MBOT
LEMBAGA TEKNOLOGIS MALAYSIA
MALAYSIA BOARD OF TECHNOLOGISTS

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TECHIES

Big Data
and Construction Management

Malaysian Fashion Coalition
Developing the Future Sustainable Fashion Business Hub

Aplikasi Data Analitik dalam Pengurusan Institusi Pengajian Tinggi

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Techies 14th Edition

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CHIEF EDITOR'S NOTE

Brief overview of contents in TECHIES 14th Edtion

Dato' Ts. Dr. Mohd Mansor Salleh

TECHIES 14th Edition presents various topics to illustrate the wide-ranging diversity of specialisations amongst members of the Malaysia Board of Technologists. Utilisation of Big Data in the construction industry, applications of data analytics in tertiary education, zero-waste farmland, sustainable fashion industries and experience-sharing from the Malaysian Battalion 850-8 are the subjects presented.

Utilisation of Big Data in the construction industry brings about many benefits in the management of construction projects. The increase in size of construction projects, such as the development of mega shopping complexes or townships means greater challenges faced by the project manager. The elements of IR 4.0, including Big Data and Internet of Things, are essential to ensure the success of the projects.

The COVID-19 pandemic has undoubtedly changed many aspects of our life. In our quest to adapt to the new norm, data analytics plays a major role. For example, in tertiary education, matters related to the management of students' academic and social welfare have changed. The application of data analytics is much needed here, and it can also be extended to students' recruitment and selection, so as to ensure the suitability of candidates for the intended academic programmes.

One article in this edition envisages the future of zero-waste farmlands. To create sustainable farmlands, data analytics can help tremendously. An example is the just-in-time production of waste-based silage at precisely the correct moment for the consumption of livestock. Another example is the scheduled breeding of livestock so that supply meets demand without unnecessary additional time spent by the livestock at the farm.

A more accurate prediction of demand and preferences for fashion products can accelerate the achievement of a sustainable fashion industry. Although some fashion products can be customised, the existing market is dominated by non-customised products. Big Data and data analytics can provide a more precise match on supply-demand, enabling the fashion industry to produce less waste and hence will become more economically viable. This in turn will work out well for the environment.

The experience of the Malaysian Battalion 850-8 in securing environmental compliance during their United Nations Interim Force mission in Lebanon shows that practicing good environmental actions is possible under whatever constraints and circumstances. Indeed, caring for the environment is no less important than tending to the peace and security of human beings all over the world.

MBOT REGISTRATION (As of March 2022)

- **32,208** Graduate Technologists
- **6,745** Qualified Technicians
- **13,530** Professional Technologists
- **1,445** Certified Technicians

Total MBOT Registrants

53,720

PRESIDENT'S NOTE
- TECHIES 14th EDITION

Recently, at the National TVET Council Meeting (MTVET), the Prime Minister has announced several efforts to strengthen the TVET ecosystem in Malaysia. TVET Collaboration Hub (TCH) is aimed to enhance the capability of TVET institutions in the country by sharing resources and expertise more efficiently. Malaysia Board of Technologists (MBOT) believes that this will be a catalyst for improved quality assurance of technology and technical education. Interestingly, all 12 centres of excellence under TCH are in line with the 24 technology and technical fields recognized by MBOT such as automotive, manufacturing, electrical, and oil and gas.

MTVET also proposes the rebranding of the national TVET. This initiative will elevate the standing of technologists and technicians in the industry as they are just as important as doctors, engineers, accountants, and other professions. As such, MBOT's role is becoming more and more prevalent: for technologists and technicians to claim that they are experts and professionals in their field, they must be governed by a professional body. At the same time, their individual and corporate clients will have peace of mind knowing that the industry is regulated and overseen by a professional body.

As of March 2022, MBOT has nearly 15,000 professional registrants across 24 technology and technical fields. With this number, MBOT realizes its potential in helping the nation's development. Their expertise and vast experience must not be limited, however, to their own careers; it should also be leveraged more widely. MBOT's role is to provide the platform for professional technologists and technicians to share their knowledge with training institutions and universities. For that reason, MBOT Technology and Technical Accreditation Council (TTAC) has made it a requirement for programmes accredited by TTAC to appoint Professional Technologists (Ts.) and Certified Technicians (Tc.) as Industry and/or External Advisors.

"As of March 2022, MBOT has nearly 15,000 professional registrants across 24 technology and technical fields. With this number, MBOT realizes its potential in helping the nation's development.

Datuk Ts. Ir. Dr.
Siti Hamisah Binti Tapsir
President of
Malaysia Board of Technologists

MBOT is also involved in several national policies such as Wawasan Kemakmuran Bersama 2030, Malaysia Digital Economy Blueprint, and Twelfth Malaysia Plan (12MP). To ensure that MBOT can provide the government with the right input, the organization has been working closely together with its professional membership. From time to time, we have been receiving requests and suggestions from our members who are interested in contributing and sharing their experience. We also rely on our professional members to help support our stakeholder engagement.

This year, MBOT is establishing a technical working group to play a part in determining the direction and improvement of the MBOT technology and technical fields. To ensure that the aims of the working group are achievable, the working group invites and selects experts and highly experienced members from various industry segments; they assist MBOT in four core functions, namely, professional assessment, academic accreditation, practising provision, and lifelong learning.

This TECHIES 14th edition is the first edition of the MBOT bulletin in 2022. The chairman of the new publication committee this year is Prof. Ts. Dr. Mohamed Ibrahim bin Abdul Mutalib, MBOT Board Member and Vice Chancellor of Universiti Teknologi PETRONAS. Under his guidance, we strive to produce high-quality publications and knowledge sharing for our fellow members. As a final point, MBOT TECHIES is moving towards digitalization, starting with a digital magazine this year. Going paperless will not only have significant environmental benefits; it will also provide members with access to information across all our platforms at any time.

Thank you.

By Ts. Dr AbdulLateef Olanrewaju, Ts. Dr. Shalini a/p Sanmargaraja, Universiti Tunku Abdul Rahman (UTAR), Kampar.
Ts. Dr. Khoo Boo Kean, Technological Association Malaysia (TAM) Perak.

Big Data and Construction Management

> "The objective of construction management is to execute construction projects so that deliverables can meet stipulated requirements within budget and schedule, at acceptable risk, quality, safety, and security levels.

Construction is a series of activities performed by construction companies in the production of built facilities. A construction company is an organisation that performs various activities and processes toward achieving a client value system. Construction companies comprise quantity surveying, engineering, facilities management, construction management, architectural, contracting, and maintenance management firms.

Thousands of workers, professionals, and decision-makers are involved in a project delivery. Several tonnes of materials, components, plants, and equipment are required for the completion of a construction work. A lot of uncertainty and risks will arise along the way. Communication, collaboration, coordination, and cooperation are required to ensure the success of any construction project, as indicated in Figure 1. Many construction projects fail because of the lack of a fundamental variable, which is construction management.

Construction management **(Figure 2)** is a professional service that manages projects from pre-construction phase to demolition. The objective of construction management is to execute construction projects so that deliverables can meet stipulated requirements within budget and schