with quick solutions on how best to make full use of this available pool. Notedly, most recent graduates are tech savvy but would require additional in-house training to be ready for the industry.

Job crafting became the quick short-term solution exercised with many types of custom-tailored training programs developed and offered to attract graduates to join. The available positions were also promoted via more attractive job titles. Medium- and long-term solutions to retain these talents are through value creation as the younger generation are observed to hop on different jobs rather frequently and may usually consider staying only due to the comforts of job perks such as medical insurance, good-paying salary, and bonuses. To organically nurture a sense of value and worthiness among the younger talents in the company, First Solar entrusted them the opportunity to grow by handling much more challenging tasks which customarily would have been shouldered by more senior personnel in the past. This trust will help the younger talents to develop their sense of self-leadership

and provide more avenues for their career growth. Currently, First Solar is proud to have 100 percent of its workers from the local talent pool because of these dedicated efforts.

DRB Hicom's active promotion of the E&E sector to school students

DRB Hicom has had consistent engagements with state education departments via its *Selangkah Ke Arah DRB Hicom* initiative. School students – segmentized to SPM-leavers, secondary and elementary levels – have been taken around the DRB Hicom grounds to spark their interest to pursue tertiary education at DRB Hicom.

With a focus on schools that especially offers automotive courses, motivational talks, testimonials from relatable alumni, and career-related programs have been conducted for the students and extended to the teachers and career counsellors. It is hoped that with this consistent promotional initiative, uptakes into the field will continue to sustain.

It is also worth highlighting that UniMap, UniKL, Petrosains (via Play Smart), UiTM, UTHM, UTM along with countless other tertiary learning institutions in the country, are doing their part by actively organizing engagement programs with schoolchildren to boost awareness towards STEM careers and beyond, especially via the *Program Sekolah Angkat* initiative.

E&E Curriculum at Tertiary Level

- UniMap, as part of the Malaysian Technical University Network (MTUN), can cater to the current needs of the industries. It also currently offers specialisation in microelectronics, an area not yet offered by other institutions, especially in the northern region.
- ILP Kepala Batas are already offering electronics academic programs though improvements can be made to meet industry demands.
- Ministry of Investment Trade and Industry (MITI) is also working with the Human Resources Ministry to introduce Industry 4.0-specific courses and programmes. Such programmes will also benefit the E&E industry from a talent development perspective.

Teaching and Learning of E&E in the context of Higher Education

- IR4.0 has been infused across university teaching and learning processes nationwide delivered via immersive online and physical innovative teaching practices.

- The talent pool is not tailor-made to meet the specific and varied demands of the E&E industry as such a curriculum would be impossible to be offered. Understanding this limitation, AT&S has engaged with higher education institutions to have a better understanding of the current talent pool's mastery of technical and conceptual knowledge resulting in collaborations between the two parties in creating programs to bridge talents into the working world. Secondary schools have also been engaged where STEM promotional activities linking the industry with students with hopes of attracting more uptake into the science stream.
- POLIMAS requires a minimum of 30 hours of guest lectures in every program each academic year. Each semester, they will engage with at least one industry partner and have invited speakers from the industry consistently. This practice has been established as part of their yearly KPIs.
- Likewise, UniMap has consistently engaged Fuji to serve as their guest lecturers.
- DRB Hicom University involves industrial experts playing advisory roles in their curriculum review processes.
- UniKL practices a working factory approach where students can join the industry to learn about the latest machinery operations and new technologies.
- Based on the 2U2I initiative by the Ministry of Higher Education Malaysia, DRB Hicom University has partnered with Composites Technology Research Malaysia Sdn Bhd (CTRM) Melaka to jointly train E&E graduates for a bachelor's degree in Composite. Such initiatives should be further amplified for the sustainability of the talent pipeline.
- Micron Memory Sdn. Bhd has donated several pieces of equipment to ADTEC Taiping for training purposes.
- Intel and Keysight established their branding with higher institutions, locally and overseas through talks, webinar sessions and campus outreach programmes.

Post-graduation Upskilling Initiatives for E&E Graduates

- Dreamcatcher, a Penang-based company has been providing technical training to the E&E industry, where it also has TVET-specific programmes. More private sector trainers and providers should be encouraged to aid this field.

What can be done?

ACADEMIA

Universities to offer demand-driven curriculum The curriculum review process should prioritize identifying courses that are still relevant and those that should be replaced with newer courses to be developed and offered. Offering relevant content will further enhance mastery of in-demand sector skills which in turn will improve employability rates of E&E graduates.	Low Effort Required
Curriculum review to include industrial experts Top-tier industrial experts in E&E such as electrical and electronic engineers should be involved in the curriculum review process to provide recommendations directly from the field.	Low Effort Required
Assessment of Learning should include measures of technical skills Current assessments of learning of E&E students are limited to course offerings and performance during field placements as well as completion of capstone projects. It would also be valuable for the industries to gauge graduates' technical competencies beyond taught courses.	Low Effort Required
Train-the-Trainer (TTT) efforts to improve instructional delivery Poor learning attainment could plausibly be attributed to poor teaching skills of E&E instructors who generally do not possess an official qualification in Education training since they too, would have been E&E graduates themselves. Efforts should be made to identify a talent pool of innovative E&E lecturers to conduct TTTs to upskill the instructional skills of current and future E&E teaching personnel. These would include training on how best to teach at the tertiary level, and better mastery of handling and demonstrating equipment, software, and new technologies. Trainers may also ideally involve industry key players.	Moderate Effort Required
Curriculum review to include use of key opinion leaders (KOLs) from social media Those spearheading the E&E sector, both from academia and the industry will need to be open to the use of social media and the role of KOLs in magnetising the public into STEM. Efficient use of successful KOLs in E&E (if any) as social media icons may address the public's misconceptions and misperceptions of the field and may once again make the E&E industry more attractive and relatable to the young.	Moderate Effort Required

Duration of internship to increase to multi-year to improve chances of being hired The academia may consider revising current curriculum offerings to allow for internships to be undertaken as early as the second year, for several semesters long. Adequate industrial training and learning programs will expose students to practical hands-on knowledge and field experience to handle the job. Direct engagement with the real-world working environment will also provide more meaningful learning experiences for these fresh talents to connect classroom instruction with job expectations. Nonetheless, students should be considered to receive remuneration during the field placement. This arrangement is also a healthy job-matching opportunity for companies to select high-quality local talents. Universiti Sains Malaysia (USM) has implemented this approach where students need to undergo internships in their 3rd year. Students also can propose to do research for their final year project in the industry so that they are familiar with all the machines and equipment there.	Moderate Effort Required
Hiring of E&E instructors with industrial exposure and experience Moving forward, talent for E&E instructors should come with industrial experience and expertise so that students can discern and understand the relevance of their respective fields of study. E&E instructors from a purely academic route will have limited industrial experience to be shared with students.	Moderate Effort Required
Universities to enhance future-ready curriculum delivery that focuses on meaningful learning experiences through company visitations Companies have a limited quota for internships and may not be able to hire all graduates for them to gain such exposure thus field visits to different companies throughout their study will allow students to gain exposure from multiple companies.	Moderate Effort Required
Universities to embrace a research-based approach in E&E instruction to improve networking for students with potential employers Research workshops and seminars attended by students, academics, and industries which include discussions on meeting the supply and demand of talent may establish early networking grounds for fresh talents with prospective employers.	Moderate Effort Required
Finishing school programs in universities should be revived with an emphasis on soft skills Several universities have put a halt on their finishing school programs mainly due to financial constraints. This should be revived with more emphasis on the soft skills much needed to succeed in the job hiring process i.e., communication skills, attitude, and aptitude than on the technicality of job application processes e.g writing cover letters, resumes, and preparing for interviews.	Moderate Effort Required

E&E instructors to undergo field placements E&E instructors especially those serving public institutions of higher education may consider using their sabbatical leave rights to partake in field placements for constant upskilling by industry partners. This then ensures industrial knowledge and advancements can be consistently embedded in university teaching. A suggestion has been made to only hire E&E instructors with at least 3 years of industrial experience before joining the academy.	Moderate Effort Required
Academia to celebrate, acknowledge and promote E&E instructors with field experience As innovative lecturers are recognized for their contributions via the *Anugerah Khas YB Menteri Pengajian Tinggi* (AKRI) for outstanding instructional practices, similar recognitions should be created for E&E instructors to identify E&E academics with highly skilled field experience. Such awards will help promote continuous upskilling, especially among university lecturers in E&E.	Moderate Effort Required
E&E to evaluate irrelevant program offerings to simplify university application processes When E&E program choices are too varied and plentiful, it further complicates school-leavers' decision-making processes to select the best university program to undertake. Simplifying this process by offering programs that match industrial demands may address a lot of the talent shortage issues down the road. Data analytics on each program's offerings will allow the academia to make informed decisions to close programs that are no longer meeting current demands. Data-driven decision-making has been exercised by Universiti Malaya (UM) as they have recently closed several graduate programs shown to no longer serve their initial purpose.	Significant Effort Required

INDUSTRY

Sponsor lab facilities or equipment to learning institution Companies can take the initiative to sponsor lab facilities and software or hardware equipment to learning or training institutions so that students can have early exposure and ample time to learn to handle them properly. The industrial training period can potentially be reduced when students enter the industries as they have familiarised themselves with the machines and equipment beforehand. This type of investment may in turn benefit the industries in the future.	Significant Effort Required

Sharing of expertise and resources While not all companies have the financial capacity to sponsor lab facilities, sharing of expertise and available resources would also significantly help the E&E talent ecosystem as the academia is in constant lack of resources with severe budget cuts in recent years.	Significant Effort Required
Organize E&E-related competitions to attract quality talents At the top end, public and private sector initiatives, such as the Innovate Malaysia Design competition geared towards the E&E industry, can be proliferated to recruit talented engineers into the industry.	Significant Effort Required
Companies to send bottom tier staffs for SKM upskilling E&E graduates of existing employees from First Solar are currently undergoing upskilling programs with Hi tech Kulim. However, companies are encouraged to not only promote upskilling of top end staffs but to also permit and require their bottom end staffs to undergo job-related training at any learning institutions e. g. by pursuing Sijil Kemahiran Malaysia (SKM). More dual training and learning programs can be introduced to make jobs in this sector more attractive to prospective machine operators and technicians.	Significant Effort Required

OTHER STAKEHOLDERS

Tax reduction incentives for companies providing training The government should consider offering tax reductions to companies that partake in providing upskilling programs for local fresh talents.	Significant Effort Required
Government to help financially aid Academy in Factory (AiF) training for technician positions At least ten E&E companies in Malaysia have hired approximately 200 SPM-leavers who have been receiving 18-month on-the-job training. Government financial aid in the form of RM100/month/person would be of great help especially to SMEs to sustain and further promote the initiative.	Significant Effort Required
Propose clear career roadmaps for E&E graduates The Ministry of Higher Education may spearhead efforts to bring multi-stakeholders together to lay out clearer career pathways for E&E graduates.	Significant Effort Required

Develop a talent profiling tool The Ministry of Higher Education may also consider forming a multi-stakeholder working committee to develop a talent profiling tool accessible to students to gauge their strengths and room for further improvements. (TalentCorp had developed Mynext Profiling tool for HEI's students)	Significant Effort Required
Nurturing soft skills of the E&E talent pool from a young age Attitudes and aptitudes, including effective and respectful communication skills, ought to be nurtured from a young age, during the formative years of development, as it could no longer be the primary focus of tertiary education when students become young adults. Career promotion efforts by all relevant stakeholders especially in STEM-related areas should also be doubled up at the secondary and elementary school levels. Some parents, especially those in the B40 families, need to be given the right exposure and awareness in influencing and guiding their children's education and career path at an early age.	Significant Effort Required
Expansion of scale and funding of the Train & Place Program for unemployed engineers and technicians 28 unemployed engineers have recently completed the program under USAINS. The current IAC members propose to expand this program to 1000 engineers and technicians through the Skill Development Center. The government may consider helping support funds of RM2,000+ and RM1,500+ for each engineer and technician throughout the 4-month training period.	Significant Effort Required
Amplify attractive incentives for E&E engineers Engineers in the design and development of E&E products can be given a 50 percent reduction in taxes. Industry-government partnerships may offer joint sponsorships for outstanding school leavers to partake in E&E engineering programs at the tertiary level.	Significant Effort Required
Tax reduction for parents with children enrolled in STEM programs Request for the government to consider significant tax exemption or reductions for parents whose children are enrolled in STEM programs. The suggestion is as follows: a. Graduate level – tax exemption of RM12,000 b. Undergraduate level – tax exemption of RM8,000 c. Secondary school level – tax exemption of RM2,000	Significant Effort Required
Permitting recruitment of foreign talent to address dire worker shortage Request for the government to consider permitting international students graduating from local Malaysian universities to be absorbed into the Malaysian E&E workforce – which would also include jobs related to accountancy, IT, supply chain and construction.	Significant Effort Required

Simplify the approval and placement process for the recruitment of foreign talent Request for the government to revise and simplify the process of approval and placement of foreign talent in all related agencies within 30 days.	Significant Effort Required
Funding allocations for Science Discovery Centres Amplifying funding allocations for discovery centres such as Penang's Tech Dome will ensure such establishments can sustain to continue providing richer avenues for children to be inspired to lead STEM-related careers.	Significant Effort Required

Way forward

The E&E war on talents within the Malaysian job landscape is distinctive and dire. On the one hand, universities are unable to keep up with the pace to cater to the highly specialized and highly varied in-demand skills needed by the industry. At best, graduates have been trained to acquire solid mastery of conceptual and technical knowledge in the related fields. On the other hand, the E&E industry, especially SMEs struggle to upskill these "non-specialized" graduates – who are generally lacking in practical skills – because of the financial









constraints and low job retention rates given the younger generation's tendency to consistently job-hop. Further exacerbating the situation is the overall lack of workplace readiness of E&E graduates, including fundamental soft skills as recent graduates are observed to be reasonably lacking in communication skills and showing frequent displays of deficient work attitudes. As character nurturing processes are most effective when started young, a dedicated investment should be made to revisit our curriculum offerings at the school level where developmental stages are still actively taking place.

However, it is worth highlighting that students and graduates in today's day and age are better learners given their access to the technological advancements available. Most of the younger graduates do not have problems in being taught to understand and master both theoretical and technical knowledge in their respective fields but they do face constraints in applying and connecting classroom learning to the job context since they do not receive ample exposure and training from the start.

Need to cultivate a fluid and proactive E&E community and culture in Malaysia

As of September 2022, the domestic E&E sector is expected to continue maintaining its uptrend momentum despite predictions made by analysts that the industry's demand has reached its highest point. Therefore, more concerted efforts should be exercised by relevant parties to continue to promote meaningful industry-academia partnerships in not only ensuring the sustainability of the local talent pool supply of this sector but also improving its attractiveness to the younger generation. As this segment will continue to be a key growth driver for Malaysia, the shortage of skilled talents needs to be urgently addressed to move the country up the value chain as knowledge-based development continues to be the most viable way forward for E&E players to remain competitive. Our local talent would therefore be key in withstanding the phases of potential technology downturns and economic uncertainties.

With a solid pool of highly skilled local talent, Malaysia could weather any market conditions, particularly those that bring down the production volume of low-cost items. The more specialised and high-value products are, the more recession-proof they become. Thus Malaysia's E&E talent pool should be cultivated to master artificial intelligence, financial technology, smart factories and other related disciplines needed to produce high-value E&E products. Transferring into this high-mix low-volume manufacturing approach where by-products are much more value-added but limited in quantity, will allow Malaysia to weather any economic slowdown better as our products could be priced much higher as they are more customised for specific markets. The proliferation of companies with fewer employees is a testament that Malaysia is already transforming into this approach and should continue to intensify efforts to proliferate further.

At any rate, Malaysia needs to continually improve its education system as it is not producing the right types of talent to support businesses in the E&E sector in the long run. Educational institutions need to bring back affordable training options into our organisations and even when budget cuts are unavoidable at the national level, allocations for education especially those that support STEM-related careers should not be compromised.

While Industry 4.0 is the way forward and all current training efforts are mainly geared towards supporting this phase, its lifespan is only to last for about 25 years at most before Industry 5.0 kicks in. As such, our education system should be fluid and proactive enough to evolve in tandem with this inevitable new wave of technologies as a bigger, more agile and resilient local talent pool is needed.

Acknowledgement

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MINISTRY OF HUMAN RESOURCES

TalentCorp
GROUP OF COMPANIES

Sector-Focused
Industry-Academia Collaboration (IAC)-
Medical Devices Industry
Workshop Report

With support from the Ministry of Higher Education Malaysia (MoHE)

Executive Summary

With a focus on higher education, this Industry-Academia Collaboration in the Medical Industry (IAC-MI) brief explores how best to bridge disparities in talent demand and supply in the Malaysian Medical Technology Industry (MI).

This brief highlights important questions for national key players involved in the medical technology industry talent development to enhance the quality of training for MI graduates to meet the demands of a post-pandemic Malaysia. Through the IAC-MI focus groups held with industry captains and members of the academia, it is agreed that a holistic MI ecosystem for our nation requires six (6) key drivers to be addressed: 1) Product upgrading and diversification, 2) Process upgrading, 3) Trade and technology promotion, 4) Promotion of further backward and forward linkages within the industry, 5) Flow and clarity of information and 6) Academia-industry dialogue and collaboration.

The COVID-19 endemic has caused the already overburdened hospitals and healthcare services to upgrade on every level, from infrastructure to processes of manufacturing and delivering medical products and services. According to a research report by Global Market Insights, the market for digital health technologies and products, including IT, wearables, health sensors and any solutions aiming to digitise healthcare, is projected to surpass USD379 billion by 2024, all of which has potential to ease overloading hospitals during times of a public health crisis. With rapid advances in technology, the Malaysian Investment Development Authority (MIDA) continues to support and encourage new foreign direct investments to help with the MI landscape in Malaysia, to further strengthen the country's position as the leading hub for the MI industry in the region. In 2020, two MI multinational companies, Smith & Nephew and Bbraun, were listed as among the high-value investments in Malaysia, leading to the creation of a multitude of new job opportunities for local talents, with Bbraun having invested close to MYR5 billion in its Malaysian facilities since its establishment in 1972. Even so, there is a drop in the overall enrolment of students in MI-related programmes at the university and college levels and an even critical talent pool – which is largely shared with the electrical and electronics sector – as the younger generation is generally unaware of the potentials of the medical technology industry and its career pathways. Further exacerbating the situation is the lack of job-specific skills among fresh talents due to the highly specialised nature of the subsectors. Therefore, there is a dire need for both the industry and academia, along with other stakeholders, to find a panacea that would allow for the medical industry to continue receiving a healthy supply of talent pool to continually grow and thrive in tandem with the electrical and electronics sector of the country.

What are the issues?

Current Scenario

Malaysia is well-positioned to be Asia's hub for the medical device industry, with over 200 manufacturers consisting of 30 medical device multinational companies producing high-value-added medical devices already in full operation in the country (Lee, 2020). The second and third tiers of medical device manufacturers for parts and components of medical devices have also increased opportunities for local vendors to be integrated into the global supply chain of this industry. In 2021, MIDA approved 38 medical device-related manufacturing projects worth RM7.68 billion, which are expected to create approximately 12,500 employment opportunities for the country. While commonly known as a top global producer of glove medical devices, Malaysia's performance in non-glove medical device export also continues to grow steadily, with the composition of non-glove exports outpacing the growth of glove medical device export[1]. Currently, the industry activities are mainly for the export market with a relatively small domestic market. Growth in exports is primarily driven by intravenous catheters and orthopaedic products.

Penang, dubbed the Silicon Valley of the East, with its robust industrial ecosystem in accelerating breakthroughs in the electrical and electronics industry, has further entrenched its position as the medical device hub in the region, currently home to the highest concentrations of medical technology companies in Malaysia and Southeast Asia (Lee, 2020; see the section on Further Reading for detailed description). The industry generates high-income jobs and in turn, increases the export value and reinforces the domestic supply chain ecosystem. With the solid ecosystem in Penang, multinational companies (MNCs) have also been continually attracted to expand their businesses by settling to branch out in Malaysia. As of June 2022, the orthopaedic related manufacturer company Smith & Nephew is supporting its business with the extension of its new technology manufacturing facility in Batu Kawan Industrial Park, Penang. The 250,000 sq ft facility, worth more than USD100 million (MYR440 million) in investments, will provide up to 800 new job opportunities in manufacturing, engineering, and supply chain. This facility will be the company's first manufacturing venture in Southeast Asia, further demonstrating Malaysia's ability to attract renowned medical device manufacturers. Knowledge and skills transfer is one of the anticipated benefits of foreign direct investments. However, some stakeholders have opined that knowledge transfer may be taking place at a slower pace than expected in the case of Penang and Malaysia, with several arguing that this is attributable to the limitations in the capacity of local talent and industry.

Regardless, our effective and industry-focused skill development centre in Penang is positive for the medical industry, where the Penang Skills Development Centre (PSDC) is seen to be instrumental in elevating skills for our local MI talents. In terms of labour adaptability among different segments, MI stakeholders argue that adaptability would be dependent upon the type of activity the talent is involved in and the skills required in the new job. For example, the talent involved in the production pipeline may be more mobile and, with adequate on-the-job training, would be more able to adapt to the skills required on the production floor. On the other hand, for technician-level staffing, there are requirements

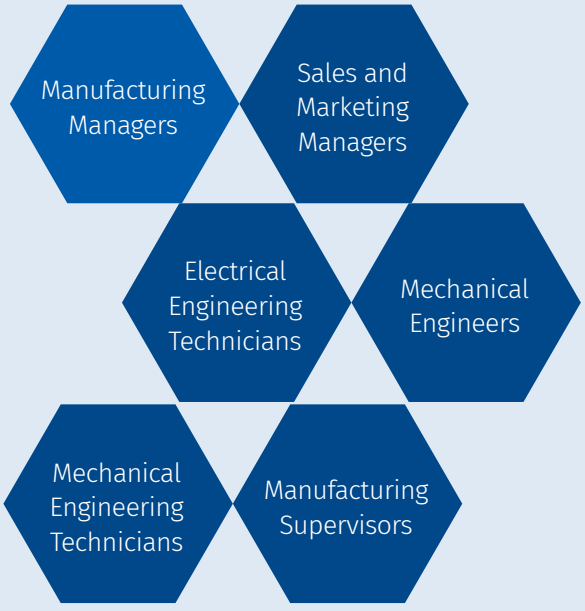

Figure1: Critical Occupations List related to the Medical Devices Industry (Source: TalentCorp)

1 15.2% non-gloves compared to gloves at 9.4% (Source: MATRADE).

for specific skills for these talents in different product segments. For example, in orthopaedics product manufacturing, a machinist with specific skillsets and training is required for orthopaedic products. However, in terms of regulations and sales, there are certain limitations since some companies are involved in original equipment manufacturing (OEM) while other companies sell directly to end users (hospitals and medical facilities). Skill in registering different classes of medical devices (such as to the United States Food and Drug Administration (FDA), China FDA, and Europe CE Mark) is useful, but stakeholders say that this requires more comprehensive skillsets from the workers involved in sales and regulatory (see Lee, 2020 for a detailed outline on labour adaptability among different product segments in the Malaysian medical industry; see Figure 1 for list of Critical Occupation List related to the Medical Devices Industry and Table 1 for a summary of workforce requirement for MI).

Table 1: Workforce requirement for the medical devices manufacturing industry

Value Chain Stage	Professional Labour with Tertiary Education	Technicians and Operators
R&D	• Clinicians • Engineers (mechanical, electronic, biomedical, electrical, chemical, industrial, process) • Product designers • PhDs with industry experience and capacity in applied research • Government & regulatory affairs officers • Risk capital specialists (angel investors, venture capitalists)	Highly skilled technicians (prototypes)
Components	• Engineers (Chemical, electrical, electronic, industrial, mechanical, automation) • Validation engineers • Quality Assurance • Microbiologists	• Mechanics • Electricians • Technicians • Machine operators • Manual assemblers
Assembly	• Engineers (Chemical, electrical, electronic, industrial, mechanical, automation) • Validation engineers • Quality Assurance • Microbiologists • Compliance officers	• Mechanics • Electricians • Technicians • Machine operators • Manual assemblers
Marketing & Sales	• Government & regulatory affairs officers • Health economics specialists • Marketers • Product Specialists	

Source: Adapted from Araujo et al. (2011), Forfás (2009) in Lee (2020).

The TalentCorp Critical Occupations List (MyCOL) 2020/2021 report highlighted that Sales and Marketing Managers and Manufacturing Supervisor positions are difficult to fill in the non-consumable medical devices manufacturing segment. There is especially a growing need to fulfil technician roles in the surgical gloves sub-sector and notedly, a growing concern that the medical device industry shares the same talent pool as the more renowned electrical and electronics industry, which is Malaysia's largest manufacturing contributor. This prevailing scenario should be made aware, especially by higher education providers, to make the necessary adjustments to the training they offer so that the local talent pool for the MI industry can be sustained.

For one, academia may take note of certain sector-specific skills that can help graduates elevate their competitiveness in the MI job market. Mastery in these specific areas can help fresh talent stand out to employers. Among the demanded technical skills for top-tier jobs in the medical device industry include expertise in nuclear medicine technology, medical equipment, and mastery of programming software.

From the demand side, talent competency, according to Paramit Malaysia, consists of three areas: core, functional, and leadership competencies. Core competencies typically cover communication skills, including proficiency in written and spoken English. Functional competency would include knowledge of software operations and technical know-how, and leadership competency would encompass the ability to take on tasks until completion and the ability to navigate setbacks along the process. Talents displaying these three areas of key competencies are also likely to have better personal development and career growth. Like all other technical-centric industries in the Malaysian job landscape, the medical industry prefers a balance of both critical thinking and good graduating GPAs when making hiring decisions. While GPAs are a good first impression to hiring managers, during interview sessions, candidates displaying critical thinking skills are often more valued for hire, in which case, master- and doctoral-qualified candidates appear to come meeting both requirements over candidates with lower qualifications.

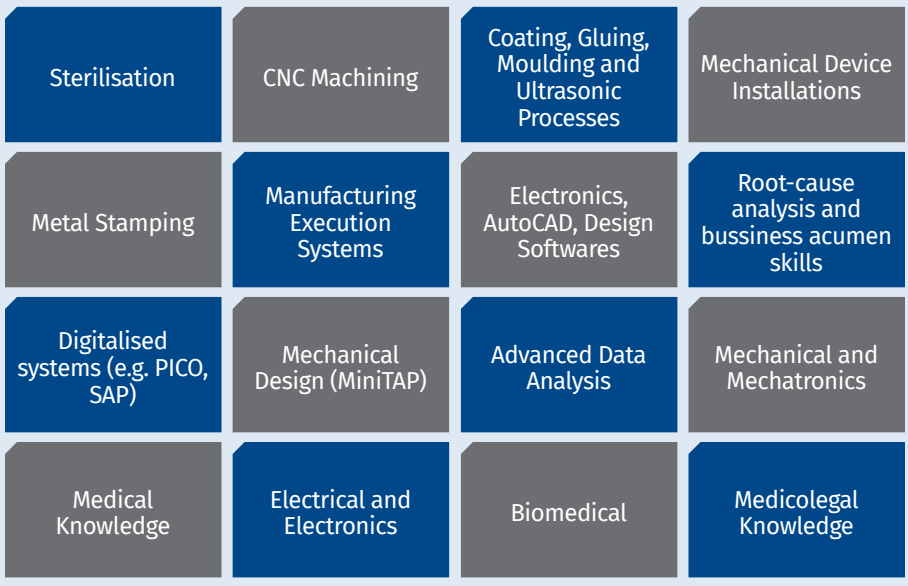

Figure 2: Highly sought technical skills employers seek in MI candidates

Technical know-how is indispensable for anyone striving to build a career in MI. To reach their fullest potential, however, talents will need to complement their knowledge with a strong set of soft skills. These qualities make significant differences in fulfilling project objectives and achieving long-term project goals. Among the key soft skills highly sought-after in MI are leadership and influencing skills, business acumen skills and precise decision-making, which in turn requires critical and creative problem-solving skills, being proactive in staying up-to-date, and being agile enough to flexibly adapt to sudden changes in the Volatility, uncertainty, complexity and ambiguity (VUCA) environment we are now living in. In today's high-stress and fast-paced world, mental health skills would be indispensable for every graduate to master to not only survive but thrive in their careers. Skills on how to fundamentally operate as a resilient human are non-existent in any form of curriculum and learning delivery across the board. Therefore, there is an urgent need to acknowledge the need for fundamental human skills to be (re-) embedded within courses, including the need to encourage students to find purpose and meaning, which in turn will help them develop intrinsic values in using their strengths and skills to create positive changes in the world and society via the tertiary

education their own. Human skills would also encompass developing students' sense of humour, for, with humour, we learn to become less stressed individuals, more confident and more resilient, all of which are lacking, especially among graduates from the technical and hard sciences.

One fundamental skill repeatedly highlighted in this IAC Workshop is the apparent lack of effective communication and interpersonal skills of recent graduates in MI-related jobs. This is especially the case for oral and written English leading to risks of misinterpretation of messages being conveyed. The IAC participants mutually agree that exposure is lacking during training years at the university; thus, hospitals and companies ought to have their fair share in shouldering the responsibility of providing in-house upskilling, especially on job-specific soft skills.

Value-added post-graduation skills that may need to be considered for MI graduates include micro-skilling on basic knowledge of ISO requirements, as the MI industry is highly tied to strict operational procedures. Graduates would also benefit from being upskilled in areas of personal branding, the medical device industry market awareness, and fine personal skills, which include attitude grooming and social etiquette, all of which are generally not covered by university education. Basic knowledge of the medical field and International Organization for Standardization (ISO)certifications would significantly enhance the overall competency of a graduate working in the MI industry.

Not all job specifications require post-degree academic qualification and comprehensive competencies. Requirements are based on the job specification needs and there is a multitude of MI-related jobs available for those with post-secondary qualifications. However, as is the case with other job sectors in Malaysia, the country is experiencing a mass loss of interest in pursuing tertiary education among its younger generation especially given the multitude of ways to earn money without higher degree qualifications such as that afforded by content creating and influencing activities on social media and e-hailing services such as Grab and FoodPanda with no obligations of working under strict directives. The lifestyle and mindset of the current talent pool are also different compared to the job crew from the older generation. Talents are more interested in jobs with higher remuneration and working in reputable MNC companies. While several local companies open their doors for direct hiring upon completion of the internship period, many local talents would eye on other opportunities with other companies while still under training. It is understood that part of the reason is attributable to the fact that local talents have a limited understanding of medical knowledge, especially among pure engineering students. A shortcut solution is to prioritise hiring biomedical engineers who would have the required technical skills in handling medical devices better but are still not generally equipped with the necessary knowledge of policies and regulations of medical devices.

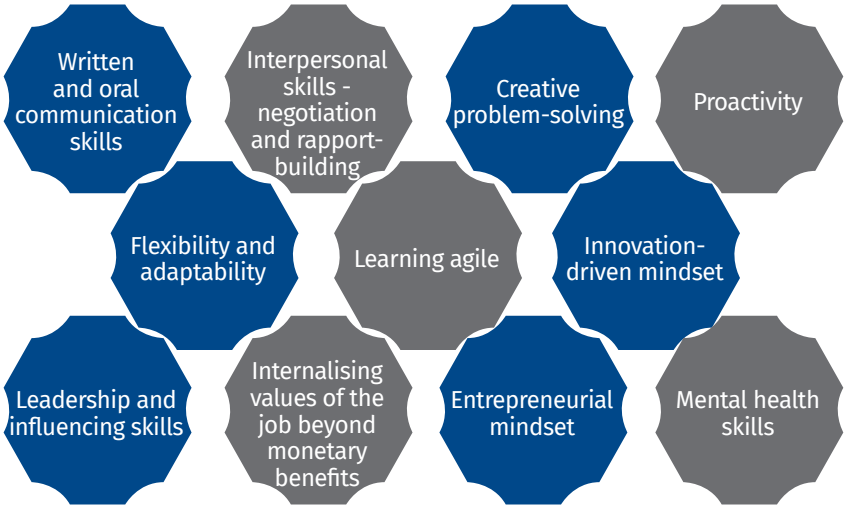

Figure 3: Top soft skills in the medical device industry

Policy-related issues in the context of addressing the Malaysian MI talent shortage

- A consensus across all participating members in the IAC-MI is the insufficient duration of internships. Three months is deemed too short and inadequate for students to pick up and master new technical and soft skills encountered during placements.

Issues in MI-related Curriculum in Universities

- Most, if not all, of the training for MI-related careers heavily focuses on the mastery of technical skills, and little focus

has been given to acquiring soft skills. However, certain jobs like nursing, for instance, require a high level of job-specific soft skills that are important, including professionalism, critical observation, time management and stamina, stress management, ethics and confidentiality, resilience, as well as teamwork and dependability.

Issues in Teaching and Learning of MI-related programmes in Higher Education

- Some training programmes can only afford to provide a 14-day placement within hospitals which is not enough to either acquire field-relevant skills or internalise specific soft skills needed for the job.

Issues in Assessment of Learning Outcomes for MI-related programmes

- Emphasis is still given on tests and final examinations, with most courses still running on a 40% final exam basis, limited to multiple-choice questions and structured short-answer formats. There is an urgent need to investigate other meaningful and more efficient ways to rightly capture the acquired technical skills of MI graduates.

Issues of disconnection between some universities and industries

- Members of academia are generally under the impression that industries are not open to collaborating and therefore find engagement opportunities difficult. Similarly, MI companies perceive HEIs to be selective in their engagement efforts, mostly preferring to partner with big players hence missing out on opportunities to work with the smaller companies that are more genuinely interested in establishing a working partnership.

What has been done?

Industry-Academia Collaboration between Paramit Malaysia and Universiti Sains Malaysia (USM)

In addressing both talent shortage and deficiency in job-specific skills, Paramit Malaysia and USM have been working closely together in developing programmes that are fluid in meeting specific industrial demands. Since each product within the company is targeted to different medical industry customers, products would require different manufacturing processes and software requirements. Meeting these varied skill-set demands would be impossible for the universities; hence talent-specific needs would be identified by the company, and academic programmes and training would then be developed with USM to meet these needs. For example, otherwise experienced and skilled technicians with 20 years of work experience but still lacking in academic qualifications would undergo technician development training developed and provided by USM that would then elevate the academic qualifications of these senior talents, which in turn, will create a sense of gratification towards the job and improve retention rates among dedicated employees.

Smith & Nephew collaboration with Penang Skills Development Centre (PSDC)

Smith & Nephew (S&N) started their Batu Kawan, Penang manufacturing plant in 2019 with state-of-the-art equipment manufacturing facilities. To ensure they have the right skill and niche talent for the new plant, S&N has collaborated with PSDC to sponsor course fees and provide an allowance for selected students to undergo specialised training at PSDC. These students will eventually be hired by S&N in their manufacturing plant upon completion of training as part of S&N's talent development initiative in producing industry-ready talent whilst minimising the skill gap.

MI-related Curriculum at Tertiary Level

- Universiti Teknologi Petronas (UTP) has 6-7 months of internship practice in place, embracing the work-based learning approach, which provides adequate industrial exposure to its graduates.
- Universiti Malaysia Perlis (UniMAP) offers a new academic programme on electronic automation, which requires final-year students to spend six months of their internship and six months of their final-year project with the industry (Work-Based Learning).
- Politeknik Shah Alam (PSA) has collaborated with Edgenta, Next Level Technologies, and Advanced Pact Sdn. Bhd in brainstorming about industry needs to achieve market-ready graduates ahead of the implementation of work-based learning, ultimately leading to the direct hiring of the interns upon completion of their studies and field placements.
- Paramit took the initiative to work alongside higher education providers, e.g. Universiti Teknologi

Mara (UiTM) and Universiti Malaya (UM), on tabling skillsets and competency matrices for engineers, especially those for the medical device industry but met with failure. Efforts are now being reattempted with USM, and opportunities to work with other education providers are welcome.

Teaching and Learning of MI-related programmes in Higher Education

- Collaborative efforts have been established between PSDC and Bbraun in sponsoring 20-25 school leavers to student advanced diploma programmes and joining Bbraun as technicians upon graduation.

Post-graduation Upskilling Initiatives for Graduates to work in the MI

- Graduates can make use of the MySTEP initiative for early upskilling exposure before landing more stable jobs. For 2022, this RM1.8 billion initiative offers 80,000 contract jobs (50,000 jobs in the public sector and 30,000 in Government-Linked Companies (GLC), Government-Linked Investment Companies (GLIC) and Strategic Partners).

What can be done?

ACADEMIA

Universities to be aware of micro-competencies in the industry Universities, in general, do not have an adequate understanding of the needed micro-competencies in the medical industry. To address this, universities may refer to TalentCorp's Critical Occupational List, a yearly report that is publicly available and comprises the required competencies and skills.	Low Effort Required
Curriculum review to include industrial experts Industry players should be invited to be part of the curriculum review process. Universities normally invite industrial top guns, but they may have lesser input on the technicalities of the field as many may serve in top-tier managerial positions.	Low Effort Required
Elective courses should be more personalised and industry-relevant Universities design and offer more up-to-date and relevant elective courses instead of students required to take forced electives that do not add up to the acquirement of industry-specific skills.	Low Effort Required
To revisit and revise the role of academic advisors Academic advisors should play more significant roles in advising on career plans for students under their academic advisory rather than solely focusing on ironing out problematic and failing students, as is the current practice in many institutions.	Moderate Effort Required
Final year projects should be more industrial based Students should work on industrial-based solutions for their final year projects rather than on hypothetical research scenarios.	Moderate Effort Required

Curriculum updates should be tailored programmes to produce more niche-segment talents of the industry. As it stands, the current curriculum offering is too broad for graduates to be industry-ready for the medical industry. Universities should consider offering a more personalised curriculum, especially towards the end of the academic programme to meet specific medical industry needs.	Moderate Effort Required
Soft skills to be embedded as hidden curriculum across subjects Leadership and good work etiquette should be considered to be embedded across the curriculum, given the apparent lack of these critical soft skills among recent graduates.	Moderate Effort Required
Academic staff to undergo industrial exposure and experience Academic staff are encouraged to take sabbatical leaves by undergoing industrial placements instead of focusing solely on research advancements. Lecturers with industrial exposure will be better able to deliver content knowledge more effectively.	Moderate Effort Required
Universities to consider work-based learning approaches Universities to consider embracing work-based learning approaches with longer durations of field placements. Universities to consider lengthening internships to six months. Six months is usually the probation period in companies hence hiring decisions can be communicated to interns by the end of the sixth-month period.	Moderate Effort Required
Internships to take place during the final semester to improve chances of direct hiring into the job Several participants from the industry have suggested that internships should take place during the final semester as companies are in a better position to directly hire the students upon completing their field placements, especially when they have been trained and adapted to the respective companies' work culture and expectations.	Moderate Effort Required
Academia to welcome industrial figures as teaching staff Universities should consider appointing adjunct lecturers from the industry to bring field experience into the lectures instead of rehiring retired academics with little exposure to the industry.	Moderate Effort Required

INDUSTRY

Improve market awareness among university students Companies involved in the medical industry ought to ramp up visibility efforts to improve market awareness among university students and to attract the right talent pool into the industry e.g. biomedical engineers.	Moderate Effort Required
Open to on-the-job training As universities are encouraged to offer a more structured internship plan, the industry should be willing to work alongside academia to provide on-the-job training for prospective talents.	Moderate Effort Required
Welcoming academia for industrial placements Industry to open its doors to university lecturers to gain industrial exposure and experience so that the quality of teaching and learning can be significantly improved for students on campus.	Moderate Effort Required
Focus on retention efforts to address job hopping Most talents frequently job-hop as they do not enjoy their work. The industry needs to focus on improving retention efforts by developing training programmes charting clearer career pathways to add value for the talent.	Moderate Effort Required

OTHER STAKEHOLDERS

Establishment of an apprenticeship academy for micro-skilling of new graduates Relevant stakeholders, e.g. TalentCorp and InvestPenang, ought to consider spearheading micro-skilling efforts required by the medical industry. Micro courses and short-term programmes can be customised as per industry requirements, with both academia and industry playing a joint role in developing and delivering to further polish the MI local talent pool.	Significant Effort Required
TalentCorp to continue to promote industry-academia facilitations TalentCorp could continue to expand and enhance the facilitation of academia and university collaboration for the medical sector for better connection and engagement between the two parties.	Significant Effort Required

Way forward

As the medical industry undergoes rapid technological advancements, the conversation often revolves around how new and existing talent can adapt to new roles and expectations while remaining dedicated and relevant to the job. This is especially pertinent in the wake of automation, in which existing employees are being tasked with upskilling and reapplying themselves to stave off the threat of job losses and fresher talents overall lacking in experience and the needed skills. Gaps in training by universities in new-age skills can be attributed to the traditional focus on academics and less on practical knowledge. Further exacerbating the situation is the lack of updated knowledge among faculty members, the absence of in-demand courses offered to students and the overall lack of academic and industry linkages.

Collaboration, therefore, is deemed the only powerful, effective strategy for the medical devices industry moving forward to embrace an Industry 4.0 Malaysia and to continue to help drive digital transformation in the region. Collaborative convergence between MI companies, academia, and supportive government programmes can drive business growth and fuel the medical technology factory of the future when the right talent pool is secured and sustained. When MI sub-sectors work together in clusters, all stakeholders in the sub-sector could link up together in new, mutually beneficial ways to address our local talent gap. Development in the sector can then be accelerated, and costs can be lowered by jointly tapping into programmes, institutions, and funding. While industry experts can guide business scenarios and technical solutions, governmental agencies and academia can assist with prerequisites such as software, infrastructure, and technical upskilling for our local talent pool.

Bringing change to the ways of delivering and assessing MI skills

To enable our future workforce to expand their skillsets for a competitive advantage, universities should introduce examination reforms, alignment of MI-related courses with global trends, and induction programmes for early orientation of students to these subjects to create awareness for the MI job market. Also, student participation in industry hackathons, mandatory internships, and industry-certified programmes to train faculty members on emerging technologies are equally important.

Industry-academia collaboration greatly benefits all stakeholders, including educational institutions, industry, and students. Universities will experience enhanced student placement in the industry, improved ranking, branding and competitive market positioning, academic staff progression in the latest curricula, enablement of research and innovation opportunities, investments aligned to technology trends, and expansion of academic streams into newer areas with industry participation.

For students, it will enable learning of technology and skills aligned to career choices, early identification of skill gaps, exposure to industry experts and best practices, hands-on training with experts, and better compensation. For the medical industry itself, collaborations will enable the availability of an industry-ready talent pool; improve deployment-ready, left-shift (sharing knowledge and making others self-reliant) training for productive employees and niche skill identification.

Acknowledgement

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Further Reading

Lee Siu Ming (2020). *Industry Mapping and Value Chain Analysis of Medical Devices Companies in Penang*. Penang Institute, Malaysia. (Available at: https://penanginstitute.org/wp-content/uploads/2020/02/Industry-Mapping-and-Value-Chain-Analysis-of-Medical-Devices-Companies-in-Penang.pdf)

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MINISTRY OF HUMAN RESOURCES

TalentCorp
GROUP OF COMPANIES

Sector-Focused
Industry-Academia
Collaboration (IAC)-

Fast-Moving Consumer Goods (FMCG)

Workshop Report

With support from the Ministry of Higher Education Malaysia (MoHE).

Executive Summary

With a focus on higher education, this Industry-Academia Collaboration in the Fast-Moving Consumer Goods (IAC-FMCG) sector brief explores how best to bridge disparities in talent demand and supply in the FMCG industry. Fast-moving consumer goods are everyday household items that are frequently consumed and mostly have a short shelf life. They include a wide range of products such as food and beverages, toiletries, cosmetics, cleaning supplies, and over-the-counter medications. These products are usually purchased by consumers on a regular basis, with high demand for them remaining consistent throughout any given year. The FMCG industry in Malaysia is home to several of the world's biggest brands, including Nestle, Unilever, Kellogg's, Colgate-Palmolive, and Procter & Gamble (P&G). These top FMCG players have a strong distribution network in the country, and some have invested in local manufacturing plants for better operational efficiency.

The FMCG industry is one of the main contributing sectors to the Malaysian economy, as about 20% of Malaysian household expenditure is spent on the consumption of fast-moving consumer goods. In 2021 alone, Malaysia's FMCG sector had a value growth of 6.6%. Malaysia's FMCG market is projected to experience annual growth along with the rise in population size and disposable income. Since the advent of COVID-19, FMCG has been one of the few industries that manage to sustain its position through significant economic adversity. The sustainability of the FMCG industry throughout the global economic recession was contributed by the notably high volume of online purchases made by Malaysian consumers. Online sites such as Lazada and Shopee have been experiencing heavy virtual traffic as Malaysian consumers visit these commercial channels daily to purchase a myriad of consumer goods ranging from apparel and personal care to food and beverage. The Asia Brand Footprint 2021, published by KANTAR[1], projected that the FMCG industry would continue to boom in the years to come as at-home consumption expands.

As the consumers' basic needs and wants are the heart of the FMCG industry, the economic sector was sufficiently insured against the global-viral outbreak and crippling economic slump. This robustness that the industry has is supported by IAC-FMCG industry participants as they disclosed a positive and optimistic outlook of the sector; the industry has recovered its pre-pandemic position, and with its current pace, the industry is projected to exceed RM30billion worth by the end of 2022. The industry has also experienced an evolution of consumer behaviour over the years since the start of the pandemic. The FMCG industry has witnessed a significant, COVID-19-driven growth of digital-savvy shoppers and the use of e-commerce platforms in Malaysia. As online commercial sites and virtual purchases become more prevalent, there is now a greater demand for digital, analytics-driven roles in the FMCG industry. These roles may be crucial in improving the digital operationalisation and online customer experience that FMCG companies aim to provide. On top of that, marketing as an important tool for product differentiation in the FMCG industry has also evolved to a stage where it places greater emphasis on online consumer engagement and personalised social media content. While employment opportunities in the FMCG industry are relatively abundant, they are getting more difficult to be secured due to the increase in the need for digitalisation-related skills.

Top FMCG players also advanced that the industry is facing a predicament of talent crunch as the industry lacks the ability to attract a greater influx of talent into the industry. IAC-FMCG industry participants shared that such a situation is contributed by the lack of industry awareness within the current generation of prospective workforce and budding talents. Consequently, the lack of industry awareness within bourgeoning talents translates into lower enrolment of students in FMCG-related programmes in higher education institutions (HEIs). Also, improving the enrolment of students into FMCG-related programmes is another tricky issue to solve as the FMCG industry may not have a specific education programme that caters to its needs, and the industry constitutes a broad field of specialisations. Moreover, IAC-FMCG participants also shared that the industry is relatively subjected to a talent crunch because of the perceived less attractive remuneration package and lack of work-life balance by prospective talents. Hence, through the IAC-FMCG focus groups held with key industry players and members of the academia, it is agreed that a holistic FMCG talent development plan for our nation should revolve around four (4) main themes: 1) Improving employer and industry branding, 2) Delivering customer-centric and data-driven marketing, 3) Expansion and

1 KANTAR is a data and evidence-based agency providing insights and actionable recommendations.

improvement of consumer goods, and 4) Promoting a greater influx of talent into the industry.

What are the issues?

Current Scenario

The talent landscape in Malaysia's FMCG industry has undergone a significant transformation in recent years, with a growing demand for digital-oriented skills. As consumers increasingly turn to online channels to purchase their daily essentials, FMCG companies are faced with the challenge of meeting this demand while delivering a seamless and personalised customer experience. This, in turn, prompts FMCG companies to search for and recruit talents with expertise in digital marketing, e-commerce, data analytics, and supply chain management. These skills are key in optimising online customer experience, from product discovery to checkout, and improving operational efficiencies in a rapidly evolving digital landscape.

With this shift in skill trend, conventional roles in the FMCG industry, such as sales and merchandising, are evolving to incorporate digital tools and analytics-driven insights. FMCG players are taking initiatives to invest in digital training programmes to upskill their existing workforce and enhance the competency of prospective talents to fill emerging roles. While this shift may arguably present exciting opportunities for the future workforce, it also presents a challenge for the talents to adapt quickly and effectively to new digital advancements and trends. Hence, it can be projected that there will be a possible talent mismatch, underemployment, and unemployment in the times to come if the academia does not adapt to this change in talent needs by the industry.

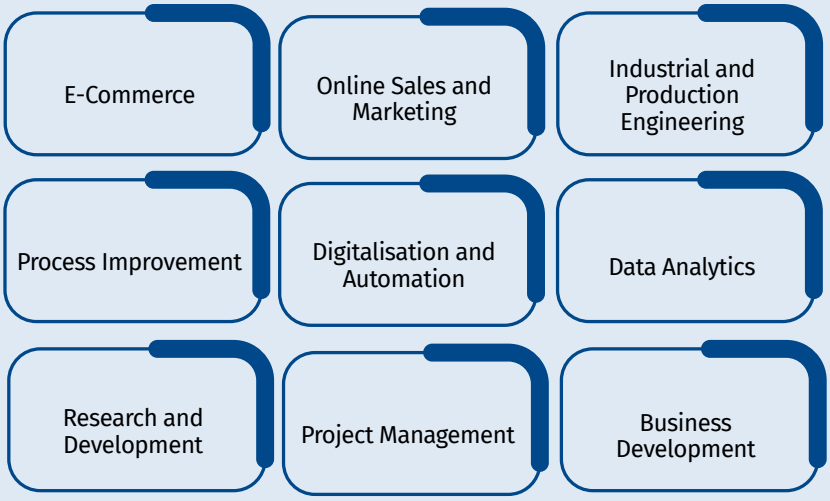

Figure 1: Highly-sought technical skills by employers in IAC-FMCG 2022

With the economic growth driven by rapid digitalisation, the impact of such force is undeniably apparent in the hiring trend of the workforce in the FMCG industry. TalentCorp's 2020/2021 Critical Occupation List (MyCOL) Report highlights that there is now a greater emphasis on digital-related roles in the FMCG industry as the COVID-19 outbreak has created strong demand for jobs that would enable businesses to run in the digital domain. The global pandemic accelerated the surge in demand for systems analysts, data professionals, and creative content designers professionals.[2] This new demand in the job market is in line with the previously stated need to optimise online customer experience and deliver data-driven marketing. During the engagement, FMCG players advanced that digitally oriented technical skills are increasingly favoured in the industry. These players believe that talents that possess digital-relevant skills will be able to improve the industry's economic sustainability in this age of rapid evolution of the workforce. The following are several highly sought technical skills in the FMCG industry as disclosed by the participating players:

Despite the rise in digital-related roles in the industry, conventional roles such as business services managers, sales and marketing managers, advertising and public relations managers, industrial and production engineers, manufacturing professionals, and research and development professionals have also maintained their relevance and appeared in the TalentCorp's 2020/2021 MyCOL report. These positions were identified as critical in meeting the demand for talent and supporting the growth of Malaysia's FMCG industry in the rapidly-digitalised economy. This is in line with the disclosure of information by IAC-FMCG industry participants, as they shared that FMCG employers still seek talents to fill in traditional roles revolving around the expertise of business development,

2 TalentCorp Critical Occupations List 2020/2021 Occupation Report

project management, and production engineering, and they contend that these positions will continue to remain relevant in the times to come. Business development skill is important for identifying opportunities for growth, developing strategies to enter new markets or expand existing ones, and fostering relationships with key stakeholders. In the FMCG industry, this is particularly crucial given the competitive landscape and the need to constantly innovate and stay ahead of the curve. A skilled business development talent can identify new products and channels that can help companies gain a commercial edge in the market.

Furthermore, project management is another critical technical skill that is essential for prospective talents of the FMCG industry to possess. Project managers are responsible for planning, executing, and monitoring projects to ensure they are completed on time, within budget, and to stakeholders' satisfaction. In the FMCG industry, project management is particularly important given the fast-paced nature of the industry and the need to deliver new and trending products to market quickly. Skilled project management talents can help companies streamline operations, reduce costs, and improve quality. Next, industrial and production engineering is another conventional field of specialisation that is still relevant in the FMCG industry. Production engineers are responsible for designing and optimising production processes to improve efficiency, reduce waste, and increase output. In the FMCG industry, this is especially significant given the need to produce high-quality products efficiently and at a large scale. IAC-FMCG industry participants shared that, those prospective talents with skills in the conventional areas of business development, project management, and production engineering are still highly sought-after by employers as talent with such skills would enable companies to sustain their commercial growth and gain.

On top of that, It is also imperative to note that in any industry, it is always preferred that talents are well-rounded and are equipped with desirable soft skills so they can attain their fullest potential. Soft skills are increasingly becoming an essential part of success in today's fast-paced and ever-changing business landscape, and this is particularly true for those working in the FMCG industry. In the industry, where customer satisfaction and engagement are crucial, having employees who possess reliable soft skills is imperative. It was established that current prospective talents tend to pay more regard to technical training than soft-skill training, and such a tendency is undesirable as the FMCG industry is a fast-paced economic sector that demands talents to build positive interpersonal relationships and embrace diverse cultures. Talents who are skilled in effective communication and interpersonal relationships can build stronger connections with customers, foster a better work environment, and work collaboratively with other team members.

In the FMCG industry, the ability to communicate effectively is particularly essential. As the industry continues to grow and evolve, communication skills are still needed to reach new customers and retain existing ones. An employee with excellent communication skills can develop effective marketing strategies and approaches that resonate with customers, understand their needs, and provide better customer service. Moreover, as the industry becomes increasingly digital, the ability to communicate effectively via virtual platforms and apps is becoming more important. The ability of effective communication is also important for prospective talents in the industry as their roles would require them to liaise with a range of stakeholders. With the fast-paced nature of the industry, employees who can work collaboratively in a team environment are more likely to succeed. In other words, teamwork is key in the industry. Teamwork involves the ability to work effectively with colleagues, share ideas, and work collectively towards a common goal.

Problem-solving and adaptability are also crucial soft skills in the FMCG industry. The industry is constantly evolving, with new challenges emerging regularly, and employees who can think critically and creatively, develop creative solutions to problems, and adapt to changes are more likely to succeed. These skills are essential for individuals working in roles such as supply chain management, product development, and marketing. Moreover, an employee who can handle change effectively and adapt to new situations can help drive innovation, improve efficiency, and contribute to the success of the business. Talents with great adaptability can help businesses to remain relevant and competitive in the industry. Hence, it can be recognised that talents who possess strong communication, teamwork, problem-solving, and adaptability skills can help drive commercial growth, improve customer satisfaction, and contribute to the

overall well-being of the industry. As such, employers and academia should prioritise the development of soft skills in prospective talents and invest in programmes that focus on building these skills.

As the FMCG industry continues to grow and evolve, prospective talents may also find it advantageous to pursue additional certifications or credentials to enhance their skillset and stand out in the competitive job market. In the fast-paced and ever-evolving FMCG industry, having project-based experience can be an invaluable credential for prospective talents. While academic qualifications and technical skills are important, having hands-on experience in project-based work can demonstrate talents' ability to apply their knowledge in a practical setting, adapt to changing circumstances, and collaborate with others towards a common goal. One of the main advantages of project-based experience is that it allows candidates to develop a wide range of skills that are highly valued in the FMCG industry. For instance, project work often requires individuals to communicate effectively, manage their time, and think critically to solve problems. These are all key attributes that companies look for in their prospective employees, as they are crucial for success in the fast-paced FMCG industry.

In addition, project-based experience can provide candidates with exposure to different areas of the FMCG industry. Through involvement in projects, talents can gain experience in areas such as marketing, logistics, supply chain management, and product development. This can help prospective talents to identify their areas of interest and build a broader skillset that can be applied to various roles within the FMCG industry. Moreover, project-based experience can also help prospective talents to differentiate themselves from other applicants in a competitive job market. While academic qualifications and technical skills are important, they are often not enough to secure a job in the FMCG industry. Having relevant project experience can demonstrate a talent's commitment to their field of specialisation and provide tangible evidence of their ability to apply their knowledge and skills in a real-world setting.

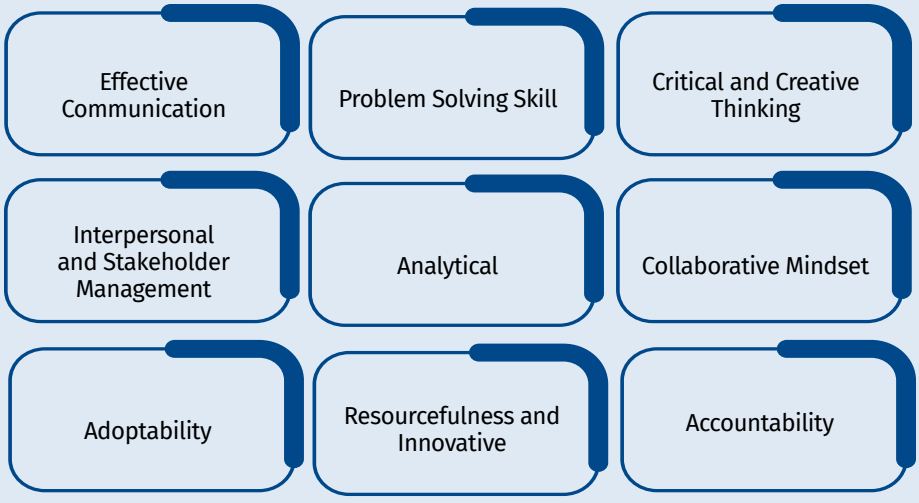

Figure 2: Highly-sought soft skills by employers in IAC-FMCG 2022

IAC-FMCG participants also shared that the Programmable Logic Controller (PLC) certification is another certification that may be beneficial for prospective talents in the FMCG industry. This certification is designed to equip talents with the necessary expertise to design, programme, and maintain industrial control systems. The use of PLCs in the FMCG industry is essential for automating processes such as packaging, sorting, and quality control. PLCs are electronic devices that can control various industrial processes automatically, improving efficiency, and reducing costs. These systems can monitor various parameters involved in the production of goods and can allow adjustments to be made accordingly. PLC certification is important for prospective talents in the FMCG industry because it demonstrates an understanding of the principles of industrial control systems and how to programme them. Moreover, this certification also shows that talents have the necessary skills to troubleshoot and maintain these systems. This knowledge is particularly valuable in the FMCG industry, where minor issues in the production line could lead to major losses.

In addition to certifications, FMCG prospective talents may also benefit from pursuing credentials in areas such as digital marketing or data analytics. With the rise of e-commerce and the increasing importance of data-driven decision-making in the industry, individuals with expertise in these areas can offer a valuable skillset to FMCG players. For instance, obtaining

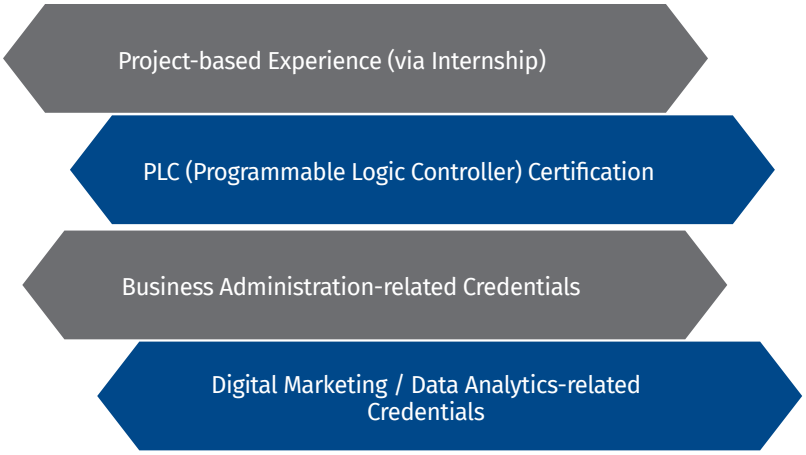

Figure 3: Commendatory additional credentials disclosed by employers in IAC-FMCG 2022

the Google Analytics Individual Certification can demonstrate an individual's proficiency in analysing and interpreting website data, which can help companies optimise their online sales channels and improve customer experience. Furthermore, having additional credentials related to business administration can also be an advantage for prospective talents in the industry. For example, a certification in project management can teach prospective talents how to effectively manage financial allocations and work with cross-functional teams. This is especially valuable in the FMCG industry, where cross-functional collaboration is essential for success. Additionally, a business-related certification in marketing can also provide insights into consumer behaviour, brand management, and market research, all of which are crucial skills in the FMCG industry.

FMCG players disclosed that these certifications would provide prospective talents with a competitive edge in the industry. By demonstrating proficiency in areas such as business administration, digital marketing, data analytics, and process improvement, individuals can position themselves as valuable assets to FMCG companies seeking to remain agile and competitive in a fast-moving market.

Structural Issues in the Context of Addressing the FMCG Talent Shortage in A Rapidly Digitalising Economy

Despite the demand for conventional and digital talent in the FMCG industry, there remain structural issues that have restrained the production of such talents, making it more difficult for companies to keep up with the rapid pace of the digitalising economy. These issues need to be identified and addressed to ensure the industry's continued growth and development.

One of the primary structural issues facing the FMCG industry is a lack of investment in education and training programmes that focus on FMCG-specific skills. While many talented and highly-skilled individuals work in the industry, many of these employees lack the specialised skills and knowledge required to succeed in digital and conventional roles. As a result, companies tend to sort to short-term measures such as substituting and relying on expensive overseas talents instead of allocating resources for talent development. Another challenge facing the industry is the lack of a clear career path for digital talent. Many companies have not yet developed clear job descriptions or progression plans for workers in digital roles, making it difficult for individuals to advance their careers or to feel confident in their long-term prospects within the industry. This can lead to a lack of motivation and a high turnover rate among digital talents, which can be costly for the industry in terms of lost productivity and recruitment costs.

There is also an issue of critical talent crunch that is taking over the national economy. Numerous industries are now competing to attract a greater influx of talent into the labour market. The FMCG industry is one of the industries that relatively struggles with such a problem. The gig-economy industry has become increasingly popular among the current generation of prospective talents due to its lower barrier to entry, better work-life balance, and potentially better pay. As a result, the FMCG industry is becoming less able to attract a desirable influx of talent into the industry. Moreover, the lack of industry awareness and employer branding is also worsening the talent crunch issue as bourgeoning talents have little to no knowledge of the career prospect and socioeconomic gain that the FMCG industry has to offer. In addition to these challenges, there is also an absence of an industrial body which could provide a platform that allows collaboration and knowledge sharing between companies in the industry. While several industry associations and

networks exist in Malaysia, many companies operate in silos and do not have access to the latest best practices or insights on innovation. This can make it more difficult for FMCG players to stay competitive and attract and retain top talent.

Issues in FMCG-related Curriculum Delivery in Higher Education Institutions

It is undeniable that HEIs face several challenges when it comes to producing talent for the increasingly-digitalised FMCG industry. One of the key challenges confronting Malaysian HEIs is the rapid pace of technological change. Limited communication and collaboration with industry stakeholders, it can be difficult for institutions to keep up with the latest trends and to ensure that their study courses and programmes are up-to-date and relevant. This can be particularly challenging in fields such as digital marketing and data analytics, where new tools and techniques are constantly being developed. While many HEIs have partnerships with local businesses and organisations, there is often a gap between the skills that are in demand in the workplace. This can lead to a disconnect between HEIs and the FMCG industry, making it more difficult for graduates to find employment and for companies to find the talent they need.

Furthermore, there is also the need for specialised programmes that focus on the unique needs, current and future state of the FMCG industry. While there are many excellent higher education programmes that focus on digital marketing, data analytics and other related fields, there is a need for more specialised programmes that focus specifically on the needs of the industry. This could include programmes that cover fundamentals such as supply chain management, e-commerce, and consumer behaviour. Moreover, many HEIs continue to focus on conventional areas of study rather than digital skills and innovation, making it difficult for students to acquire the skills needed to succeed in digital roles within the industry. This, in turn, will inevitably lead to more crippling problems, such as huge skills gaps and talent mismatches.

What has been done?

FMCG-related Programmes and Initiatives in HEIs

It has been established that it is imperative that the growing demand for conventional and digital talent in the FMCG industry is sufficiently met for continued economic growth. Currently, there are a few FMCG-related study programmes and initiatives that support the production of such talents for the industry. Malaysian HEIs have launched a range of programmes aimed at producing digital talent for the FMCG industry. One such programme is the Bachelor of Science in Digital Marketing and Analytics, which is offered by Taylor's University. This programme provides students with a strong foundation in digital marketing and analytics, preparing them for FMCG industry careers. Another key programme is the Bachelor of Science in Business Intelligence and Analytics offered by Sunway University. This programme provides students with the skills and knowledge needed to analyse large data sets and to develop insights and strategies that can be used to drive business growth and innovation. On top of that, Universiti Teknologi Malaysia (UTM) also implements a Startup@UTM programme which provides students and faculty members with the skills and resources needed to launch and grow their start-ups, with the aim of creating a vibrant ecosystem of digital entrepreneurship in Malaysia.

Another approach taken by HEIs is to establish dedicated centres and institutes focused on digital innovation and entrepreneurship. These centres and institutes provide students and researchers with opportunities to develop their skills and knowledge in areas such as data analytics, artificial intelligence, and digital marketing, as well as to collaborate with businesses and other stakeholders on research and development projects. One example of such a centre is the Centre for Digital Business at the University of Malaya. The centre is focused on developing research and teaching in e-commerce and digital marketing, and has partnerships with a range of businesses and organisations in the FMCG industry and other sectors. The centre also hosts regular workshops and seminars on digital topics, providing opportunities for students and other stakeholders to learn from leading experts in the field.

What can be done?

ACADEMIA

Implement a project-based curriculum

Low Effort Required

A project-based curriculum enables students to apply what they learn in a real-world setting. By working on projects, students develop skills such as problem-solving, collaboration, and critical thinking. Project-based learning also helps to increase student engagement and allows them to resonate with the subjects better. This strategy may also provide students with the evidence and significance they can carry to prospective employers.

A few tasks that could be incorporated into such a curriculum are online market surveys and virtual consumer engagement.

Academic staff to gain industrial exposure and experience

Low Effort Required

HEIs should encourage academic staff to gain industrial exposure and experience as industry players hold that such will enable them to better deliver industry-relevant study programmes and courses.

Disseminate information and improve brand awareness of their industrial partners

Low Effort Required

HEIs should consider propagating any reputable information regarding the career prospect and opportunities of their industrial partners to improve their brand awareness. This, in turn, will spark the interest of prospective talents to pursue careers in the industry as they will be attracted by the reliability of employment terms that the industry has to offer.

Incorporate more industrial inputs into the curriculum By engaging with industry experts and incorporating their perspectives and experiences into the curriculum, prospective talents can gain a better understanding of the real-world challenges that exist within the industry. This allows the talents to develop a more holistic view of the industry and can better prepare them for the workforce.	Moderate Effort Required
Collaborate with industry players to organise project-based competition/business challenge HEIs should consider devising industry-based project competitions/business challenges with FMCG players as part of coursework training to allow students to work on real-world cases and initiate early collaborations with the industry.	Moderate Effort Required

INDUSTRY

Organise a networking/industrial insight-sharing session Such a session could provide a platform for students and graduates to interact with industry experts, share ideas, and learn from their experiences. This may offer opportunities for prospective talents to build their network, enhance their knowledge, and develop their skills. Such a session also allows talents to gain insight into the industry's current trends, market demands, and future prospects.	Low Effort Required
Organise a business challenge competition By participating in these competitions, talents can gain practical experience and develop analytical and problem-solving skills. Moreover, FMCG players, as purveyors of such a competition, can have direct access to identify and recruit potential talents that can contribute to the success of their business. Ultimately, such a competition can serve as a valuable platform for fostering innovation and promoting talent development.	Moderate Effort Required
Implement a mentoring/coaching programme IAC industry participants maintained that a mentoring/coaching programme may be necessary for producing industry-ready talents. Industry experts as mentors can provide valuable insights and guidance on navigating the industry and sharing their experiences. This can help accelerate the professional growth of mentees and give them a better understanding of what it takes to succeed in the industry.	Moderate Effort Required

Implement a more structured internship programme Talents need to be equipped with all the industry-relevant skills to competently serve as an employee; thus, structured on-the-job training is an imperative approach for achieving such. Structured internship provides talents with hands-on experience, exposure to real-world scenarios, and the opportunity to apply academic knowledge in a practical setting i.e the National Structured Internship Programme (MySIP) spearheaded by TalentCorp has been providing structured internship experiences with MySIP-endorsed companies since 2012. MySIP endorsed companies paying a minimum of RM 500 internship allowance are eligible to claim for double tax deduction for all related expenses incurred on the interns This approach can also serve as a medium for FMCG players to attract and retain top talents while contributing to the development of the future workforce.	Moderate Effort Required
Increase and improve engagement with academia It is acknowledged by industry players that engagement with universities needs to be frequent and better. Engagement can be done either with the assistance of a facilitator such as TalentCorp or directly with the management of universities. Such engagement may enable industry players to provide insights into the current skills and competencies required for the job market, while academia can incorporate these inputs into their curriculum. This may also provide room for both parties to implement more joint efforts in developing talents.	Moderate Effort Required
Promote and improve employer branding It has been established that FMCG companies are struggling with attracting a greater influx of talent into the industry due to the competition posed by popular industries and budding talents' tendency to enter the gig economy. IAC participants proposed that FMCG companies should improve their employer branding to attract more talent into the industry by offering better work-life balance, a positive working environment, and a more appealing remuneration package.	Moderate Effort Required

OTHER STAKEHOLDERS

Implement more industry-academia engagement programmes Overall, industry-academia engagement programmes can be an effective way to bridge the gap between industry demands and the skills possessed by prospective talents, thereby creating a win-win situation for both industries and HEIs.	Moderate Effort Required
Establish an online platform for industrial forum/discourse IAC industry participants suggested that such a platform would enable industry experts and professionals to share their knowledge and expertise with a wider audience, including students and graduates. This can facilitate networking opportunities and foster collaborations between industry players, HEIs, and talents.	Significant Effort Required

Way forward

A Need to Improve Industry Awareness and Employer Branding

It has been established that there has been a significant shift in the FMCG industry towards seamless commercialisation and digitalisation, which has created a new demand for talent. The industry now requires talents with conventional expertise in running commercial businesses and digital literacy. Despite the increasing demand for conventional and digital talents in the industry, the most critical problem that the industry is facing is the lack of industry awareness and employer branding. Unlike popular industries such as financial services, or electrical and electronics (E&E), the Malaysian bourgeoning talents have little to no knowledge of the FMCG industry. IAC-FMCG industry participants shared that a significant share of prospective talents are unaware of the socioeconomic prospect and career progression that the industry has to offer. Consequently, this issue dampens the enrolment of prospective talents into FMCG-related programmes in HEIs and shrinks the available pool of talent needed for the optimal operation of the industry.

Moreover, it was also acknowledged that FMCG companies and relevant stakeholders should take a more proactive approach to improve their brand awareness. A company's employer brand is the perception current and potential employees have of the company as an employer. It encompasses everything from the company's mission and values to its culture and work environment. Improving employer branding is essential because it can help companies attract top talent and increase employee engagement and retention. In the current state of the economy, it is especially important for FMCG enterprises to have strong employer branding because of the intense competition for talent. With numerous companies from popular industries vying for the same talent pool, it is crucial to differentiate the FMCG industry from the competition. A reputable employer branding can help enterprises stand out and make a compelling case for why talents

should choose to work for them in the FMCG industry.

On top of that, this brief has also explored that the current structure of the talent ecosystem may not be up to the task of producing the right talents for the industry. It has been established that there are limited specialised study programmes or courses in the local HEIs that caters to the specific needs of the FMCG industry. As previously stated, one of the primary approaches in addressing this issue is to establish more significant collaborations between FMCG players and HEIs to develop industry-specific programmes. These collaborations can take various forms, internships i.e the National Structured Internship Programme (MySIP) spearheaded by TalentCorp has been providing structured internship experiences with MySIP-endorsed companies since 2012 and industry-specific courses. Such partnerships will also enable FMCG players to engage with talents at an early stage and provide them with the necessary skills and exposure to the industry. In conclusion, the FMCG industry is undergoing a significant transformation towards seamless commercialisation and digitalisation, which has resulted in a new demand for relevant talents. Such novelty necessitates greater and more frequent engagements between the industry's stakeholders to implement affirmative, industry-tailored initiatives.

Acknowledgement

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Further Reading

KANTAR. (2021). *Asia Brand Footprint 2021: The path of growth from leading FMCG brands.* (Available at: https://www.kantar.com/inspiration/fmcg/asia-2021-the-path-of-growth-from-leading-fmcg-brands)

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MINISTRY OF HUMAN RESOURCES

TalentCorp
GROUP OF COMPANIES

Sector-Focused
Industry-Academia Collaboration (IAC)-
Information and Communication Tehnology
Workshop Report

With support from the Ministry of Higher Education Malaysia (MoHE), Malaysia Digital Economy Corporation (MDEC), Malaysia Productivity Corporation (MPC), The National Tech Association of Malaysia (PIKOM) and Asia-Pacific University

Executive Summary

With a focus on higher education, this Industry-Academia Collaboration in the Information and Communication Technology (IAC-ICT) brief explores how best to bridge disparities in talent demand and supply in the Malaysian Information and Communication Technology (ICT) industry. As of November 2022, the US Department of Commerce stated that the ICT industry is Malaysia's best prospect industry sector and was one of the few sectors that have seen exponential growth since the endemic. ICT contributed 23.2% of Malaysia's gross domestic product (GDP) in 2021, according to the Department of Statistics Malaysia (DOSM), with a growth of 12.1% to RM359.3 billion. Employment in the ICT industry in the country amounted to 1.21 million persons in 2021, with the ICT manufacturing industry as the primary contributor, with a share of 35.9%, followed by ICT services (29.2%) and ICT trade (21.9%). Currently, Malaysia's government and private sector are embracing a country-wide digital transformation, as the digitalisation of operations across all major industrial sectors will be a decisive factor in securing Malaysia's role in the future global economy.

While ICT-related jobs are aplenty, they are hard to fill due to the high specificity in the required skills. ICT educators in Higher education institutions (HEIs) are continuously challenged by the need to adjust their courses and instruction to the ongoing technological developments to provide up-to-date and industry-relevant learning experiences for students with limited and dated resources leading to talent mismatch and unemployment. This brief highlight essential questions for critical national players involved in the ICT industry talent development to enhance the quality of training for its graduates to meet the digital economy's demands in a post-pandemic Malaysia. Through the IAC-ICT focus groups held with industry captains and members of the academia, it is agreed that a holistic ICT talent development ecosystem for our nation requires four key drivers to be addressed: 1) Expanding higher education provision, 2) Delivering a professional pathway in further and higher education, 3) Expansion of ICT apprenticeships, and 4) Re-skilling professionals in the ICT sector through industry-academia collaborations.

What are the issues?

Current Scenario

The ICT sector is of vital strategic importance in Malaysia, regarding the number of highly skilled professionals employed and its significant contribution to export performance, accounting for a quarter of the country's total GDP per annum. Skills growth in the sector has been supported to date by the Malaysia Digital Economy Blueprint (MyDIGITAL), which outlines the plans to accelerate Malaysia's progress as a technologically advanced economy. This plan aims to create 500,000 new digital-based job opportunities and assist 875,000 micro-enterprises and small and medium enterprises (MSMEs and SMEs) to go digital via e-commerce. It targets to catalyse 5,000 start-ups within the next five years, which will be the starting point to attract RM70 billion (USD 17.32 billion) in digital investments from domestic and international markets. The blueprint also sets a roadmap to achieve a 30% increase in productivity for the economic sector by 2030 and employ a "Cloud First Strategy" of migrating 80% of public data to a hybrid cloud system by the end of 2022 to reduce government costs in the long term.

With the economic growth of the digital sector, the impact of information and communication technology on national economic growth is tremendous. TalentCorp's 2020/2021 Critical Occupation List (MyCOL) Technical Report highlights that 86% of newly listed jobs are in the digital sector, with entry-level professionals receiving a pay scale of RM5,000 upwards (PIKOM, 2022)[1]. Last Covid-19 Endemic has created a strong demand also created strong demand for selected jobs. In the 2020/2021 MyCOL, seven (7) critical occupations appear for the first time. Most of these critical occupations are digital-related jobs. The endemic accelerates the surge in demand for web and multimedia developers, data professionals, cybersecurity professionals, animation and visual effects professionals, digital games and eSports professionals, and creative content designers and professionals.[2] These positions were identified as critical in meeting the demand for digital talent and supporting the growth of Malaysia's digital economy.

While professional talents in the field are constantly headhunted, and fresh talents are offered abundant work opportunities, most of these jobs are hard to fill due to the high specificity of skillsets required

1 Data from PIKOM (The National Tech Association of Malaysia) database, tabulated from over 1,000 tech companies registered as members under PIKOM.
2 Table 14 TalentCorp Critical Occupations List 2020/2021 Technical Report

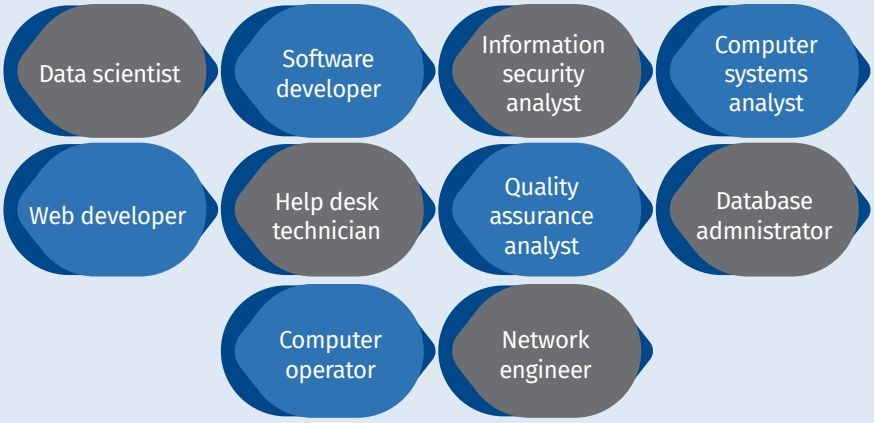

Figure 1: Current jobs in ICT as reported in the IAC-ICT 2022

resulting in unemployment issues on the part of ICT graduates and talent shortage among ICT industrial players.

Working in ICT can range from resolving an employee's Wi-Fi issues to programming an organisation's new cloud infrastructure. Therefore, technical skills required in the ICT job landscape vary greatly depending on the sub-sector focus and the specific job role. Areas of high demand and potential growth include artificial intelligence, robotics, animation, gaming, blockchain, the Internet of Things, 3D printing, augmented and virtual reality, and cybersecurity or next-generation security. One skill set that will continue to be in high demand is cloud computing, specific configuration, deployment, security, and troubleshooting for cloud services. Organisations dramatically accelerated and expanded their adoption of cloud infrastructure in reaction to the challenges of the pandemic and will continue to do so in pursuit of digital transformation initiatives, which often go together with the cloud.

The demand for software engineers reached an all-time high during the peak of COVID-19, and there are no signs of it letting up in the upcoming years. Demand for high-quality software engineers will likely continue to increase as cutting-edge tools like AI/ML and automation become table-stakes features for growing businesses. It is noted that Python, JavaScript, C#, .NET, React, Angular, and Golang skills are currently in the highest demand.

As companies progress on their digital transformation journey, with deep and wide convergence in functional areas such as R&D, manufacturing, engineering, supply chain and logistics – combined with cloud adoption – there are new and evolving threat vectors and attack surfacing. As the risk of insider threats continues to grow, global trade becomes even more complicated as countries continue to enact their cyber security and data privacy laws and resultant data sovereignty aspects. These, in turn, will require upskilling and re-skilling around cloud, networks, threat hunting, private/public/government sector collaboration, privacy, and counterintelligence.

These highly specified areas will be challenging for HEIs to train ICT students as HEIs continue to operate with limited funds, facilities and technologies. Therefore, a workable partnership model with the industry on many programmes must be prioritised to afford these necessary learning experiences for IT students to elevate to the market demands.

To reach their fullest potential, however, talents must complement their knowledge with a robust set of soft skills. The lack of soft skills harms company outcomes such as employee behaviour, safety, engagement, and productivity. According to research, when hiring recent IT graduates, broader employability skills are deemed more critical than specific professional, technical, and academic knowledge and skills that come with graduation in the field of ICT (K. P. Aničić and V. Bušelić, 2020). The most important generic skills to master are the ability to rapidly acquire new knowledge (i.e., learning agility), apply knowledge in practical situations, and identify and resolve problems.

An emerging "power skill" in ICT is the ability to lead change, which separates high-performing technology leaders from the rest. Although many IT leaders and managers understand how to manage people, managing change requires a different set of capabilities, including an understanding of change dynamics, experience with change leadership frameworks and tools, the ability to create a clear roadmap for change as well as structure and processes to sustain it, and the ability to manage organisational risks, human challenges, and success factors of change initiatives, all of which are still

Figure 2: Highly sought technical skills employers are seeking in ICT candidates as reported in the IAC-ICT 2022

under-developed skills among many of our local ICT talents.

On the other hand, ICT employers have continuously provided feedback on our local graduates' apparent lack of English language proficiency, business and workplace communication skills, analytical skills, and critical thinking. The Malaysian Qualification Framework, however, has exhaustively covered demanded soft skills needed by the ICT industry, which, in turn, are translated into the university curriculum. It is, therefore, still unclear as to the level of soft skills expected by hiring companies and how poorly graduates' deficiencies are in these areas. It is agreeable during the IAC-ICT 2022 that soft skills cannot be explicitly taught but emulated by students during teaching and learning processes as afforded by the respective instructors.

One fundamental skill repeatedly highlighted in this IAC Workshop is the apparent need for more effective communication and creative problem-solving skills. Local graduates are perceived as brilliant but unable to fully articulate ideas and express themselves well, most plausibly due to the East Asian culture of deeming superiors and elders must be given due respect through language and custom and voicing out differences in opinion and ideas are not much welcomed.

Equipping ICT students with the ideal generic skillset is challenging, especially in educating ICT professionals for unknown future jobs. A review of the current literature shows that the perception of graduates' attainment level of generic skills is different between academia and

the industry, with the latter viewing graduates as deficient in various areas and the former affirming that students have been equipped with the necessary training on these skills. This further suggests a disconnection between how higher education institutions view the preparation of their graduates and how employers view students' soft skills attainment upon graduation.

Value-added post-graduation skills that may need to be considered for ICT graduates include project management and professional certifications, including AGILE, Microsoft, Clouds, and Azure, skills used in integration layers, and the ability to adapt to the current trend of gig employers. The e-Learning module by HRDCorp, for instance, is a good initiative in defining the needed skillset. However, it would also be helpful for the ICT sector to have a professional body overseen by MDEC or PIKOM to validate the certified programmes so that these post-graduation skills may be formally recognised and acknowledged beyond the Malaysian ICT job landscape. As different ICT companies and job positions require very different specific skills, it is best that students first master the generic skillset in ICT and be given an intermediary phase upon graduation to upskill in the more sub-sector-specific skills needed by the market. As such, ICT companies ought to consider embracing micro-credential skills for their staff, especially in big data and analytics.

Policy-related issues in the context of addressing the Malaysian ICT talent shortage

- There is an overall lack of investment and incentives for industry-academia collaborations in ICT by the Government.
- Several companies that attended the IAC-ICT admitted to not knowing how to engage university students and are willing to sponsor and provide opportunities moving forward.
- Several ICT companies in attendance at the IAC-ICT are willing to collaborate with universities and MDEC, work in partnership with academia to improve digital talent ecosystem to produce ICT-Digital ready talent.
- Most universities are tied to budget allocations made by the Malaysia Plan (Rancangan Malaysia, RMK) and the related ministries in talent development. Therefore, transformation and reform are very much needed in terms of curriculum fluidity and flexibility.
- HEIs are sandwiched between Malaysian Qualifications Agency (MQA), the Ministry of Higher Education and the industry and, therefore, posed greater risk to

Figure 3: Top soft skills in the information and communication technology industry as reported in the IAC-ICT 2022

keep up with fast-paced change in technology and adaptability.

- Most facilities and infrastructure of ICT faculties, especially in public universities, not parallel to the current trends, technology and industry needs.
- There is a preference for hiring Malaysians from overseas as fresh talents graduating from local institutions, especially from public universities, lack appropriate workplace mannerisms and confidence in their skills. There is also an apparent gap in the mastery of technical skills among local graduates upon joining the workforce compared to their overseas-graduating counterparts.
- As the quality of local graduates does not match up to industrial expectations, acquiring outside talents, especially from India, for TVET-related digital businesses has been constrained by local policies, further exacerbating talent shortage issues.

Issues in ICT-related Curriculum in Universities

- There is a lengthy approval process for a new curriculum to be in effect, especially in public HEIs. A typical curriculum cycle for public universities lasts for five years on average, and curriculum review processes will take up to two years to be approved and offered. The long and lengthy process make it challenging for public HEIs to keep track and stay updated in meeting industrial demands.
- Academia cannot plausibly cover emerging technical skills since ICT is fast-moving in nature, and certain specific skills may be obsolete after a few years. Therefore, universities prioritise students' mastery of foundational knowledge for graduates to apply to specific areas in the ICT job market. Even so, companies are highlighting the apparent lack of mastery of these fundamental skills,
- Several industrial attendees of the IAC-ICT argued that the curriculum offered is not rigorous and comprehensive enough. As ICT is not a time-based but rather a project- or portfolio-based field, one final year project throughout the undergraduate programme is deemed insufficient and should be done semesterly.
- As it stands, most university ICT-related programmes are offered via on-campus coursework, a final-year project, and internship training. This model will no longer work if local graduates are to meet industrial demands where an industrial-based curriculum via an apprenticeship model

is deemed to be more relevant moving forward.

Issues in Teaching and Learning of ICT-related programmes in Higher Education

- Conventional and traditional teaching and learning instead of the curriculum's fluid, flexible, and innovative delivery. Few are leveraging digital tools to make teaching and learning more engaging.
- The standard practice of a three-month-long internship is deemed insufficient by many IAC-ICT participants. Three months may be sufficient for non-technical students, but ICT-focused employers are generally hesitant to employ interns with only three months of field experience.
- Having students doing real company work during internships may pose breaches in confidentiality as some data are classified as confidential and cannot be accessed by unauthorised or temporary staff. As a result, ICT interns often find themselves assigned to doing menial, non-meaningful tasks.
- In terms of programming, companies prefer graduates familiar with frameworks such as Laravel and Spring Boot to support enterprise applications. The market has been in high demand for Android applications, where graduates familiar with frameworks such as Flutter would be highly sought after. However, universities are of the view that native or fundamental frameworks still ought to be taught to students as it still serves as the basis for students to adapt to in-trend and upcoming frameworks.

Issues in Assessment of Learning Outcomes for ICT-related programmes

- Emphasis should be given to acquired competencies rather than basing a graduate's skills on mastery of specific software.
- ICT programmes are primarily assessed via closed book exam formats, mainly measuring theoretical mastery instead of capturing talent's skill-based competencies, which ICT-based employers need more.

What has been done?

Asia Pacific University Walking the Talk

The Asia Pacific University highlights the fundamental issue of HEIs needing to properly define their client, i.e., the industry and the need to fulfil industry demands for talent development to serve the job market. The APU argues that HEIs are highly divergent in their key performance indexes (KPIs), with most being ranking- and Ministry-centric rather than honouring industry requirements, leading to mismatches in talent training. Realising that every institution's prerogative is to ensure the industry employs talents, APU ensures its curriculum offerings are

fluid, industry-tailored, and updated yearly. The institution hires 85-90% of its academic workforce from the industry, as working and staying connected with the industry is essential in ensuring industrial needs are consistently met as curriculum offerings become more intact and solid when industrial players are brought in. Currently, APU has the most extensive digital talent in the country with unbeatable ICT infrastructure with studios and labs of industrial grade. Students of APU are also afforded the experience of learning in a corporate and industrial setting within its corporate-like campus as school-like setups of which most HEIs are designed are not ideal in equipping students for the real world, with most traditional universities erecting their chancellery buildings up front and centre as opposed to placing student-centric buildings at the heart of campus. APU further argues that people need to learn to work together, but most universities have buildings far apart, which hampers integration. As a result of these concerted client-centred initiatives, APU graduates received job offers even before they attended the graduation ceremony, with 20,000 of its recent ICT graduates all employed with assistance by MDEC.

Microsoft-AI.DA UTHM Collaboration

With the rise of big data and artificial intelligence, the demand for skilled data scientists still needs to be met, and the gap is widening. Microsoft has partnered with government agencies, educational institutions, and private companies in Malaysia to provide access to digital tools and skills training. One of their major initiatives is the Digital Skills for Tomorrow's Jobs programme, which aims to upskill and reskill Malaysians for digital skills and data science. Microsoft has also collaborated with the Malaysian government to bolster Malaysia's economic resilience, where the MyDIGITAL GovTech will equip civil servants with digital skills and training to support the nation's aspiration for inclusive, responsible, and sustainable development. Additionally, Microsoft has lent its expertise to building local data centres to provide secure and compliant cloud services to Malaysian customers. The technical-focused Microsoft Learn for Educators (MSLE) series of training offers a Microsoft curriculum to educators covering topics on enhancing classroom technology, borderless collaboration, and Next Gen Learning within and beyond classrooms, targeted at least 1 million Malaysians. Currently, Microsoft Technical Certifications are

being offered by AI.DA – Akademi Intelek dan Data Analitik – of Universiti Tun Hussein Onn (UTHM) to create pathways for new talent to be more employable in areas of AI, data science and cloud computing as value-added certifications offered by esteemed industries like Microsoft are highly sought after by companies.

MDEC's role in growing Malaysia's future digital talent

In nurturing the future of Malaysia, MDEC has launched the Tech Talent @ Institute of Higher Learning initiative to nurture industry-ready skills among tertiary students. It also plays a vital role in forming the Premier Digital Tech Universities and Polytechnics (PDTIs), Malaysia's leading digital tech-focused tertiary institutions. The PDTIs have a proven track record in producing high-quality graduates for digital tech-based high-value jobs via cutting-edge research and education policies, strong industry linkages, and career development and placement services. MDEC also spearheaded collaborations between industry, academia and government in ensuring the digitally-skilled talent pipeline is maintained. Other than internship and employment opportunities and offerings of micro-credential certifications, MDEC has also initiated the Digital Tech Faculty Expert Program (DTeX), which provides a structured program to create a pool of digital tech subject matter experts among faculty members of PDTIs and partner universities as well as to strengthen the quality of teaching and learning within HEIs. It creates a platform for Technology Partners to collaborate with Premier Digital Tech Institutions and partner universities and to be more actively involved in nurturing and developing industry-ready tech talent from the tertiary education level (see: *https://mdec.my/digital-economy-initiatives/for-the-people/talent-development/tech-talent-at-institute-of-higher-learning*).

ICT-related Curriculum at Tertiary Level

- There have been numerous initiatives to enhance the curriculum of ICT programmes in universities to ensure graduates are furnished with the skills and knowledge needed to thrive in a digital economy and to prepare them for careers in a wide range of sectors that require digital skills.
- Universities have now made it a regular practice to involve industries to provide insights into the curriculum development process and incorporate the latest ICT developments.
- Universities have also used student feedback collected to ensure curriculum updates meet their needs and expectations.
- Numerous instructors have leveraged the vast array of online courses and resources to supplement existing curricula to ensure students stay ahead in the latest advancements in codings, data analyses and cybersecurity.
- Curriculum of ICT programmes now also embeds participation in ICT competitions and hackathons that challenge students to apply their ICT skills to solve real-world problems and develop innovative solutions. Recently, Sunway University, through its Innovation arm - Sunway Innovation Labs (iLabs), organised Malaysia's first data hackathon on Future Mobility, which provided means to enable students to bridge the knowledge they acquire in the classroom with real-world case studies and practices.

Teaching and Learning of ICT-related programmes in Higher Education

- Universities partner with various ICT companies to provide students with opportunities for internships, industrial training, and mentoring from industry professionals.
- Microsoft MSLE in Malaysia has collaborated with several local universities to provide skills training and support for students and faculty members. Among the partnerships include Universiti Teknologi MARA (UiTM), Universiti Teknologi Malaysia (UTM), Universiti Tun Hussein Onn (UTHM), and Universiti Teknologi Petronas (UTP), which have collaborated on various initiatives such as research, curriculum development, and technology adoption. These partnerships aim to support the development of local talent, promote digital transformation, and enhance the capabilities of the Malaysian workforce.
- UTHM has established the AI.DA Centre of Excellence. This centre is focused on providing training and education in areas such as artificial intelligence, machine learning, and data analytics, as well as conducting research in these fields.
- Opened to students in 2021, AI.DA now extends its Microsoft professional certifications to

students from other universities, including Universiti Malaysia Terengganu (UMT).

Assessment of ICT-related Learning Outcomes

- Most ICT programmes capitalise on the role of portfolios in assessing student learning outcomes. These portfolios better reflect students' skill attainment, including examples of completed projects and various formative assignments demonstrating their learning and development over time.
- Problem-based assessments are also widely used in that students work on real problems or case studies, using their ICT skills to analyse the situation and develop solutions.
- Simulation and games are also an alternative means of assessing ICT-related learning outcomes while allowing students to apply their skills and knowledge in a fun and interactive way.

Post-graduation Upskilling Initiatives for Graduates to work in the ICT industry

- Various post-graduation upskilling initiatives are available for graduates working in the ICT industry in Malaysia. Some of the options include:
- LTT Global Communications Sdn Bhd started a programme called GetEmployedToday, designed to help the unemployed retrain and reskill for free, with hopes of bringing back these talents to the current market as entrepreneurs or to be absorbed into relevant sub-sectors.
- Multimedia University (MMU) established the iCADET programme, which aims to groom work-ready graduates. The one-year programme where university students are attached to a matching industrial partner will be considered equivalent to a year's working experience.
- Crest has been sponsoring their employees to upskill at Master's and PhD levels through a dedicated grant provided by the Company.
- The Ministry of Communications and Multimedia Malaysia (K-KOMM), through its Malaysia Digital Economy Corporation (MDEC), offers a range of upskilling programmes, including the Digital Up, Let's Learn Digital, DTeX and the Global Online Workforce (GLOW) programme.
- Industry associations such as the Malaysia Digital Association (MDA) also offer training and development programmes for graduates to upskill and gain industry-specific knowledge.
- Graduates from universities and institutions can pursue higher education degrees or certifications in relevant fields, such as computer science, software engineering, or data science.

What can be done?

ACADEMIA

Include industry experts in the curriculum review process. Industry players should be invited to be part of the curriculum review process. Universities typically invite industrial players only for formality reasons as part of the curriculum review process, but the industry's input may not be considered seriously.	Low Effort Required
Offer programming languages as electives. Mastery of programming skills is fundamental for most ICT graduates. It is suggested that ICT students consider taking other programming languages as an elective, such as JavaScript, Python, C++, PHP, Ruby, Swift, Objective-C, SQL (Structured Query Language) and Go.	Moderate Effort Required
Embed more project-based assessments in the curriculum. As ICT employers value the number of completed projects as evidence of skillsets in prospective talents rather than the number of accumulated years in a job, the university curriculum should consider adding more project-based assessments to provide students with the evidence they can carry to prospective employers.	Low Effort Required
Industry-based learning projects for courses during university training. ICT lecturers should consider crafting industry-based assignments as part of coursework training to allow students to work on real-world cases and initiate early collaborations with the industry.	Moderate Effort Required
Be more proactive in identifying future in-demand skills and train students in advance. University curricula should be fluid and agile enough to keep track of near-future in-demand skills in ICT and be ready to adjust their curriculum offerings to meet the demands rather than rigidly adhering to time-honoured traditions of curriculum review processes that span across several semesters to approve and implement.	Moderate Effort Required
Service learning should be genuinely valued to promote soft skills. While soft skills are pertinent to the success of any career, university training often does not include them in day-to-day teaching to focus on delivering the technical skills. Embracing service learning for ICT students could be an effective way to instil soft skills through meaningful community engagements and projects naturally.	Moderate Effort Required
Academic staff to undergo industrial exposure and experience. Academic staff is encouraged to take sabbatical leaves by undergoing industrial placements instead of focusing solely on research advancements. Lecturers with industrial exposure will be better able to deliver content knowledge more effectively.	Moderate Effort Required

Academia to be (re-)trained with an entrepreneurial mindset. While mastery of technical skills is expected out of IT graduates, entrepreneurial skills are equally important in today's job currency. However, many university lecturers need an entrepreneurial mindset to infuse into their teaching as they were primarily trained in a purely academic context and therefore, such upskilling is pertinent.	Moderate Effort Required
Lengthen the duration of industrial apprenticeship to six months. Universities to consider lengthening internships to six months. Six months is usually the probation period in companies hence hiring decisions can be communicated to interns by the end of the sixth-month period, affording higher chances for students to secure a job.	Moderate Effort Required
Invite industrial experts to guest lecture and evaluate student work. Industry experts should be invited to teach students technical parts and real-world skills in the market; they should also be invited as panellists and juries in evaluating student work to receive feedback from an industrial point of view.	Moderate Effort Required
Conduct Final Year Projects after industrial placements. ICT students' lack of depth and authentic final-year projects is partly attributed to their apparent lack of industrial experience. Final-year projects to be conducted after industrial placements instead of the current practice of vice versa would promote better quality research projects, which could benefit the industry's growth.	Significant Effort Required
MoUs between TVET institutions and industry on job arrangements. TVET education providers may consider signing MoUs with industry players for an arrangement that provides fresh talents with ICT job opportunities upon graduation. This, in turn, also increases collaboration between both parties.	Significant Effort Required

INDUSTRY

Improve market awareness among university students through career talks. Companies involved in the ICT industry should consider providing career talks to future and fresh ICT graduates to better communicate market needs and expectations.	Moderate Effort Required
Participate in student capstone project by providing non-critical project ideas. Capstone projects are deemed one of the best delivery and assessment methods to prepare industry-ready ICT talent. The industry can offer non-critical problems to be solved but also needs to adjust its expectations on expected outcomes. Since in-training students have multiple coursework and other on-campus obligations, non-critical projects would be feasible and meaningful for both the student and the industry.	Moderate Effort Required

Approach future graduates much earlier to build rapport. Companies may engage future talents much earlier while they are still in the university by involving students to beta-test products and be a part of their developing projects. Mid-career talents may serve as mentors both in academics and research.	Moderate Effort Required
Amplify hackathon efforts to scout for the right talent. Organising various competitions and hackathons may further improve rapport-building with future talents, and winners may be offered places for internships or job offers.	Moderate Effort Required
Welcoming academia for industrial placements. Industry to open its doors to university lecturers to gain industrial exposure and experience so that the quality of teaching and learning can be significantly improved for students on campus.	Moderate Effort Required
Connect with universities via TalentCorp. It is acknowledged by several industry players that universities need help to connect with. Engaging via TalentCorp events and participating in career fairs would be one way of getting direct and informal updates from universities and students.	Moderate Effort Required
Provide opportunities for fresh talents to experience and explore. As fresh talents are encouraged to take on more proactive roles to seek employment opportunities, companies should be receptive to opening their doors to provide the needed experience.	Moderate Effort Required
Offer a more structured trainee programme. Fresh talent may need to be equipped with all the skills needed to serve as fully skilled staff; thus, companies should consider intermediary positions with more structured on-the-job training before absorbing new talents as full-time employees.	Significant Effort Required
Provide upskilling opportunities for mid-career talent. Given the fast-paced nature of technologies, the ICT industry should consider providing sabbatical leaves for their mid-career employees to upskill and reskill in the field. Mid-to-senior-career HRs, for example, may need help coping with the evolving business goals given the traditional HR training they received during their university years. An industry-academia convention can be established in which both parties have a shared responsibility in developing and delivering programmes to retrain and upskill current employees in cohorts.	Moderate Effort Required
ICT-specific online job portal to scout for matching talent pool. The ICT industry should consider establishing an ICT-specific online job portal targeted to ICT graduates. Companies may post ICT-specific job opportunities and, in turn, may be able to scout for better talent than posting in non-specific job portals, e.g., Indeed, LinkedIn, etc.	Significant Effort Required

OTHER STAKEHOLDERS

Gatekeepers to lax bureaucratic processes for industry-academia collaborations. Much of the official collaborations between the industry and academia are centred around fulfilling specific yearly key performances, especially on the side of the academe, resulting in structural restraints and regulations. Relaxing such rigid requirements will result in more genuine and efficient partnerships with the student's best interest in mind.	Moderate Effort Required
Regulation bodies to monitor certifications should be explicitly established for the field of ICT. Given the fast-paced nature of the ICT field requiring current and fresh talents to continuously upskill and reskill to maintain relevancy in the job market, post-graduation certifications ought to have a regulatory body to acknowledge training formally. This can be analogised to university programmes receiving MQA accreditations.	Significant Effort Required
Hosting of Industry-Academia Career Convention. While career fairs are aplenty, there is justification for organising an ICT-specific career convention where the industry and academia can meet and table talent pool issues to be ironed out together. The dialogues may provide avenues for companies to send their mid-career employees back to school through arrangements of more personalised programmes with the universities.	Significant Effort Required
Consideration of a transitional year post-degree to upskill. Relevant ministries ought to reconsider the structure of talent training in ICT especially given the particular skills and fast-paced nature of technologies. An intermediary year post-graduation to upskill would benefit all parties in the long run.	Significant Effort Required
Root cause analysis on talent mismatch in ICT. Mismatch issues are likely a direct result of talent training programmes in public universities rather than those from private universities. Conducting a root cause analysis may unearth specific issues that can be urgently addressed in the training process.	Significant Effort Required
Talents to be furnished with competency-based advice and guidance. Certification bodies such as SIRIM may advise fresh talents on the current competencies needed to excel in ICT-related jobs.	Significant Effort Required
TalentCorp to initiate the connection with founders. In an era of the gig economy where graduates are keener on becoming bosses of their businesses, bridging connections between fresh talent with successful business founders could establish meaningful mentorship and potential business partnerships moving forward.	Significant Effort Required

Way forward

It is widely accepted within the IAC-ICT that the most critical resource in the ICT industry would be a healthy supply of skilled talent. Therefore, investing in talent development needs to remain a top priority. However, ICT educators are continuously challenged by the need to adjust their courses to the ongoing technological developments to provide students with up-to-date and industry-relevant learning experiences. Adding to the challenge is a perceived gap between the ICT industry and university, with documented reports that ICT graduates need to be sufficiently prepared when entering the workplace. In particular, professional skills, usually developed in a professional context and over time, seem underdeveloped in ICT graduates upon entering the workforce.

Most of the current IAC-ICT centred around the need for fresh talent to be further upskilled upon graduation before they are ready to serve specialised roles within ICT companies. There is mutual consensus by all parties involved in the discussion that internship duration should at least be lengthened from the standard three (3) months to a minimum of six (6) months as it would also involve equipping graduates with job-specific soft skills as they then continue to be trained in the specific technical areas.

Academic participants of the IAC-ICT highlighted the need for industries to anticipate new generational behaviour so that mismatch of expectations can be addressed. The industries must also be open to shifting their views that locally developed talent is equally as excellent and trainable as those graduating from abroad.

Developing the ICT Workforce for the Future through Work-Integrated Learning

A prevalent suggestion throughout the IAC-ICT in developing the Malaysian ICT workforce is for work-integrated learning to be adopted in university curricula as it is deemed to help ICT students develop the skills needed to thrive in the field. It allows the students to experience multidisciplinary collaborative learning activities and links the ICT industry to students' learning experiences. Furthermore, a work-based approach will allow students to take part in authentic challenges, enabling them to take on work-like roles with direct involvement and feedback from the industry. This will subsequently help students develop work-ready skills to improve their transition from university to the workplace.

With the emergence of new technologies and inventions, the digital ecosystem is in a constant state of renewal. Hence, one of the most crucial aspects in ensuring a healthy supply of skilled talent is to ensure that university curricula and modes of instruction in the field of ICT can remain dynamic for a short time. The relevant ministries must constantly update the national policies, initiatives, and planning for the HEIs to keep up and remain ahead of the curve in talent training. A mechanism will need to be put in place to guide all parties involved in talent development in observing the latest trends of the digital sectors, adapting the latest best practices globally, and evolving the way of doing things, especially in the academe. As highlighted, every industry requires the skillsets necessary to deploy and exploit emerging technologies and functions. Therefore, a systematic and systemic collaboration between Government, industry, and academia will be crucial to maintaining and advancing the competitiveness and confidence in the Malaysia-based ICT enterprise both domestically and in global markets in the years ahead.

Acknowledgement

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Further Reading

Economic Planning Unit (2021). *Malaysia Digital Economy Blueprint*. Economic Planning Unit, Prime Minister's Department. (Available at: https://www.epu.gov.my/sites/default/files/2021-02/malaysia-digital-economy-blueprint.pdf)

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MINISTRY OF HUMAN RESOURCES

TalentCorp
GROUP OF COMPANIES

Sector-Focused Industry-Academia Collaboration (IAC)- **Biotechnology** Workshop Report

With support from the Ministry of Higher Education Malaysia (MoHE) and executive assistance from Invest Selangor Berhad.

Executive Summary

With a focus on higher education, this Industry-Academia Collaboration in the Biotechnology (IAC-BioTech) sector brief explores how best to bridge disparities in talent demand and supply in the biotechnology industry. The Malaysian biotechnology industry has been recognised by the government as a critical sector that will drive the country towards a progressive and high-income position. This is in line with the National Biotechnology Plan 2.0[1], as Malaysia aims to become a high-tech bio-innovation nation that is prosperous and sustainable by the year 2030. However, despite the government's initiative to vitalise the country's biotechnology industry, the issue of talent demand-and-supply disparity may disrupt the national economic plan for the industry.

The biotechnology industry has been promoted by the government as a source of economic growth since the 1990s and, as such, has shifted the focus of efforts for economic improvement onto the industry. In spite of that, the industry is still perceived as being in an infancy stage and needs further development. Industry experts shared that there is a critical need for commercialising R&D[2] findings, and such requires talents with industry-specific technical skills and an entrepreneurial mindset. It has been acknowledged that one of the key factors that contribute to the success of the industry is the development of numerous sufficiently qualified biotechnology graduates by local higher education institutions (HEIs). However, the need to produce a large number of biotechnology-relevant talents to ensure the productive operation of the industry is, unfortunately, still inadequately met. The current predicament that the industry is facing is due to several factors, such as the lack of proper training and education programmes that are aligned with the industry's needs. Additionally, the industry's lack of career prospects and job security discourages graduates from pursuing biotechnology as a viable career option.

With the country's aim to transform the biotechnology industry into a high-performing economic sector, it can be reasonably projected that the need for more skilled professionals in the industry to critically grow. Without a healthy number of industry-relevant talent, such an economic plan may not be realised to its fullest potential. And so, it is imperative for the Malaysian government and the industry's stakeholders to address the talent demand-and-supply disparity issue plaguing the industry. To achieve this, Malaysia needs to implement a comprehensive strategy to produce sufficient skilled biotechnology professionals. Through the IAC-BioTech focus groups held with key industry players and members of the academia, it is agreed that a holistic biotechnology talent development ecosystem for our nation requires three key drivers to be addressed: 1) Enhancing the quality of biotechnology education, 2) Attracting and retaining relevant talent, and 3) Developing a robust talent pipeline via more proactive industry-academia collaborations.

1 Malaysia's National Biotechnology Plan 2.0 is a comprehensive plan and initiative by the government to vitalise its biotechnology industry.
2 R&D: Research and Development.

What are the issues?

Current Scenario

The Malaysian biotechnology industry is a critical sector poised for significant growth, as the country aims to become a bio-innovation nation in the current decade. To achieve this goal, the industry requires a highly skilled workforce with the technical expertise necessary to drive innovation and growth. In this regard, several key technical skills are in high demand in the biotechnology industry, particularly in the specialisations of biopharmaceuticals, bioinformatics, and agricultural biotechnology.

Biopharmaceuticals

Biopharmaceuticals are a class of drugs derived from living organisms, such as bacteria or plants, and are used to treat a myriad of diseases, including cancer, diabetes, and autoimmune disorders. The biopharmaceutical domain of the industry is a rapidly growing space, growing space, with a Compound Annual Growth (CAGR) of more than 9% between the years 2013 and 2022.. One of the key technical skills in demand in the biopharmaceutical specialisation is cell culture technology. Cell culture technology involves the growth of cells in a controlled environment, which is essential for the production of biopharmaceutical products. This technique requires expertise in maintaining and manipulating cell cultures to optimise production efficiency and yield.

Another critical technical skill in demand in the biopharmaceutical area of the industry is protein purification. Protein purification is a process that involves isolating a specific protein from a complex mixture, such as cell

lysate, and involves several steps, such as filtration, chromatography, and centrifugation. This skill requires a deep understanding of protein biochemistry and the ability to apply this knowledge to develop effective purification techniques. In addition to cell culture technology and protein purification, bioanalytical techniques such as high-performance liquid chromatography (HPLC) and mass spectrometry (MS) are also in high demand in the biopharmaceutical space. HPLC is a technique used to separate, identify, and quantify complex mixtures of molecules, such as proteins or peptides, while MS is used to identify and quantify specific molecules based on their mass-to-charge ratio.

Bioinformatics

Bioinformatics is an interdisciplinary field that combines biology, computer science, and statistics to analyse and interpret biological data, particularly genomic and proteomic data. With the increasing availability of genomic data and the growing importance of precision medicine, bioinformatics has become a critical component of the Malaysian biotechnology industry. One of the key technical skills in demand in bioinformatics is next-generation sequencing (NGS). NGS is a high-throughput sequencing technique that allows for the rapid and cost-effective sequencing of large volumes of DNA[3] or RNA[4]. This skill requires expertise in bioinformatics software and computational tools, as well as a deep understanding of the underlying biology.

Another critical skill in demand in bioinformatics is data analysis and visualisation. Data analysis involves using statistical methods to interpret large datasets, while data visualisation involves presenting complex data clearly and meaningfully. These skills require expertise in bioinformatics software and programming languages, such as R and Python, as well as an understanding of statistical methods and data visualisation techniques. In addition to NGS and data analysis and visualisation, machine learning and artificial intelligence are also in high demand in bioinformatics. Machine learning and artificial intelligence are used to develop predictive models and algorithms that can analyse large datasets and identify patterns and relationships that may not be immediately apparent to humans.

Agricultural Biotechnology

Agricultural biotechnology is the application of biotechnology to agriculture, with the goal of improving crop yields, enhancing food quality and safety, and reducing the environmental impact of agriculture. With the growing global population and increasing demand for food, agricultural biotechnology has become an essential domain within the industry. One of the key technical skills in demand in agricultural biotechnology is molecular biology techniques. Molecular biology techniques are significant in agricultural biotechnology as they allow professionals to manipulate and modify genetic material in crops and livestock. A few of the molecular biology techniques that are crucial in agricultural biotechnology include gene editing, gene sequencing, and PCR (Polymerase Chain Reaction). Prospective talents in this area of specialisation must have a good understanding of these techniques to be able to use them effectively.

Another skill that is gaining more relevance than ever in agricultural biotechnology is plant physiology. Plant physiology is the study of how plants function and grow. It is an essential area of agricultural biotechnology as it allows professionals to understand how plants respond to different environmental conditions and how they can be modified to improve their growth and productivity. Professionals working in agricultural technology must have a good understanding of plant physiology to be able to develop new crops that are better adapted to different environmental conditions. In addition to molecular biology techniques and plant physiology, employers in the industry are also seeking prospective talents who are knowledgeable about the latest scientific research and developments in the field. This requires a strong foundation in biology and other related disciplines, as well as a deep understanding of the challenges and opportunities in the industry. Talents who are able to stay up-to-date with the latest trends and developments in agricultural biotechnology can help their organisation to stay ahead of the curve and develop new products and solutions that meet the current needs of the industry.

During the engagement with biotechnology enterprisers, they advanced that technical skills that revolve around the domains of biopharmaceuticals, bioinformatics, and agricultural biotechnology have always been relevant and favoured in the industry and will continue to be so in the years to come. These players believe that talents that possess the

3 DNA: Deoxyribonucleic Acid, is the hereditary material in humans and almost all other organisms.
4 RNA: Ribonucleic Acid, is a nucleic acid present in all living cells that has structural similarities to DNA.

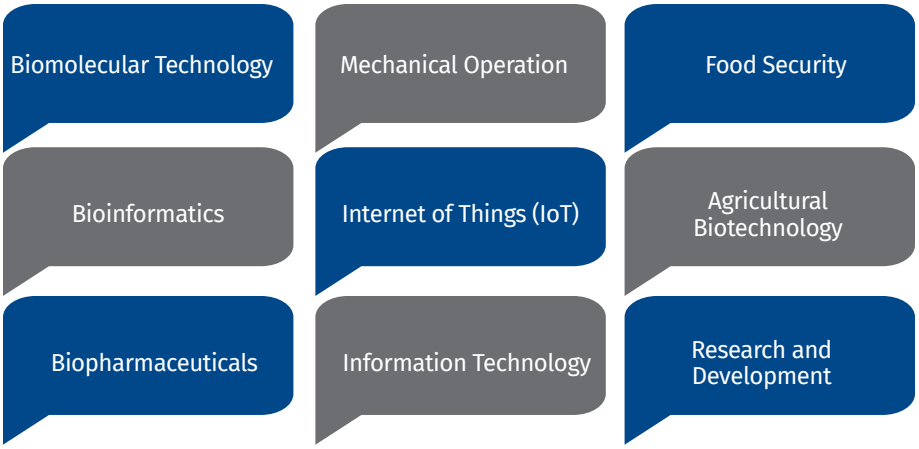

Figure 1: Highly sought technical skills by employers in IAC-BioTech 2022

aforementioned skills will be able to propel the industry's economic growth to a greater height, especially in this age where substantial focus has been placed on the development of biotechnology. The following are several highly sought technical skills in the biotechnology industry as disclosed by the participating players:

Despite the high demand for talents with expertise in biotechnology-related fields, TalentCorp's 2020/2021 Critical Occupation List (MyCOL) Report highlights that information technology (IT) and data-analytics-related roles are also relevant in the biotechnology industry. This is in line with the disclosure of information by the industry players where biotechnology enterprises seek professionals to fill critical roles such as business services managers, statisticians, production engineers, software developers, and data professionals[5] for the continuity of their businesses.

Industry experts shared that the current state of the biotechnology industry lacks commercialisation, and thus it has to be improved if the industry were to develop further. Business services managers play a crucial role in the commercialisation process for biotechnology enterprises in the industry. As the industry continues to grow, the need for skilled professionals who can manage and coordinate the commercialisation of biotechnology products and services becomes increasingly important. Business services managers are well-equipped to meet this need, providing a range of expertise essential for successful commercialisation. One of the key roles of business services managers in biotechnology enterprises is to identify potential markets for biotechnology products and services. They work closely with researchers to understand the commercial potential of new technologies and help to develop strategies for bringing these products to market. This involves conducting market research, analysing market trends and consumer behaviour, and developing marketing and sales plans to reach target audiences.

On top of that, the production engineer is another role that is in high demand in the biotechnology industry. The role of production engineers in the industry is multifaceted. They are responsible for designing and developing production processes that can be scaled up to meet demand while maintaining product quality. In addition, they work with research and development teams to ensure that products can be manufactured at a reasonable cost and within a set timeframe. As the industry expands and produces more biotechnology products, it is only reasonable to project that the demand for production engineers will increase. Moreover, software developers and data professionals are also in high demand in the industry as they play a critical role in ensuring its success. These professionals are responsible for developing and implementing innovative software and data solutions that can enhance the efficiency, productivity, and profitability of biotechnology enterprises. By developing and implementing data analytics and visualisation tools, they can help biotechnology players analyse complex datasets and gain insights that can inform business strategies. They are also essential in enabling biotechnology companies to leverage emerging technologies such as machine learning and artificial intelligence. These technologies can be used to automate and optimise various processes, including drug discovery, manufacturing, and supply chain management.

It has been established that there is a need for technical expertise revolving around the domains of biopharmaceuticals, bioinformatics, and agricultural biotechnology in the industry. Despite the emphasis on the aforementioned areas of specialisation in the industry, it is also worth noting that there are other IT

5 TalentCorp Critical Occupations List 2020/2021 Occupation Report.

and data-analytics-related roles being highly sought by employers in the biotechnology sector, such as software developers and data professionals. Hence, if the industry were to sustain its projected growth and development, it is imperative that the education programmes and courses based on the identified technical skills are implemented by local HEIs. However, as disclosed by industry experts, the current biotechnology graduates are, unfortunately, not satisfactorily equipped with the industry-required, specialised skills.

On top of that, it is imperative to note that in any industry, it is always preferred that talents are well-rounded and equipped with desirable soft skills so they can attain their fullest potential. The Malaysian biotechnology industry is poised for growth and success in the coming years, but it requires a workforce with not just technical skills but also an entrepreneurial mindset. During the engagement, industry experts have emphasised the need for commercialisation of R&D findings, and such requires talent with entrepreneurial inclination. Moreover, soft skills such as communication and problem-solving are also especially crucial for prospective talents who view the biotechnology industry as a viable career option.

In today's fast-paced and ever-changing world, adaptability is essential. The biotechnology industry is no exception, and having the ability to adapt to changes in the market, technology, and regulations is crucial for success. Prospective talents in the industry must be willing to learn new skills, technologies, and ideas and be willing to take calculated risks to innovate and create solutions. Effective communication is another important soft skill that has been highlighted by both industry players and academia. Communication skills go beyond the ability to speak and write with clarity. Effective communication involves the ability to actively listen, collaborate, and build relationships with colleagues and stakeholders. In the biotechnology industry, effective communication is essential for conveying complex scientific ideas and findings to non-scientific stakeholders, such as investors, regulators, and the public. A lack of effective communication can lead to misunderstandings, delays, and even failure of projects.

Problem-solving is yet another critical soft skill required for prospective talents in the industry. With the industry being at the forefront of technological innovation, problem-solving is crucial in finding solutions to complex scientific and technical challenges. The ability to think critically, analyse data, and develop creative solutions is essential for developing new products and processes in biotechnology. Unfortunately, as disclosed by industry participants, current graduates lack the proactivity to explore new solutions and prefer to remain in an area of conventionality. Furthermore, the most significant soft skill emphasised by IAC-BioTech participants is an entrepreneurial mindset. An entrepreneurial mindset involves being able to identify commercial opportunities and taking calculated risks to capitalise on them. In the biotechnology industry, this mindset is crucial for taking scientific discoveries and findings and translating them into marketable products and services. Entrepreneurial skills are not just essential for founders of biotechnology start-ups but also for employees working within established enterprises. In today's fast-paced business environment, employers are searching for talents who can take on leadership roles and drive innovation. Prospective talents in the biotechnology industry with an entrepreneurial mindset can bring new ideas and innovative solutions to the table and help drive growth and collective industrial success.

As the biotechnology industry continues to grow and evolve, prospective talents may find it advantageous to pursue additional certifications or credentials to enhance their skillset and stand out in the job market. The industry requires a diverse range of skills and expertise, including research and development, regulatory affairs, manufacturing, quality control, and marketing. Hence, to meet the demands of this industry, academic qualifications alone may not be sufficient to secure prospective employment as employers are increasingly looking for talents who possess additional credentials and certifications that demonstrate their knowledge, skills, and commitment to the field. One of the commendatory additional credentials that can benefit prospective talents in the industry is the Occupational Safety and Health (OSH) certification. OSH certification refers to training programmes by the Department of Occupational Safety and Health (DOSH) that focus on workplace soundness and well-being. By completing OSH certification programmes, talents can gain knowledge and skills to identify and control workplace hazards, prevent accidents and injuries, and ensure regulatory compliance. These skills are vital in ensuring the efficient and quality production of biotechnology products and services.

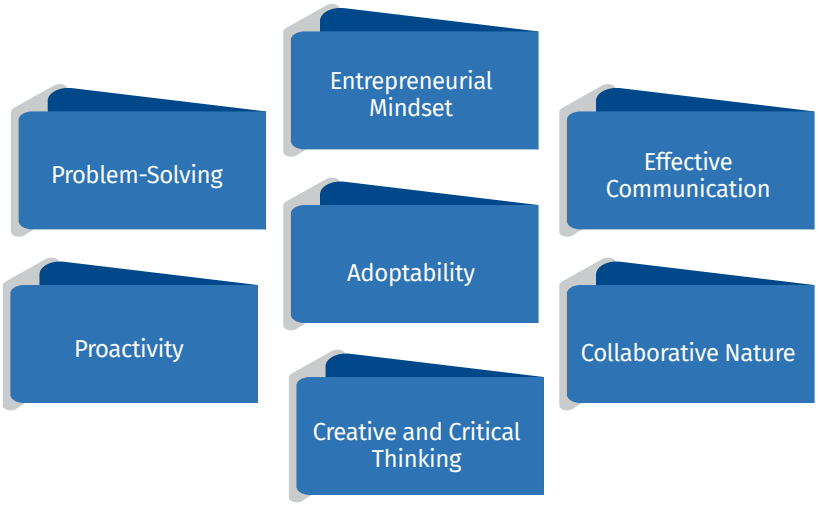

Figure 2: Highly sought soft skills by employers in IAC-BioTech 2022

Another commendatory certification that is highly sought-after in the biotechnology industry is the Good Manufacturing Practice (GMP) certification. GMP is a set of guidelines that ensure consistent and controlled production of quality products. The biotechnology industry is heavily regulated, and GMP certification is essential for prospective talents involved in manufacturing, quality control, and regulatory affairs. GMP certification demonstrates talents' knowledge and understanding of the guidelines and regulations that govern the biotechnology industry. Furthermore, in the rapidly expanding field of biotechnology, having data analytics-related credentials such as Tableau Certification and Certified Analytics Professional (CAP) certification is becoming increasingly important for prospective talents. As the industry continues to generate large amounts of data, the ability to analyse and interpret this data is becoming a crucial skill for professionals in the field. With the help of data analytics, researchers and professionals in biotechnology can make informed decisions, optimise processes, draw valuable insights, and drive innovation from available data.

On top of that, additional credentials in the use of programming languages such as Python and R are also deemed desirable in the industry. These credentials would equip talents with expertise to perform critical-skill tasks such as computational modelling, statistical analysis and visualisation, that are highly relevant in the biotechnology industry. In addition to the aforementioned credentials, prospective talents can also benefit from being involved in special projects that focus on specific areas of the biotechnology industry, such as biomanufacturing, bioprocessing, and regulatory affairs. These projects provide hands-on training and practical experience that can help talents develop the skills and knowledge required to excel in their prospective roles in the industry. IAC-BioTech industry participants disclosed that these certifications and additional credentials would provide prospective talents with a competitive edge in the industry. By demonstrating proficiency in research and development, regulatory affairs, manufacturing, quality control, and commercialisation of R&D findings, talents can position themselves as valuable assets to biotechnology enterprises seeking to remain agile and innovative in a rapidly evolving market.

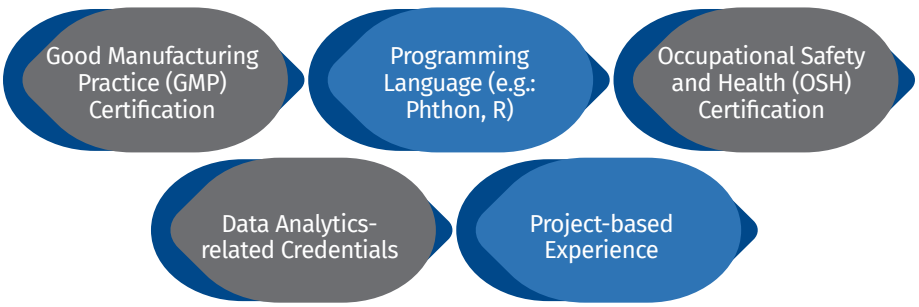

Figure 3: Commendatory additional credentials disclosed by employers in IAC-BioTech 2022

Structural Issues in Producing Relevant Talents for the Biotechnology Industry

It has been established in the preceding part of this brief that there is a high demand for talents with technical skills in the specialisations of biopharmaceuticals, bioinformatics, and agricultural technology. On top of that, there is also an emphasis on talents with proficiency in IT and data analytics, and commercialisation and marketing to further develop the industry's potential. Despite the critical demand for talents revolving

around the stated expertise and skills in the industry, there remain structural issues that have restrained the production of such talents, making it more difficult for the industry to fulfil the aspired economic plan by the national government. These issues need to be identified and addressed to ensure the industry's continued growth and development.

One of the primary structural issues in producing relevant talents for the industry is the mismatch between the skills HEIs produce and the needs of the industry. While there are undoubtedly quite a number of HEIs that offer biotechnology-related degrees and courses, many of the programmes offered do not adequately prepare students for the realities of working in the industry. For instance, industry experts shared that students may not have sufficient exposure to the latest trends and technologies in the industry, and they may lack the business acumen needed to commercialise research findings. This shows that there is a gap between the skills that are being delivered to prospective talents by HEIs and the skills that are highly sought-after by biotechnology enterprises. This issue is evident in the industry as Universiti Putra Malaysia (UPM) shared that only 40% of biotechnology-related graduates make it into the industry, and the remaining 60% advanced into other, unrelated industries.

Another critical, structural issue hindering the production of sufficient talent for the industry is the limited job prospects and opportunities. It was disclosed by UPM that the current reality of the industry is not serving its further development in the long run. For instance, local biotech enterprises are often inclined to rely on overseas research institutes (RIs) for the R&D of their products and services than the local RIs. This inclination is rather short-sighted as it will limit the prospect of jobs and career opportunities in the biotechnology industry. This, in turn, will discourage the participation of prospective talents into the industry as it will be perceived that there is limited socioeconomic gain for the talents if they enter the industry. Hence, if relevant stakeholders wish to attract a greater influx of talent into the industry, it is imperative to note that there should be a significant improvement in the job prospect and opportunities of the biotechnology industry.

Ultimately, the lack of industry-specific courses and programmes in HEIs will lead to the misalignment between the expertise delivered by HEIs and the skills desired by the industry players. On top of that, the limited job prospect and career opportunities offered by the industry are also hindering the influx of talent into the biotechnology field. Thus, these primary structural issues require immediate attention and effective solutions by stakeholders if they wish to sustain the growth and development of the biotechnology industry.

What has been done?

Initiatives by Industry's Stakeholders

In response to the growing talent demand-and-supply disparity in the biotechnology industry, stakeholders have taken various initiatives to address the issue. This section will highlight some of the key initiatives that have been implemented to address the critical talent need in the industry.

One of the initiatives that have been implemented is the establishment of the National Biotechnology Policy (NBP) in 2005. The NBP aims to create a conducive environment for the development of biotechnology in Malaysia by providing funding and incentives for R&D, as well as promoting entrepreneurship in the industry. Through the NBP, several constituent initiatives have been introduced to promote the development of human capital in the biotechnology industry, including scholarships, training programmes, and grants for R&D. Another initiative that has been implemented is the establishment of the Malaysian Bioeconomy Development Corporation (formerly known as Biotechnology Corporation) in 2005. Bioeconomy Corp is a government agency responsible for promoting and developing the biotechnology industry in Malaysia. One of the agency's key roles is to provide support for the development of human capital in the biotechnology industry. Bioeconomy Corp has introduced several initiatives to develop human capital, including BioKerjaya portal (www.biokerjaya.my), scholarships, training programmes, and internships. One of the corporation's significant initiatives is the Bioagrotech & Biopharmaceutical Employability and Entrepreneurship Specialised Training (BEST) program - a hiring incentive program to encourage biotechnology & bio-based companies to hire unemployed biotechnology/science graduates (knowledge workers). In which had secured jobs for >200 graduates (knowledge workers) in the biotechnology & bio-based industry.

Another initiative is the BioNexus SME Development Programme, a collaborative effort between Bioeconomy Corp and the industry, which was introduced to provide support for bourgeoning biotech enterprises. These startups provide job opportunities for biotechnology graduates, ultimately allowing them to gain industrial experience and exposure. The programme has been rather successful in producing industry-ready graduates who can contribute to the growth of the biotechnology industry. In addition to the NBP and Bioeconomy Corp initiatives, several universities in Malaysia have also introduced biotechnology-related courses to produce more relevant talents for the industry. For instance, UPM has developed courses such as the Bachelor of Science in Biotechnology and Master of Science in Biotechnology. These courses aim to provide students with the fundamental knowledge and skills to pursue a career in the biotechnology industry. Besides UPM, universities such as Universiti Kebangsaan Malaysia (UKM) and Universiti Teknologi Malaysia (UTM) have also inaugurated biotechnology-related courses. Currently, there are 18 HEIs in Malaysia that offer biotechnology-related courses for prospective talents who wish to pursue specialisations in the industry. The aforementioned initiatives have been relatively successful in producing a pool of skilled and competent talents for the industry. Nonetheless, there is still room for improvement, and stakeholders must continue to collaborate and cooperate in developing and implementing initiatives that effectively address the talent demand-and-supply disparity in the industry.

What can be done?

ACADEMIA

Implement internship as a weightage of curricular assessment By making internship a requisite of a curriculum, such an arrangement would allow students to work alongside industry professionals, understand the practical applications of theoretical concepts, and gain insight into the industry's dynamics. This would also benefit the industry by providing access to a pool of bright, prospective talents.	Low Effort Required
Lengthen the duration of internship Most of the industry participants of IAC-BioTech advance the proposition of lengthening the duration of internships for graduating students. Industry participants believe that a longer internship duration would allow talents to engage in more in-depth tasks and further develop their skills and knowledge to excel in the industry. Additionally, the exposure would not only improve their technical skills but also develop their soft skills, such as communication, teamwork, and problem-solving.	Moderate Effort Required
Conduct Final Year Project (FYP) with industrial inputs IAC-BioTech industry participants propose that students conduct FYP based on problem statements provided by biotechnology enterprises. This approach would enable students to be in the know of current and relevant trends and development in the industry. In addition, this method could also expose students to real-life scenarios and challenges that are faced by the industry while allowing them to gain a better understanding of the relevance and importance of their studies in the industry.	Moderate Effort Required
Implement curricular reviews in HEIs Both industry players and academia share the sentiment that there is a crucial need to implement curricular reviews in HEIs for biotechnology-related programmes to improve the relevance of prospective talents in the industry. It has been concurred that any current curriculum taught at HEIs should be tailored to fulfil current and future industry requirements and place more emphasis on the identified niche areas of biopharmaceuticals, bioinformatics, and agricultural biotechnology.	Moderate Effort Required

INDUSTRY

Organise a mentoring session/programme with industry professionals

Low Effort Required

Industry professionals who have been in the field for a considerable amount of time have undeniably amassed a wealth of knowledge and experience that can be invaluable to aspiring biotechnology talents. Through mentoring sessions, students can receive guidance on career paths, learn about the latest industry trends, and understand the skills and qualities that are necessary to succeed in the industry.

Moreover, mentoring sessions also provide students with the opportunity to network with industry professionals. Networking is an essential aspect of career development, and it can open doors to new opportunities, collaborations, and breakthroughs.

Implement a more structured internship programme

Moderate Effort Required

It is imperative that internship programmes are structured in a way that benefits both the students and companies involved i.e the National Structured Internship Programme (MySIP) spearheaded by TalentCorp has been providing structured internship experiences with MySIP-endorsed companies since 2012. MySIP endorsed companies paying a minimum of RM 500 internship allowance are eligible to claim for double tax deduction for all related expenses incurred on the interns. Such a programme should provide students with adequate support, mentorship, and supervision to ensure that they are able to learn and grow in a safe and productive environment.

Companies, on the other hand, should provide interns with meaningful and valuable work assignments and opportunities for professional development while also managing their expectations and offering appropriate compensation.

Establish a Centre of Excellence (COE) that closely work with HEIs

Significant Effort Required

IAC-BioTech academia participants advance that biotech enterprises recognise the importance of investing in a centre of excellence that provides industry-specific training and development programmes. Such a centre can act as a bridge between academia and industry, facilitating collaborations, knowledge-sharing, and networking between the two. The centre can also provide access to industry experts, technologies, and facilities that can enhance research capabilities and help translate research findings into commercial products.

Moreover, the centre can act as a platform for industry players to provide feedback and input to the development of HEIs' curriculums, ensuring that graduates have the necessary skills, knowledge, and competencies to meet industry requirements.

Offer better career prospects and opportunities

Significant Effort Required

As established in the preceding parts of this brief, one of the key reasons why a significant number of biotech graduates are not attracted to the industry is the lack of clear career prospects and job security. Hence, biotech employers should offer better career prospects and opportunities to attract and retain prospective talents. This can be done by providing direct career progression, job stability, and opportunities for professional development and growth.

Furthermore, offering competitive remuneration packages and benefits can also attract and retain talent. This not only includes financial incentives but also non-monetary incentives such as flexible work arrangements and work-life balance practices.

OTHER STAKEHOLDERS

Facilitate more industry-academia engagements Both academia and industry participants of IAC-BioTech shared that they eagerly welcome frequent industry-academia engagement programmes by government bodies such as TalentCorp, or any other relevant industry stakeholders. They maintain that such programmes would ensure that both industry and academia can engage in a constructive manner and can then coordinate necessary plans for the betterment of the industry.	Moderate Effort Required
Establish a research and development nexus IAC-BioTech industry participants shared that it would be instrumental in replicating an initiative undertaken by the Taiwanese government; to institute an R&D centre that ultimately becomes a nexus of collaboration between industry players and HEIs. Such a centre or nexus would enable more collaborations in unimaginable forms and would help to bridge the gap between theory and practice.	Significant Effort Required
Improve the state of facilities in HEIs It is important for HEIs to have state-of-the-art facilities in order to provide students with hands-on experience and practical training. Biotechnology is a highly technical field, and students need access to modern laboratories, high-end equipment, and the latest technology to develop the skills and knowledge needed to excel in the industry. Without access to these resources, students may not be able to fully develop their potential and contribute to the growth of the industry. Such an investment would enable industry stakeholders to create a pipeline of talent that is both skilled and relevant to the needs of the industry.	Significant Effort Required
Ease and relax industrial regulations It is also important for industrial regulations to be eased in order to produce relevant, skilled talents for the industry. This is because stringent industrial regulations on production processes can create barriers to entry for new enterprises, which limits the opportunities available for prospective talents. When regulations are too complex or expensive to comply with, it becomes difficult for start-ups to enter the market, reducing the demand for skilled talents. Easing regulations can create a more favourable environment for businesses in the biotechnology industry to thrive, leading to an increase in job opportunities and a greater demand for skilled talents. This can, in turn, attract more individuals to pursue careers in biotechnology, leading to a larger pool of talent for the industry.	Significant Effort Required

Way forward

The Need to Improve Curriculum Delivery and Career Prospects

The Malaysian biotechnology industry has been recognised by the government as a critical sector in driving the country towards a progressive and high-income nation. However, the industry is facing a talent demand-and-supply disparity issue, which may hinder the country's economic plan for the industry. Despite the government's initiative to vitalise the country's biotechnology industry, the industry is still relatively perceived as being at its infant stage and needs to be further developed. One of the key factors that will undoubtedly contribute to the success of the industry is the development of numerous sufficiently qualified biotechnology graduates by the local HEIs.

Unfortunately, the need to produce a large number of biotechnology-relevant talents to ensure the productive operation of the industry is still inadequately met. The current predicament that the industry is facing is due to several factors, such as the lack of proper training and education programmes that align with the industry's needs. Additionally, the industry's limited career prospects and job security discourages graduates from perceiving the biotechnology industry as a viable career option. To address these issues, there is a need to improve curriculum delivery and career prospects in the biotechnology industry. HEIs should collaborate closely with industry stakeholders to design and deliver courses that meet the industry's current and future needs. This collaboration can help ensure that graduates are equipped with the necessary technical skills and expertise to succeed in the industry.

Moreover, the industry must also work to improve career prospects and job security for graduates. This can be achieved by promoting a clear career progression and attractive remuneration package for biotechnology graduates. These efforts can help attract and retain skilled talents in the biotechnology industry, which is crucial for its long-term growth and development. On top of that, the biotechnology industry should engage in a discourse of relaxing industrial regulations with

Photo credit to Malaysian Bioeconomy Corporation Development Sdn Bhd

the government. This is critical to foster a more conducive business environment in the industry so that more enterprises can commercially thrive and ultimately create more job opportunities and greater career prospects.

In conclusion, the biotechnology industry is currently hindered from reaching its fullest economic potential due to the major issue of talent demand-and-supply disparity. This predicament requires immediate attention, concerted efforts, and effective solutions from all stakeholders. To efficiently address this issue, HEIs need to update their curriculum to revolve around the industry's critical requirements. The industry needs to offer better career prospects and opportunities to attract more influx of talent into the industry and retain them. With the future fulfilment of these recommendations, an optimistic view of the biotechnology industry attaining its projected growth and development can be confidently maintained.

Acknowledgement

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Further Reading

Ministry of Science, Technology, and Innovation. (2022). *National Biotechnology Policy 2.0: Accelerating Towards A Bio-Innovation Nation.* (Available at: https://www.mosti.gov.my/wp-content/uploads/2022/09/Dasar-Bioteknologi-Negara-2.0-1.pdf)

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MINISTRY OF HUMAN RESOURCES

TalentCorp
GROUP OF COMPANIES

Sector-Focused Industry-Academia Collaboration (IAC)- **Logistics** Workshop Report

With support from the Ministry of Higher Education Malaysia (MoHE) and executive assistance from Invest Selangor Berhad.

Executive Summary

With a focus on higher education, this Industry-Academia Collaboration in the Logistics (IAC-Logistics) sector brief explores how best to bridge disparities in talent demand and supply in the logistics industry. According to GII's Market Research Report[1], the logistics sector in Malaysia is poised for significant growth in the coming years. The industry was valued at USD 37.6 billion in 2020 and is projected to rise to USD 55 billion by 2026. However, this growth also poses significant challenges for the sector, particularly in terms of talent demand and supply.

One of the most significant trends driving change in the logistics industry is the rapid expansion of online commercial activities. As Malaysian consumers become more integrated with e-commerce activities such as online purchases, logistics companies are now pressured to re-strategise their operations to embrace a more digitalised modus operandi. This trend has led to the adoption of innovative technologies, such as Artificial Intelligence (AI)-powered logistics management platforms, which can help companies optimise and automate their processes to improve delivery productivity and reduce costs. The increasing emphasis on sustainability in the world economy is also having an impact on the logistics industry. With the need to decrease trip volumes and reduce carbon emissions, logistics players are being prompted to adopt new methodologies and technologies that can help them achieve these goals. This includes implementing more efficient and sustainable transport modes, such as electric vehicles, and using analytics and predictive intelligence to optimise delivery routes and schedules.

As the logistics industry evolves to meet these challenges, the demand for talent to solve the rising issues is also growing. In particular, there is a need for talents with expertise in digital technologies, analytics, and sustainability. Logistics companies are looking for individuals who can help them leverage these emerging trends to improve their operations and gain a competitive edge in the market. However, there is a significant talent gap in the industry, with a shortage of talents with the necessary skills and expertise. The logistics sector is facing a significant talent supply-and-demand disparity, with many companies struggling to search for the relevant talents they need to continuously grow. This talent gap is particularly acute in the areas of digital technologies and analytics. As logistics companies adopt new technologies and tools to improve their operations, there is a growing need for talents with expertise in these areas. This includes individuals with experience in software development, data analysis, and machine learning, as well as those with a deep understanding of logistics and supply chain management.

According to the account produced by Worldwide Recruitment Solution (WRS)[2], there is also a growing need for talents with expertise in sustainability in the industry. With the increasing emphasis on reducing carbon emissions and adopting sustainable practices, logistics companies are looking for individuals who can help them achieve these goals. This includes talents with expertise in renewable energy, sustainable transport modes, and green logistics. To address these talent demand-and-supply disparities, logistics enterprises and higher education institutions (HEIs) must take a proactive approach to talent development. Collaboration between industry and academia is key in developing industry-tailored solutions such as specialised programmes and courses that prepare prospective talents for careers in the sector. Through the IAC-Logistics focus groups held with key industry players and members of the academia, it is agreed that a holistic logistics talent development ecosystem for our nation requires two key drivers to be addressed: 1) Incorporating innovative and efficient methodologies and 2) Implementation of and greater emphasis on sustainable practices.

What are the issues?

Current Scenario

The logistics industry in Malaysia is currently experiencing a period of rapid change and transformation as it strives to keep up with the fast-paced digital revolution and the increasing demand for sustainable practices. With e-commerce activities continuously expanding and consumers becoming more integrated with online purchases, logistics companies are being pushed to re-strategise their operations to embrace a more digitalised modus operandi. In addition, with the growing emphasis on reducing carbon emissions and adopting sustainable practices, logistics companies are looking for talents that can propel them to these heights.

1 A comprehensive sector-focused report produced by Global Information, Inc.

2 WRS is global workforce solution provider to a number of industries.

However, there is a significant talent gap in the industry, with a shortage of talents with the necessary skills and expertise. Currently, there is a growing need for talents with expertise in software development, data analysis, machine learning, renewable energy, sustainable transport modes, and green logistics. While there are talents with these skills, there is a shortage of individuals with both the technical expertise and a deep understanding of the logistics industry. This makes it difficult for logistics players to search for the talents they require to succeed in an increasingly competitive market. Moreover, digitalisation is rapidly transforming the logistics industry, with enterprises seeking to optimise and automate their processes. To achieve this goal, they are turning to technologies such as AI-powered logistics management platforms, which can help improve delivery productivity and reduce operational costs. However, these new technologies require a new set of technical skills that are in high demand but in short supply.

In particular, there is a growing need for talents with expertise in software development and data analysis. These skills are essential for building and managing digital platforms that can help logistics companies optimise and automate their operations. Companies are also looking for talents with expertise and understanding of blockchain technology, which is becoming more relevant than ever in the industry. The Malaysian logistics industry has been exploring the potential of blockchain technology to increase transparency, security, and efficiency in supply chain management. However, to fully leverage the potential of blockchain technology, logistics companies need talents with blockchain expertise. Therefore, there is now a growing demand for blockchain developers, engineers, and architects.

Additionally, the logistics industry is rapidly embracing AI to optimise its processes, from warehouse management to delivery. The use of AI-powered systems can help companies make data-driven decisions and automate many of their processes. However, the development and implementation of AI systems require talents with expertise in machine learning and natural language processing. As a result, there is now a growing demand for talents with AI expertise in the logistics industry. Another area of focus for the logistics industry is sustainability. With the increasing emphasis on reducing carbon emissions and adopting sustainable practices, logistics employers are beginning to search for talents that can help them to achieve such, and this includes talents with expertise in renewable energy, sustainable transport modes, and green logistics.

In this age of greater emphasis on sustainability, logistic employers are exploring the use of renewable energy sources such as solar and wind power to reduce their carbon footprint. However, the development and implementation of these technologies require talents with expertise in renewable energy systems and management. Furthermore, logistics players are also venturing into using sustainable transport modes, which can help improve environmental sustainability and air quality. However, the implementation and development of such transport systems require talents with expertise in transportation engineering and sustainable development. These shifts in demand for talent are in line with the disclosure of information by the IAC-Logistics industry participants. During the engagement with logistics players, they advanced that technical skills revolving around the theme of environmental sustainability and automation are becoming increasingly relevant and favoured in the industry. These players believe that talents who possess the aforementioned skills will be able to propel the industry's economic sustainability to a greater height in this age of rapid workforce evolution. The following are a number of highly-sought technical skills in the logistics industry as disclosed by the participating players:

Despite the increase in demand for talents with expertise in environmental sustainability and operational optimisation, TalentCorp's 2020/2021 Critical Occupations List (MyCOL) report highlights that conventional roles such as business services managers and mechanical engineers still maintain their relevance in the Malaysian logistics industry.[3] Business services managers are responsible for overseeing the daily operations of logistics companies, including managing budgets, developing and implementing policies, and ensuring compliance with regulations. These talents are vital in ensuring that logistics enterprises run smoothly.

Mechanical engineers, on the other hand, are responsible for the development and maintenance of machinery and equipment used by logistics players. This includes everything from trucks and forklifts to conveyor belts and packaging machines. Mechanical engineers play a crucial role in securing logistics

3 TalentCorp Critical Occupations List 2020/2021 Occupation Report.

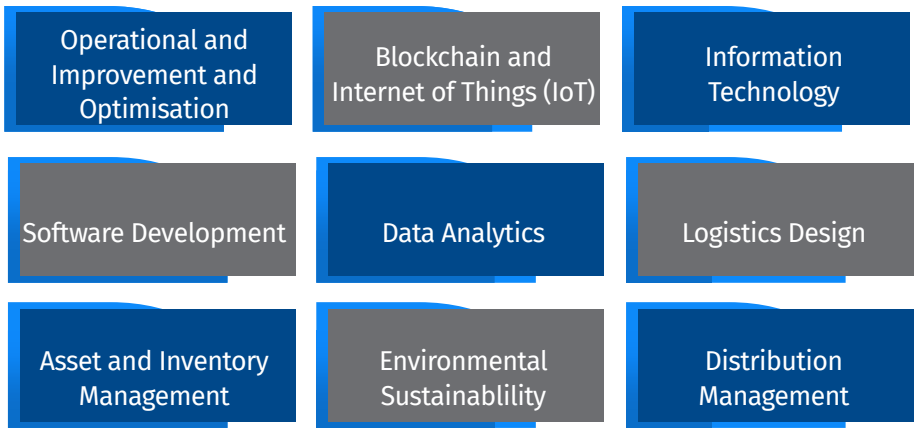

Figure 1: Highly-sought technical skills by employers in IAC-Logistics 2022

operations, as any breakdown in the equipment can cause delays and operational disruptions. Hence, it is also imperative not to overlook the significance of these conventional roles. As shared by IAC-Logistics industry participants, numerous logistics enterprises in Malaysia are still seeking talents with skills in business management and capital maintenance. This is because these roles are essential to the smooth operation of logistics enterprises and will continue to be so for the foreseeable future.

It has been established that there is now a growing need for technical expertise revolving around environmental sustainability and operational optimisation in the Malaysian logistics industry. With the advent of Covid-19, it is no secret that the pandemic has catalysed digital transformation in almost every economic sector, and the logistics industry is no exception. In line with this shift, the industry is moving towards an environmentally sustainable future with increased pursuits in technological innovations such as digitalisation and automation, and data analytics, which can optimise operational processes while reducing carbon emissions.

However, the shift towards a sustainable future has brought about a potential problem of talent shortage in supporting prospective growth of the industry. A report by the World Bank Group in 2020 revealed that the current talent pool in Malaysia's logistics industry is not keeping pace with the ever-growing demands of the sector. The increasing demand for technical skills revolving around environmental sustainability and operational optimisation is driving a need for a new generation of skilled talents, including data analysts, sustainability experts, and automation engineers, to name a few. However, the current talent pool in Malaysia is not equipped with the necessary technical skills, and this gap is set to widen if effective measures are not taken.

On top of that, it is imperative to note that in any industry, it is always preferred that talents are well-rounded and equipped with desirable soft skills so they can attain their fullest potential. Soft skills are personal attributes that enable individuals to work effectively with others and are highly sought-after by employers across industries. One of the most highly-sought soft skills in the industry is crisis management skill. The logistics industry, like any other industry, is vulnerable to unexpected events that can disrupt its supply chain and operations. These disruptions can range from natural disasters, cyber-attacks, and political instability to pandemics such as the Covid-19 crisis. Therefore, it is crucial for talents in the industry to possess crisis management skills to be able to handle and mitigate these disruptions effectively.

Crisis management skills involve the ability to identify, evaluate and respond to unexpected events in a timely and effective manner. In the logistics industry, this means having contingency plans in place, including alternative routes and modes of transportation, to ensure the continuity of supply chain operations. It also involves the ability to quickly assess and respond to supply chain disruptions to minimise the impact on customers and the business as a whole. The Covid-19 pandemic has highlighted the importance of crisis management skills in the logistics industry. The pandemic led to unprecedented disruptions in the industry, from port closures to flight cancellations, which affected the delivery of goods and services globally. The industry had to adapt to these changes, and talents with crisis management skills were in high demand. These talents were instrumental in navigating the crisis and minimising the impact on the industry. Such skills are not only essential during a crisis but can also help prevent future disruptions. Talents with these skills can identify

potential risks and develop proactive measures to mitigate them.

In addition, several of the highly-sought soft skills in the industry include communication, collaboration, and adaptability. These skills are essential for prospective talents in the logistics industry as their future career would require them to interact with a range of stakeholders, including clients, suppliers, and regulatory bodies, among others. Effective communication skills are necessary for logistics talents to communicate efficiently with stakeholders and ensure frictionless operations. This entails the ability to communicate both orally and in writing, to listen actively, and to understand the perspective of others. Problem-solving skills are another critical soft skill in the industry, where talents must be able to identify problems, analyse them and come up with effective solutions. This involves the ability to think critically, make the best decisions, and take calculated risks.

Adaptability is another highly-sought soft skill in the industry, as the industry is continually evolving, and talents must be able to adapt to new technologies and trends. This involves the ability to learn quickly, be receptive to changes, and embrace new ideas. Moreover, talents with great adaptability can help businesses to remain relevant and competitive in the industry. Hence, it can be recognised that critical soft skills such as effective communication, problem-solving, and adaptability would enable prospective talents to work efficiently with others and adapt to the ever-changing dynamics of the logistics industry. As such, employers and academia should prioritise the development of soft skills in prospective talents and invest in programmes that focus on building these skills.

As the logistics industry continues to grow and evolve, prospective talents may find it advantageous to pursue additional certifications or credentials to enhance their skill sets and stand out in the competitive job market. One such certification highly valued in the industry is the Certified Supply Chain Professional (CSCP) certification. The CSCP certification is awarded by the Association for Supply Chain Management (ASCM) and is recognised globally. The certification is designed to validate a talent's knowledge and skills in supply chain management, including logistics, operations, and procurement. Possessing this certification can demonstrate to potential employers a candidate's proficiency in the critical areas of supply chain management and logistics and can lead to better job opportunities and higher salaries.

Another highly sought-after certification in the industry is the International Air Transport Association (IATA) Dangerous Goods Regulations (DGR) certification. With the increase in e-commerce activities and online purchases, transportation of goods by air has become increasingly common. The IATA DGR certification is essential for prospective talents involved in the handling and transportation of dangerous goods by air. It covers the regulatory requirements governing the safe handling, transportation, and storage of hazardous materials. The certification can demonstrate a talent's understanding of the regulations governing the transportation of dangerous goods and their ability to handle them safely and efficiently. With the increasing importance of safety and compliance in the industry, having an IATA DGR certification can be a significant advantage for prospective talents.

Figure 2: Highly-sought soft skills by employers in IAC-Logistics 2022

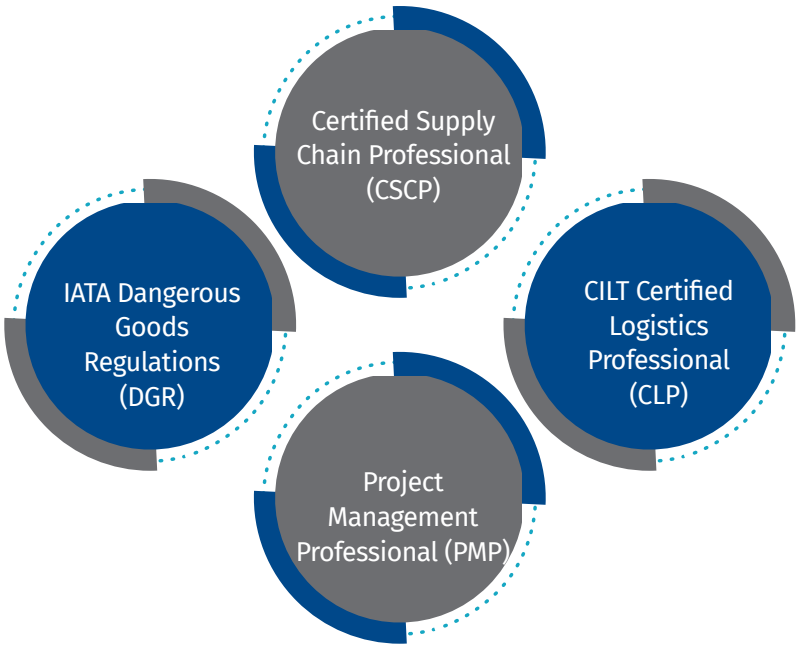

Figure 3: Commendatory additional credentials disclosed by employers in IAC-Logistics 2022

Another commendatory certification that can be valuable for prospective talents in the logistics industry is the Certified Logistics Professional (CLP) certification. The CLP certification is awarded by the Chartered Institute of Logistics and Transport (CILT) and is recognised globally. It is designed to validate a talent's knowledge and skills in logistics and supply chain management, including inventory management, procurement, and transport operations. Apart from certifications, having credentials in areas such as project management and data analysis can also be beneficial for prospective talents in the logistics industry. For instance, having a Project Management Professional (PMP) certification from the Project Management Institute (PMI) can demonstrate a talent's ability to manage projects efficiently. This is particularly relevant in the industry, where project management is critical in ensuring the smooth flow of goods and services.

Similarly, possessing data analysis-related credentials, such as certification in Microsoft Excel, can demonstrate a talent's ability to analyse data and make informed decisions. This is becoming increasingly relevant as the industry is being transformed by digitalisation, with the use of data and analytics playing an important role in improving operations. IAC-Logistics industry participants disclosed that these certifications would provide prospective talents with a competitive edge in the industry. By demonstrating proficiency in supply chain management, dangerous goods regulations, transport operations, project management, and data analysis, talents can position themselves as valuable assets to logistics enterprises seeking to remain agile and innovative in a rapidly-evolving market.

Structural Issues in Producing Relevant Talents for the Logistics Industry

Despite the increasing demand for talent revolving around the expertise of environmental sustainability and operational optimisation in the industry, there remain structural issues that have restrained the production of such talent, making it more difficult for companies to adapt to the rapidly changing business landscape. These issues need to be identified and addressed to ensure the industry's continued growth and development.

One of the primary structural issues in producing relevant talents for the industry is the lack of specialised courses or programmes that cater to the unique needs of the logistics industry. Many logistics employers find that recent graduates, even those with relevant degrees, often lack the practical skills and experience needed to perform well in a logistics-related role. This suggests that the current logistics-related curriculum in HEIs lacks industrial inputs and designs. Without inputs from industry players, these institutions are unable to tailor their programmes to meet the specific needs of the logistics industry. Hence, it has been acknowledged that there is a vital need for specialised logistics training programmes that provide more hands-on experience so that these prospective talents can perform competently in their future career.

It has also been recognised that several institutions are unaware of the latest development and trends in the logistics industry, resulting in outdated curriculums that do not meet the need of the industry. An absence of industry-relevant courses and programmes would lead to a

problem of misalignment between the skills taught in HEIs and the skills required by the industry. Another area for improvement is the outdated teaching methods used by many institutions. Traditional lecture-based teaching does not provide students with hands-on experience, which is critical in the logistics industry. Students need to be exposed to real-world scenarios and given the opportunity to apply their knowledge in a practical setting. Additionally, the lack of resources for HEIs has also hindered their ability to produce relevant talents for the industry. Many institutions are unable to update and revise their curriculum to meet the industry's standard because of the rather significant restructuring costs.

The lack of diversity in the logistics workforce is another structural issue that needs to be addressed. The industry is still seen as a male-dominated field, which may deter women from pursuing a career in logistics. This lack of diversity results in a smaller pool of talent and limits the industry's ability to draw from a diverse range of perspectives and experiences. Furthermore, the logistics industry also struggles with retaining talent, especially those with technical expertise. Some graduates may find that the industry lacks career progression opportunities or that their skills are not being utilised fully. Employers need to provide clear career paths and training opportunities for employers to retain them and encourage their growth. This shows that the lack of specialised courses, misalignment between skills being taught and industry requirements, and lack of diversity all contribute to the talent demand-and-supply disparity in the industry.

What has been done?

Initiatives by Industry's Stakeholders

In response to the growing talent demand-and-supply disparity in the logistics industry, stakeholders have taken various initiatives to address the issue. These initiatives range from public-private partnerships to industry-led initiatives, which are targeted at nurturing young talents and upskilling the current workforce. This section will highlight some of the key initiatives that have been implemented to address the critical talent need in the industry.

One notable initiative is the Malaysia Logistics Council (MLC) Talent Development Programme. This programme is an industry-led initiative that seeks to identify and nurture young talents in the logistics industry. The programme provides students with hands-on experience in the industry through internships and job shadowing opportunities. The MLC Talent Development Programme also provides training and development opportunities to upskill the current workforce, enabling them to adapt to the changing needs of the industry. Another notable initiative is the collaboration between logistic companies and HEIs. Many logistics enterprises have established

partnerships with HEIs to offer internships, industrial training, and job opportunities to students. This collaboration enables students to gain practical experience in the industry, and it also provides logistics companies with a pool of potential candidates for future employment. One such partnership is between DHL and Universiti Teknologi MARA (UiTM). DHL has established an innovation centre at UiTM where students can gain practical experience in logistics and supply chain management.

Additionally, the government has also implemented various initiatives to address the talent gap in the industry. One such initiative is the National Dual Training System (NDTS) or Sistem Latihan Dual Nasional (SLDN). The NDTS/SLDN is a government-led initiative that provides a dual training system to students, enabling them to gain practical experience in the industry while pursuing their academic studies. The NDTS/SLDN has been implemented in various sectors, including the logistics industry, and it has been rather successful in producing a pool of skilled and competent talents for the industry. Another government-led initiative is the establishment of the Human Resource Development Corporation (HRDC). HRDC is a government-linked agency that provides financial assistance to industry players for the upskilling and reskilling of their workforce. The fund enables companies to provide training and development opportunities to their employees, enabling them to adapt to the changing needs of the industry. HRDC has been relatively successful in upskilling the current workforce in the logistics industry, and it has also provided a platform for logistics

companies to attract and retain top talent.

Furthermore, the Malaysian government has also established the Logistics and Trade Facilitation Masterplan to develop the national logistics industry. The masterplan provides a roadmap for the development of the industry, and it includes various initiatives to address the talent gap in the industry. One such initiative is the establishment of the Logistics Industry Development Committee (LIDC). The LIDC is a committee that brings together key stakeholders to address issues facing the industry. The LIDC provides a platform for collaboration and cooperation between logistics enterprises, HEIs, and the government to develop and implement initiatives to address talent-related issues in the industry. The aforementioned initiatives have been relatively successful in producing a pool of skilled and competent talents for the industry. Nonetheless, there is still room for improvement, and stakeholders must continue to collaborate and cooperate in developing and implementing initiatives that effectively address the talent demand-and-supply disparity in the industry.

What can be done?

ACADEMIA

Coordinate industrial exposure programmes during semester breaks Such programmes would help students gain valuable industry contacts and network with professionals in the field. In turn, this can lead to job opportunities or recommendations upon graduation.	Low Effort Required
Implement curricular assessments based on projects and hands-on experience This approach allows students to apply their theoretical knowledge in real-world situations, thus preparing them for the challenges they may face in the industry. By working on projects and assignments that reflect real-life scenarios, students can gain practical skills such as problem-solving, critical thinking, communication, and teamwork. Additionally, implementing curricular assessments based on projects and hands-on experience can help students develop a deeper understanding of the logistics industry and its operations.	Low Effort Required
Organise an alumnus mentoring programme Through regular interaction with alumni who have already established their careers in the industry, students can gain valuable insights into the industry's latest developments, trends, and best practices. Alumni can also provide guidance to students in areas such as career choices, skill-building, and networking opportunities. In addition, an alumnus mentoring programme can also help to create a strong sense of community among graduates of institutions, fostering long-term relationships and promoting ongoing collaboration between industry and academia.	Low Effort Required
Update and revise current curriculum in HEIs Both industry players and academia share the sentiment that there is a critical need to revise and update logistics-related curricula in HEIs to improve the relevance of prospective talents in the evolving industry. This involves engaging with industry stakeholders to identify the skills that are becoming increasingly in demand and forecasting the skills that will be needed in the future. More significant industrial input should be incorporated into the design of a newer and more up-to-date curriculum. More emphasis should be placed on environmental sustainability and operational optimisation.	Moderate Effort Required
Lengthen the duration of internships With an extended period, students can engage in more comprehensive and in-depth tasks that allow them to gain more experience and skills. The longer duration also allows students to build stronger relationships with industry players, providing them with better prospects for future employment.	Moderate Effort Required

INDUSTRY

Disseminate awareness of career prospects in the industry

Low Effort Required

Many students and young graduates remain unaware of the potential opportunities and career paths available within the industry. By highlighting the industry's potential and opportunities, the industry can attract a broader pool of talent and address the talent shortage issue in the long run.

Organise a networking/industrial insight-sharing session

Low Effort Required

Such an event provides a platform for professionals to share their knowledge and experiences with aspiring talents, bridging the gap between theory and practice. It also creates an opportunity for prospective employees to connect with potential employers and establish meaningful relationships within the industry.

Through such sessions, aspiring talents can gain a better understanding of the industry's expectations and the skills required to excel in their prospective roles.

Organise a business challenge competition

Moderate Effort Required

Such a competition can provide opportunities for students and young graduates to showcase their skills and knowledge in a practical setting while also allowing them to network with industry professionals and gain valuable feedback on their work. By participating in these competitions, participants can develop problem-solving and critical thinking skills, as well as gain exposure to real-world challenges faced by the logistics industry.

Offer a more attractive remuneration package

Significant Effort Required

IAC-Logistics industry participants shared that the industry is often made as a transitory point for talents before moving on to other sectors with more lucrative pay. The industry is also known for its demanding and high-pressure work environment, which further emphasises the importance of providing fair compensation to its employees. By offering a more attractive remuneration package, the industry may be able to improve its talent retention position.

OTHER STAKEHOLDERS

Facilitate more industry-academia programmes

Significant Effort Required

The most significant impact that can be achieved from implementing such programmes is that HEIs can gain insights into the latest industry developments, enabling them to design courses and programmes that meet industry demands. Furthermore, such programmes encourage partnerships and collaborations between industry and academia, ultimately fostering a mutually beneficial relationship.

Improve the industry's technological capacity and capability Improving the industry's technological capacity and capability in environmental sustainability and operational optimisation is of paramount importance to produce relevant talent for the industry. With a growing demand for sustainable and optimised logistics solutions, industry stakeholders must integrate innovative technologies to remain competitive so prospective talents can gain experience in operating such technologies.	Significant Effort Required

Way forward

The Need to Produce Talent Revolving Around Environmental Sustainability and Operational Optimisation

The logistics industry is undergoing rapid transformation, driven by the need to be more environmentally sustainable and operationally efficient. This transformation is necessitated by the increasing demand for faster and more efficient delivery of goods, as well as the need to reduce the carbon footprint of logistics operations. As a result, there has been a growing demand for talents with expertise in environmental sustainability and operational optimisation, which are essential for the industry to achieve its goals.

However, the current structure of the talent ecosystem may be inadequate to fulfil this new requirement. For instance, the higher education system may not be producing sufficient graduates with the relevant skills and knowledge to support the logistics industry's transformation. This is because the curriculum of many logistics-related courses may not be keeping up with the latest developments in the industry and may not be adequately preparing graduates for the challenges of a rapidly-evolving industry. In addition, the logistics industry may not be doing enough to attract and retain the best talent. This is because the industry is still viewed by many as a low-skilled, low-paid sector, even though it is undergoing a significant transformation. As a result, the industry may be losing out on talented individuals who could significantly contribute to its growth and development.

To address these issues, it is imperative for the logistics industry to improve its technological capacity and capability in environmental sustainability and operational optimisation. This can be achieved through the adoption of new technologies and innovative practices that enable logistics companies to operate more efficiently and sustainably. For instance, the use of autonomous vehicles, drones, and smart logistics systems can help to reduce the carbon footprint of logistics operations while also improving efficiency and reducing costs. Moreover, the logistics industry needs to work closely with HEIs to ensure that they produce graduates with the skills and knowledge required by the industry. This can be achieved by developing industry-led curricula, internships, and other programmes that provide students with real-world experience and exposure to the latest trends and developments in the industry. Furthermore, the industry needs to work on improving its reputation as being an attractive and high-paying sector. This can be achieved through better pay and benefits packages, as well as by promoting the industry as a place where talented individuals can make a real difference and have a positive impact on society.

In conclusion, to effectively address the identified, talent-related issues, the industry needs to improve its technological capacity and capability, work closely with HEIs, and improve its reputation as an attractive and high-paying sector. By doing so, the industry can develop and retain the best talent and ensure its continued growth and development.

Acknowledgement

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Further Reading

Global Information, Inc. (2023). *Market Research Report: Malaysia Freight and Logistics Market – Growth, Trends, Covid-19 Impact, and Forecasts.* (Available at: https://www.giiresearch.com/report/moi1200986-malaysia-freight-logistics-market-growth-trends.html)

Worldwide Recruitment Solution. (2022). *The Importance of Sustainability in Logistics.* (Available at: https://www.worldwide-rs.com/blog/2022/02/the-importance-of-sustainability-in-logistics-and-supply-chain?source=google.com)

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Sector-Focused

Industry-Academia Collaboration (IAC)- Oil & Gas Services & Equipment (OGSE) Workshop Report

With support from the Ministry of Higher Education Malaysia (MoHE) and executive assistance from Malaysia Petroleum Resources Corporation (MPRC).

Executive Summary

With a focus on higher education, this Industry-Academia Collaboration in the Oil and Gas Services and Equipment (IAC-OGSE) sector brief explores how best to bridge disparities in talent demand and supply in the OGSE industry. According to the National OGSE Industry Blueprint produced by the Malaysia Petroleum Resources Corporation (MPRC), an agency under the Ministry of Economy, the Malaysian OGSE industry has been a key contributor to the country's economy, generating an annual revenue of more than RM65.1 billion and providing employment to approximately 59,000 core talents.[1] However, the industry is facing challenges in meeting the rapidly evolving needs and expectations of the market, particularly in the focus areas of sustainability, renewable energy management, and digitalisation. This has resulted in a talent demand-and-supply disparity, which poses a significant threat to sustaining the industry's long-term economic gain and development.

The Malaysian OGSE industry has been impacted by the urgent call for energy transition, which sees the energy industry moving towards a more sustainable model that is focused on renewables and less dependent on fossil fuels. Consequently, there is now a need for the industry to adopt new technologies and practices that support sustainable development, such as digitalisation and low carbon emission solutions. Yet, the industry is facing a talent demand-and-supply gap in these areas, hindering its ability to rapidly adopt and adapt to the changing market needs and expectations. This is primarily due to a lack of relevant education courses and training programmes that focus on competencies in the areas of sustainability and digitalisation. On top of that, numerous OGSE enterprises in Malaysia are still reliant on traditional modes of operation and lack capital for investment in digital technologies and sustainability initiatives. A direct result of this diminutive emphasis in the aforementioned areas is that there will be lesser production of relevant talents by higher education institutions (HEIs) for the current growing need of the industry.

A consensus that was established by the participants of the IAC-OGSE workshop is that the industry and its stakeholders need to implement a comprehensive strategy to produce a healthy and sufficient number of skilled OGSE talents to ensure its continued growth and development. This includes investing in the development of a strong talent pipeline that can meet the evolving needs of the industry, particularly in the aforementioned areas of sustainability and digitalisation. Through the IAC-OGSE focus groups held with key industry players and members of the academia, it is agreed that a holistic OGSE talent development ecosystem for our nation requires three key drivers to be addressed: 1) Revising the curriculum of OGSE-related courses in HEIs, 2) Placing greater emphasis in the areas of sustainability, renewable energy management, and digitalisation, and 3) Developing a robust talent pipeline via more proactive and frequent industry-academia collaborations.

What are the issues?

Current Scenario

It has been established that the Malaysian OGSE industry has long been contributing to the general well-being of the national economy, so it is imperative to safeguard the industry's progress and continued growth. To achieve such an objective, the industry requires a relevant and highly-skilled workforce with the technical expertise necessary to drive innovation and growth. In this regard, several key technical skills are in high demand in the OGSE industry, particularly in the specialisations of sustainability and low carbon emission, renewable sources management, and digitalisation.

Sustainability and Low Carbon Emission Solutions

The increasing relevance and significance of talent needs in the areas of sustainability and low carbon emission in the Malaysian OGSE industry cannot be overstated. With the global push towards sustainable practices, the OGSE industry must adapt and innovate to remain competitive and relevant in the market. This requires a pool of relevantly-skilled talents that are equipped to meet the industry's future challenges and demands. The OGSE industry in Malaysia has traditionally been focused on the extraction and processing of fossil fuels. However, the rapid evolution of the energy landscape has led to a need for greater emphasis on sustainability and low carbon emission. This shift towards sustainable practices has created a significant demand for talent in the areas of energy efficiency and sustainable technologies.

Furthermore, the push towards sustainable practices is not only driven

1 Malaysia's National OGSE Industry Blueprint is a comprehensive plan and initiative by the government to revitalise its OGSE industry.

by global concerns for the environment but also by industry stakeholders such as the national government and investors. The Malaysian government has set ambitious targets for the reduction of greenhouse gas emissions and the promotion of sustainable practices. One such target the Malaysian government set is the Low Carbon Nation Aspiration 2040. The Aspiration primarily aims to accelerate developments in low carbon sectors, such as expanding energy efficiency practices and increasing the adoption of electric vehicles (EVs).[2] This Aspiration is expected to create a significant positive economic advancement impact with greater job opportunities and higher Gross Domestic Product (GDP). In other words, the current shift towards sustainable practices and energy efficiency has the potential to create new markets and opportunities for OGSE enterprises in Malaysia. Consequently, this has led to an increasing demand for skilled talent in the areas of sustainability and low carbon emission solutions, as OGSE enterprises must adapt to the changing industrial landscape and meet the demands of their stakeholders.

The pursuits in sustainability and low carbon emission area can also be observed to be increasingly prevalent in the industry as Petroliam Nasional Berhad (Petronas), as one of the top OGSE frontrunners in Malaysia, is leading the low carbon emission solutions domain. In 2022, Petronas' establishment of its Carbon Management Division (CMD) aimed to pursue key low-carbon initiatives prioritising carbon dioxide management and development of the Carbon Capture and Storage (CCS) business.[3] CCS business is hoped to be part of the solution to decarbonise the extraction of hydrocarbon and improve the state of sustainability of the OGSE industry. Moreover, Malaysia has identified sufficient fields for safe carbon storage to cater for domestic and regional emissions, which means that CCS is a viable and practical economic solution to achieving low to zero carbon emission targets. With Petronas paving the way for CCS ventures, it can be extrapolated that other OGSE players may follow suit in this direction, which in turn, will increase the demand for skilled talents that would enable OGSE enterprises to enter low carbon emission ventures.

Energy Transition to Renewable Sources

There is an established consensus that the energy landscape is rapidly evolving, and the transition to renewable energy sources is undeniably one of the identified key transformations of the OGSE industry. This shift has created a need for skilled talents in the areas of renewable energy management, particularly in the specialisations of renewable energy generation and energy storage. This transition requires significant investment in renewable energy infrastructure and technologies, as well as a skilled workforce to drive innovation and implementation. One of the key areas of realising the energy transition to renewable sources in the industry is the development of renewable energy generation technologies. This includes solar, wind, and hydroelectric power technologies, which are becoming increasingly important in the country's energy mix. Skilled talents are needed to design, develop, and implement these technologies, as well as to manage and maintain renewable energy infrastructures.

In addition to renewable energy generation, the transition to renewable energy sources also requires investment in energy storage technologies. Energy storage is critical for ensuring a stable and reliable energy supply from renewable sources, as it enables the storage of excess energy generated during times of high production for use during periods of low production. Skilled talents are needed to design and develop energy storage technologies, as well as to manage and maintain them. On top of that, hydrogen has also emerged as a promising alternative to fossil fuels due to its clean-burning properties and ability to be produced from renewable sources. From the IAC engagement, industry players disclosed that the national OGSE industry has a vital role in the development of the hydrogen economy, including the design and construction of hydrogen production facilities, transportation infrastructure, and storage facilities. The implementation of these significant projects will undoubtedly require skilled talents to drive innovation and to ensure a safe and efficient operation of hydrogen infrastructure.

Digitalisation (Data Analytics and Machine Learning)

Digitalisation has also been acknowledged as a key aspect transforming the OGSE industry, and a large pool of talents in this field is required to drive productive

2 Low Carbon Nation Aspiration 2040 is a national low-carbon plan set in the National Energy Policy 2022-2040.

3 Carbon Capture & Storage is one of Petronas' approaches to achieve its decarbonization plan.

progress. The OGSE industry in Malaysia has been adopting digital technologies to increase operational efficiency, reduce costs and improve safety. This transformation demands skilled talents to design, develop, and implement digital solutions that are tailored to the unique needs of the industry. One of the key areas of focus in the digitalisation of the OGSE industry is the use of data analytics. This involves the collection, analysis, and interpretation of data to provide insights and guides for decision-making processes. This means that skilled talents are needed to design and develop data analytics solutions that will enable OGSE enterprises to manage large and complex data sets and achieve better operational efficiency.

Another important area of focus in the digitalisation of the OGSE industry is the use of digital twins. Digital twins are virtual replicas of physical assets, such as oil rigs or pipelines, that allow for real-time monitoring and predictive maintenance. Skilled talents with competencies in overseeing digital twin solutions are needed to manage the complex and hazardous environments of the industry. On top of that, the adoption of artificial intelligence (AI) is also becoming increasingly relevant and important in the industry. AI can be used to automate routine tasks, improve safety and security, and reduce operational costs. Additionally, the use of robotics is also gaining more prevalence in the industry. Robotics can be used to perform tasks that are dangerous or difficult for humans to perform, such as underwater inspection or maintenance. Hence, the ability to manoeuvre and maintain robotics solutions too has become one of the highly-sought skills by employers in the industry. The aforementioned skills revolving around the domain of digitalisation, such as data analytics and machine learning, digital twin solutions, and robotics, undeniably show that digital expertise is gaining more relevance in the industry.

During the engagement with OGSE enterprises, they advanced that technical skills that revolve around the novel domains of sustainability practices, renewable energy management, and digitalisation are getting increasingly relevant and favoured in the industry and will continue to be so in the decades to come. These players believe that talents that possess the aforementioned skills will be able to propel the industry's economic growth to a greater height in this age of rapid transformation of the energy landscape. The following are several highly-sought technical skills in the OGSE industry as disclosed by the participating players:

Other Relevant Skills (primarily Engineering and Geoscience)

Despite the increasing demand for talent in novel areas such as sustainability practices, renewable energy management, and digitalisation, the demand for talent in conventional areas such as engineering and geoscience remains strong in the OGSE industry. One of the highly-relevant technical skills in the industry is engineering expertise, particularly in the areas of petroleum, electrical, and mechanical engineering. Talents with petroleum engineering-related competencies are imperative for the exploration, extraction, production, and refinement of non-renewable, natural resources, while talents with electrical and mechanical engineering expertise are of great importance for the design, development and maintenance of electrical systems used in power drilling rigs, offshore platforms and other vital infrastructures. This need for talents in the field of engineering is evident and is further highlighted in TalentCorp's 2020/2021 Critical Occupations List (MyCOL) report, which outlines that roles such as mechanical engineering technicians, manufacturing professionals, and construction supervisors[4] are still relevant in the OGSE industry.

On top of that, talents with skills and knowledge in geoscience are also still relevant and highly sought-after by OGSE employers. One of the key areas of focus in geoscience is the use of advanced seismic imaging technologies to generate detailed images of the subsurface, including the identification of potential hydrocarbon reservoirs. Another important area of focus in geoscience is the use of reservoir modelling and simulation. This involves the use of elaborate software tools to model hydrocarbon reservoirs, predict production rates, and identify enhanced oil recovery (EOR) opportunities. The skills to competently use seismic imaging technologies and software tools to model and simulate hydrocarbon reservoirs are still core in the industry, and such explains why talents that demonstrate proficiency in these specialisations of geoscience are highly sought after by OGSE enterprises. Furthermore, the current state of the industry increasingly demands talents with expertise in distributed control systems (DCS) to manage and optimise the distribution of energy resources. In the OGSE

4 TalentCorp Critical Occupations List 2020/2021 Occupation Report.

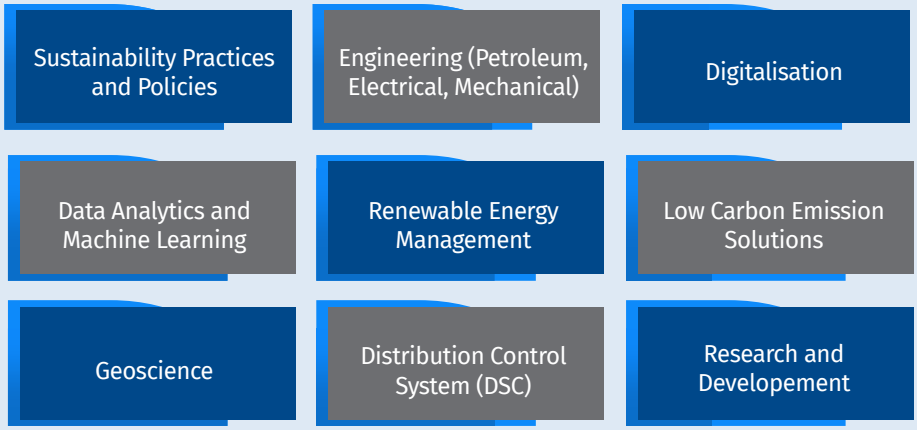

Figure 1: Highly-sought technical skills by employers in IAC-OGSE 2022

industry, DCS is used to manage the distribution of oil, gas, and other energy resources and to ensure that these resources are delivered safely and efficiently.

Hence, it can be established that the current talent need of the OGSE industry is primarily revolving around the domains of sustainability, renewable energy management, and digitalisation. Despite the greater emphasis on the novel areas of the industry, it is also worth noting that the demand for talent in conventional areas such as engineering, and geoscience is still firm in the industry as OGSE enterprises seek to fill roles related to these fields. Hence, if the industry were to sustain its projected economic gain, it is crucial that education programmes and courses based on the identified technical skills are to be implemented in local HEIs. However, as shared by industry experts, despite the implementation of numerous OGSE-related study courses in HEIs, prospective talents are, unfortunately, still unsatisfactorily equipped with industry-relevant skills.

On top of that, It is imperative to note that in any industry, it is always preferred that talents are well-rounded and equipped with desirable soft skills to attain their fullest potential. One of the most important soft skills that was repeatedly highlighted by OGSE industry players is effective communication. Effective communication is more than just speaking with clarity; it involves active listening and using appropriate language and tone. In the OGSE industry, technical knowledge and expertise are essential, but without effective communication, it can be challenging to collaborate and deliver projects successfully. Moreover, effective communication is vital for conveying complex ideas, proposals, and project plans in a clear and concise manner. It also helps in preventing misunderstandings and delays in project implementation.

On top of that, interpersonal and stakeholder engagement are another set of soft skills highly sought-after by OGSE enterprises. This set of skills is highly essential, particularly when there is a need to build relationships with and manage the expectations of stakeholders. In the industry, this can include engaging with clients, investors, local communities, and government agencies. Solid interpersonal and stakeholder engagement skills can help to build trust, positive connections, and mutual respect. Furthermore, the rapidly evolving and dynamic OGSE industry also requires a pool of talent that possess great adaptability. Adaptability is defined as the ability to adjust to new and changing situations. In the context of the industry, this means being able to respond to new technological advancements, regulatory changes, and shifts in market demand. The ability to adapt is particularly important in the current energy transition era, which sees the industry moving towards a more sustainable model that is focused on renewables and less dependent on fossil fuels. Additionally, the OGSE industry is characterised by a high degree of uncertainty and volatility, notably in the wake of the Covid-19 pandemic. This has placed a premium on talents who are agile and can respond quickly to changing circumstances. Those who are able to thrive in this challenging environment will be well-positioned for success in the industry.

Teamwork and collaborative nature are another set of soft skills that is essential for prospective talents in the OGSE industry. This skill is essential and required in the process of implementation of any project. In the OGSE industry, projects are often complex, multi-faceted, and involve collective efforts from colleagues of different backgrounds. Working in a team requires a certain level of collaboration to ensure all parties are aligned with project objectives and deliverables. Hence, talents who can work collaboratively with other team members are invaluable to any organisation in the OGSE industry. In addition to teamwork and collaborative nature, the ability

Figure 2: Highly-sought soft skills by employers in IAC-OGSE 2022

to think creatively and critically is becoming more crucial for prospective talents to possess. Creative thinking is essential in the industry, as it enables talents to approach problems and challenges in innovative ways, and innovation is key in the industry, as it drives growth and enables enterprises to stay competitive. Creative thinking is also vital in developing new products, services, and strategies to help organisations thrive. Critical thinking is equally important as it allows talents to analyse and evaluate data, identify patterns, and make sound decisions. In the OGSE industry, where many decisions can have serious consequences, critical thinking is vital in ensuring that talents make well-informed choices that align with business objectives.

In the OGSE industry, crises can occur at any time and can have far-reaching effects. Therefore, it is critical for prospective talents to possess crisis management skills to effectively deal with difficult situations and minimise the impact of any crisis. Crisis management is the ability to plan for, respond to, and recover from crises in a way that minimises their impact on businesses and operations. In the absence of talents with such a skill, it would be relatively difficult and more costly for enterprises to recover from any unforeseen, commercially-crippling crisis. Hence, to stay relevant in the OGSE industry, it is essential for prospective talents to develop soft skills such as effective communication, interpersonal and stakeholder engagement, adaptability, teamwork, creative and critical thinking, and crisis management, in addition to their technical skills. This is because OGSE enterprises are actively seeking for well-rounded talents who can bring a range of skills and perspectives to the table. By developing the aforementioned soft skills, prospective talents can position themselves for success in this rapidly evolving industry.

As the OGSE industry continues to re-coordinate its energy strategies, prospective talents may find it advantageous to pursue additional certifications or credentials to enhance their skill set and stand out in the job market. One such credential widely recognised and highly sought in the industry is the Project Management Professional (PMP) certification. This certification validates the knowledge and skills of talents in project management. PMP-certified talents are equipped with the necessary expertise needed to manage complex projects effectively, from planning to execution and monitoring. This certification is particularly relevant for project manager, project engineer, and project coordinator roles. In addition to PMP, Lean Six Sigma certification is another commendatory credential for prospective talents to possess. Lean Six Sigma-certified talents have a comprehensive understanding of process improvement and the ability to identify risks, errors, or defects in a business process. As OGSE enterprises seek to optimise their operations and reduce costs, this certification will relatively improve prospective talents' employability in the industry.

On top of that, International Well Control Forum (IWCF) certification is also a credential that is highly sought-after by OGSE employers. The IWCF certification programme is designed to ensure that candidates have a thorough understanding of well control principles and practices. The certification process involves rigorous training and examination, which covers topics such as wellbore pressure control, well control equipment and methods. In the OGSE industry, IWCF certification is highly valued by employers and is often a requirement for drilling positions. The certification provides assurance to employers that talents possess the required skills and expertise to perform drilling operations safely and efficiently. Furthermore, the Basic Offshore Safety Induction and Emergency Training (BOSIET) is another commendatory certification in the industry. This certification is designed to provide offshore workers with the necessary knowledge and

skills to work safely on offshore facilities. In the OGSE industry, where offshore natural resources exploration and production play a significant role, BOSIET certification can demonstrate a talent's readiness and commitment to safety. BOSIET training covers topics such as offshore hazards, survival techniques, firefighting, and first aid. The certification includes practical training in a simulated offshore environment, giving candidates hands-on experience in dealing with emergencies.

Another commendatory credential highly sought-after in the OGSE industry is certification in the use of software tools such as ECLIPSE or Petrel. These certifications validate talents' proficiency using software tools such as ECLIPSE or Petrel that are widely applied in the industry. These two software tools are often used by OGSE enterprises for geological and reservoir modelling, field development planning, production forecasting, and well designing. The prevalence of the use of these software tools in the industry means that it is vital for prospective talents to obtain credentials that demonstrate their proficiency in applying these instruments so they can improve their relevance and employability. Additionally, Enterprise Resource Planning (ERP) certification is also commended by OGSE players for prospective talents to possess. ERP is a software system that helps organisations manage and integrate their core business processes, such as finance, human resources, and supply chain management. As the industry continues to digitalise, ERP systems are becoming increasingly essential for managing large-scale projects and optimising operational efficiency.

Moreover, it was also shared by IAC-OGSE industry participants that it is preferred that prospective talents obtain professional engineer certification governed by the Board of Engineers Malaysia (BEM). Having a professional engineer certification demonstrates that a talent possesses the necessary skills and knowledge to perform tasks such as designing, operating, and maintaining equipment and facilities involved in a number of operations. IAC-OGSE industry participants disclosed that these certifications and additional credentials would provide prospective talents with a competitive edge in the industry. By demonstrating proficiency in areas such as petroleum and mechanical engineering, use of simulation software tools, project management, offshore safety, and operational improvement, talents can position themselves as valuable assets to OGSE enterprises seeking to remain agile and innovative in a rapidly-evolving market.

Structural Issues in Talent Development in the OGSE Industry

It has been established in the preceding part of this brief that there is a high demand for talents with technical skills in the specialisations of sustainability, renewable energy management, and digitalisation. On top of that, there is still a significant emphasis on talents with proficiency in conventional areas of the industry, such as engineering and geoscience, which remain highly relevant. Despite the critical demand for talents revolving around the stated expertise and skills in the industry, there remain structural issues that have restrained the production of such talents, thus making it more difficult for the industry to fulfil the current industry need of adapting to the evolving energy landscape. These issues need to be identified and addressed to ensure that the industry can sustain its economic gains.

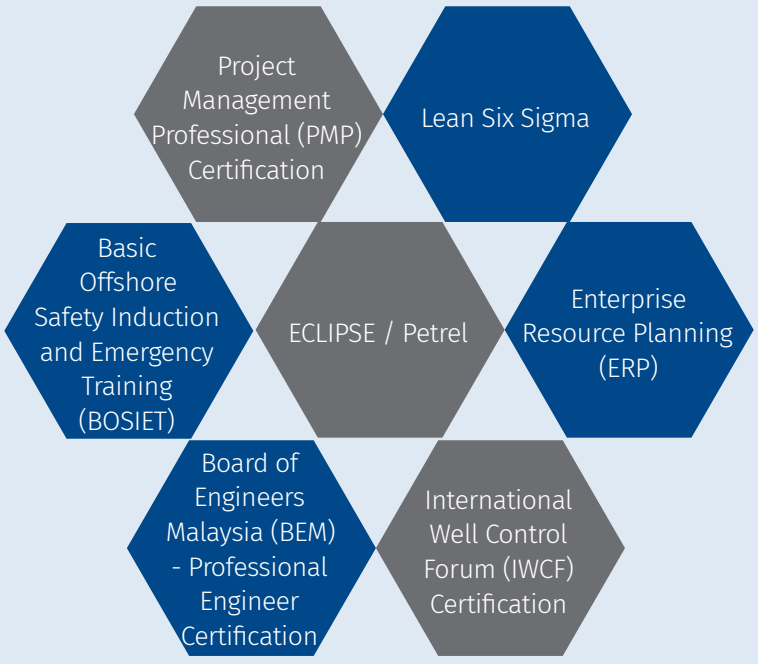

Figure 3: Commendatory additional credentials disclosed by employers in IAC-OGSE 2022

One of the primary structural issues in producing relevant talents for the industry is the lack of alignment between academic curriculum and industry expertise requirements. It was acknowledged that the current academic programmes in local HEIs are not adequately align to prep prospective talents for the skills required in the industry. The OGSE industry requires a workforce with diverse skills, such as engineering, geoscience, and energy management, among others. While some local HEIs undoubtedly offer courses in these fields, they do not have specific programmes tailored to the requirements of the industry. This mismatch between the skills required and those produced by the current academic programmes leads to a talent shortage in the industry. Furthermore, the lack of practical training programs in HEIs is also a significant issue. Theoretical knowledge alone is insufficient to prepare graduates for the practical aspects of the industry. Hands-on training is crucial to develop prospective talents for the technical and operational demands of the industry.

Another challenge is the perceived lack of attractiveness of the industry as a viable career option by prospective talents. IAC-OGSE industry participants shared that the industry is losing out on attracting talent as the current generation of graduates is more inclined to participate in the gig industry. The gig industry is increasingly favoured by the current youths in Malaysia due to its low barrier to entry and the offer of arguably satisfactory pay. Moreover, industry participants also shared that most young Malaysians perceive jobs in the OGSE industry as dangerous and difficult, and such has reduced the desirability of the industry in the eyes of budding talents. Ultimately, this has further discouraged the participation of the current generation of talents in the labour force of the OGSE industry. Such perception is also compounded by the fact that the industry has not done enough to promote itself and showcase the opportunities available to young Malaysians.

Additionally, the lack of diversity and inclusivity in the industry is also a significant structural issue that hinders the development of relevant talent in the OGSE industry. The industry has been primarily dominated by men, and there are very few opportunities for women and people from marginalised groups to work in the sector. IAC-OGSE academia participants shared that this lack of diversity and inclusivity creates a perception that discourages the enrolment of female students into industry-related study programmes. As a result, the industry is restricted to a smaller pool of prospective talents due to the lack of willingness of individuals from marginalised groups to participate in industry-relevant training or study programmes. Fundamentally, the absence of industry-specific courses and programmes in HEIs led to the misalignment between the expertise delivered by HEIs and the skills desired by the industry players. On top of that, the unattractive perception of industry jobs among potential talents and the lack of diversity and inclusivity hinders the influx of talents into OGSE-related fields. Thus, these primary structural issues require immediate attention and effective solutions by stakeholders if they wish to sustain the economic gain of the OGSE industry.

What has been done?

Initiatives by Industry's Stakeholders

In response to the growing talent demand-and-supply disparity in the OGSE industry, stakeholders have taken various initiatives to address the issue. This section will highlight some of the key initiatives implemented to address the critical talent need in the industry.

One of the initiatives implemented is the establishment of the Malaysia Petroleum Resources Corporation (MPRC) in 2011. MPRC plays a significant role in advancing the progress of the industry and executing initiatives to achieve such an end. The initiatives that MPRC implements are in the areas of trade and investment facilitation, technology and innovation, and most importantly, the development of human capital. On top of that, the Malaysian government, with executive assistance from the Malaysian Oil & Energy Services Council (MOGSC), also implemented Research and Development (R&D) Apprenticeship Programme to produce talents with relevant skills. It was acknowledged that local R&D talents are more theoretically inclined, and there is a need to develop talents' expertise in conducting practical and industry-applicable R&D activities. With the R&D Apprenticeship Programme, it was hoped that R&D talents' exposure to industry-applicable R&D could be increased and closer collaboration between industry and academia could be enabled.

Another initiative of talent development in the OGSE industry is the secondment of local talents to foreign R&D centres by the national government. MPRC as the overseer

of the initiative, expected that this approach could improve the innovativeness of R&D talents and increase their proficiency in R&D to the industry-required level. This initiative is also supplemented by another strategy of nudging OGSE multinational corporations (MNCs) in Malaysia to provide R&D support to local HEIs. This approach aims to allow MNC's R&D best practices and methods to diffuse into the local OGSE industry through local universities that have partnered with MNCs. Moreover, the national government and MPRC had also implemented a large-scale OGSE career promotion to increase talent influx into the industry. This initiative is important to address the issue of heavier competition posed by other industries in attracting prospective talents. This strategy is aimed to be executed at all levels of talent institutions, such as secondary schools, vocational schools, universities, and career placement centres.

The preceding part of this brief has highlighted the importance of engineering technical skills in prospective talents of the industry. This issue is hoped to be addressed via the initiative to expand engineering courses by the Ministry of Higher Education (MOHE). This is crucial to equip prospective talents with a holistic and comprehensive knowledge of the evolving energy landscape and the necessary training on energy transition. This initiative was undertaken by promoting the expansion of existing OGSE-related curricula in local HEIs to include adjacent sector topics, such as renewable energy management as electives, and by broadening the scope of study programmes to offer courses in Energy Engineering. Furthermore,

TalentCorp, with executive support from the Ministry of Human Resources, organised an initiative of expert mentorship from ex-OGSE talents to impart critical industry skills to budding talents. This initiative was primarily undertaken by encouraging skilled professionals who had exited the OGSE industry to return as internal trainers, mentors or subject matter experts in industry training centres or academia.

The aforementioned Initiatives have been relatively successful in producing a pool of skilled and competent talents for the industry. Nonetheless, there is room for improvement, and stakeholders must continue to collaborate and cooperate in developing and implementing initiatives that effectively address the talent demand-and-supply disparity in the industry.

What can be done?

ACADEMIA

Lengthen the period of internship

Low Effort Required

Industry participants of IAC-OGSE put forth the proposition of lengthening the duration of internship for final-year students.

Industry players believe that a longer internship period of at least six months would provide the time and space for students to be involved in more comprehensive tasks and to further improve their skills to excel in the industry.

Encourage students' participation in OGSE-related events (conferences, exhibitions, etc.)

Low Effort Required

Industry participants of IAC-OGSE advance that it would be desirable and productive for local HEIs to nudge prospective talents into participating in industry-related events such as Asian Oil, Gas & Petrochemicals Engineering Exhibition or Offshore Technology Conference Asia.

These events can provide students with the opportunity to interact with industry experts, learn about the latest developments in the industry, and gain insights into the skills and expertise required to succeed in the field.

Conduct FYP (Final Year Project) based on industrial inputs

Low Effort Required

IAC-OGSE industry participants propose that students conduct FYP based on problem statements provided by OGSE players. This approach would enable students to gain an in-depth understanding of real-world problems and develop practical solutions that meet the industry's needs.

On top of that, this strategy would also enable prospective talents to stay current and relevant in the trends and development of the industry.

Appoint experienced industry professionals as adjunct lecturers

Low Effort Required

Universities should consider appointing experienced industry professionals as adjunct lecturers as they have spent years working in the field and have a wealth of practical knowledge that they can share with students. They can also provide real-world examples and case studies that can help students understand the practical aspects of the industry.

Increase lecturers' involvement and exposure in industrial projects

Moderate Effort Required

Traditionally, lecturers focus on teaching and research in the academic setting, and their exposure to practical working of the industry may be limited.

However, by increasing their involvement in industrial projects, lecturers can gain valuable experience and insight into the industry's needs and requirements, ultimately improving their curriculum relatability and delivery.

Implement curricula revision in HEIs Both industry and academia share the perspective that there is a critical need to implement curricula review in HEIs for OGSE-related programmes to improve the relevance of prospective talents in the industry. It has also been concurred that new curricula should place greater emphasis on the bourgeoning domains of the industry, such as sustainability, renewable energy management, and digitalisation.	Moderate Effort Required

INDUSTRY

Organise industrial insight/sharing sessions Primarily, these sessions could help to create a culture of continuous learning within the industry. As the industry evolves and new technologies and practices emerge, it is essential that prospective talents stay up-to-date with the latest developments. Such events can provide a forum for ongoing learning, enabling talents to continually expand their knowledge and awareness.	Low Effort Required
Implement a more holistic internship programme There is a consensus among the participants of IAC-OGSE that internship programmes should be made more meaningful and comprehensive to produce relevant, skilled talents. For an internship programme to be effective, it is imperative that it is well-structured and provides consequential learning opportunities i.e the National Structured Internship Programme (MySIP) spearheaded by TalentCorp has been providing structured internship experiences with MySIP-endorsed companies since 2012. MySIP endorsed companies paying a minimum of RM 500 internship allowance are eligible to claim for double tax deduction for all related expenses incurred on the interns. This can include assigning nurturing supervisors to guide students through their internship, providing training and development opportunities, and offering regular feedback on their performance.	Moderate Effort Required
Organise a mentoring session/programme with industry professionals Mentorship programmes would not only provide an opportunity for personal and professional growth but would also serve as a means of networking. Moreover, mentorship programs would also provide prospective talents with exclusive insights into real-world issues that may not be covered in lectures. Furthermore, such programmes would also provide talents with a broader perspective on the industry. Mentors can share their experiences working in different areas of the industry, providing mentees with a deeper understanding of the various roles and opportunities available. This can help mentees identify their strengths and interests and make informed decisions about their career paths.	Moderate Effort Required

Organise or sponsor more upskilling programmes Such upskilling programmes could take various forms, including on-the-job training, apprenticeships, and external training courses. By investing in these programmes, the industry can help to bridge the skills gap and create a pipeline of competent talents. Not only would this benefit the industry in terms of having access to the necessary talent, but it would also provide talents with the opportunity to upskill and progress in their careers.	Moderate Effort Required
Offer a more attractive remuneration package As established in the preceding parts of this brief, the industry is not often perceived as a viable career option by the Malaysian youth. With the rise of digitalisation and the increasing need for sustainable and renewable energy sources, the OGSE industry requires a highly skilled and specialised workforce. However, these talents are in high demand and have numerous employment options to choose from. To remain competitive, OGSE enterprises should offer attractive remuneration packages that will create a greater influx of talent into the industry.	Significant Effort Required
Lend technologies to academia for better curriculum delivery By lending technologies to academia, the industry can help institutions to better understand the practical applications of the theories they impart to prospective talents. Furthermore, lending technologies to academia can also help to foster a culture of innovation and collaboration between the industry and academia. By working together, both stakeholders can identify areas where new technologies and approaches are needed and can collaborate to develop and implement them.	Significant Effort Required

OTHER STAKEHOLDERS

Improve the visibility and awareness of the industry IAC-OGSE participants share that relevant stakeholders need to play a more proactive role in promoting the industry's significance and contribution to the national economy to attract more talent and interest from the public. The long-term achievement of this approach would be reinvigorating talents' enrolment into OGSE-related study programmes and fields. IAC-OGSE participants believe that creating industry awareness should start from school to pique their interest and gain an encouraging idea about the industry.	Moderate Effort Required
Facilitate more industry-academia engagements IAC-OGSE participants hope that for talent/human capital development, government agencies can facilitate more industry-academia engagements so that all parties can have more discourse on pressing issues of the industry. They maintain that such programmes would ensure that both industry and academia can engage in constructive communication and coordinate necessary plans for the betterment of the industry.	Moderate Effort Required

Provide more allocation for talent development programmes There is a critical need for more financial allocation and concerted efforts for talent development programmes in the OGSE industry. These programmes can help to develop the relevant, skilled talents needed to support the advancement of the industry and ensure that it remains competitive and sustainable in the years to come.	Significant Effort Required
Establish an engagement nexus for industry and academia Such a nexus could serve as a collaborative, communicative platform for both industry practitioners and academics to work together in identifying the industry's specific skill needs, as well as to craft and implement initiatives to address them. This approach may also bring about the possible inception of a robust and dynamic talent development ecosystem.	Significant Effort Required

Way forward

The Need to Produce Talents in the Face of Evolving Energy Landscape

The Malaysian OGSE industry's contribution to the well-being of the national economy has been monumental and it is only rational for the government to sustain the industry's continued advancement. However, the industry is facing a talent demand-and-supply disparity issue, which may hinder the economic transformation and progress of the industry. Despite the government's plans and strategies to maintain the significance of the country's OGSE industry, the industry is still lacking in certain aspects of industrial advancement, particularly in talent development. This issue is imperative to be addressed as one of the key factors that will undoubtedly contribute to the success of the industry in the production of numerous sufficiently qualified OGSE graduates by local HEIs.

It has been established that the need to produce a number of OGSE-relevant talents must be sufficiently met in order to maintain the productive operation of the OGSE industry. To achieve this end, it is vital to improve the current OGSE-related curricula and implement more specialised study programmes that are tailored to the specific needs of the industry. It has been acknowledged that there is now a critical need to produce more talent in the domains of sustainability, renewable energy management, and digitalisation to facilitate a constructive evolution of the industry. Additionally, the perception of the industry as a less viable career option is also discouraging the enrolment of prospective talents into OGSE-related education programmes. IAC-OGSE participants shared that the current generation of Malaysian youth views professions in the industry as dangerous and difficult, thus ultimately creating a less desirable image of the industry. On top of that, the OGSE industry is also losing out in the competition of attracting talents into the industry as current talents are more inclined to participate in the gig economy instead.

To address these issues, there is a need to improve curriculum delivery and heighten the attractiveness of the OGSE industry. HEIs should collaborate closely with industry stakeholders to design and deliver courses that meet the industry's current and future needs and to create a more attractive perception of the industry among potential talents. Moreover, a consensus established via this IAC-OGSE programme is that there is a greater need for industrial presence and inputs in HEIs. This is because most of the initiatives advanced by the participants revolve around the theme of greater industry involvement in local talent institutions. Such is evident in a few of the possible approaches that were frequently highlighted by IAC-OGSE participants; appointing seasoned industry experts as adjunct lecturers in HEIs, enabling more lecturers' involvement in industrial projects, and OGSE enterprises providing problem statements or topics for students' final year projects.

All in all, the OGSE industry is rather hindered from adapting to the currently evolving energy landscape due to the major issue of talent demand-and-supply disparity. This predicament requires immediate attention, concerted efforts, and

effective solutions from all stakeholders. To efficiently address this issue, HEIs need to update their curriculum to revolve around the industry's critical requirements, and relevant stakeholders need to provide meaningful and empowering internship experiences and create a positive awareness of the industry to attract more talents into the field and retain them. With the future implementation of these recommendations, an optimistic view of the OGSE industry maintaining its economic contribution can be confidently championed.

Acknowledgement

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Further Reading

Prime Minister's Department, Economic Planning Unit. (2021). *National OGSE Industry Blueprint 2021-2030: Abridged Report.* (Available at: https://www.mprc.gov.my/sites/default/files/resources/National%20OGSE%20Industry%20Blueprint.pdf)

Prime Minister's Department, Economic Planning Unit. (2022). *National Energy Policy 2022-2040* (Available at: https://www.epu.gov.my/sites/default/files/2022-09/National%20Energy%20Policy_2022_2040.pdf)

Hidayah Mazlan, Petroliam Nasional Berhad. (2023). *Unlocking New Opportunities Through Carbon Capture & Storage.* (Available at: https://www.petronas.com/flow/technology/unlocking-new-opportunities-through-carbon-capture-storage#:~:text=Malaysia%20has%20sufficient%20fields%20that,which%20surpasses%20Malaysia's%20forecast%20of)

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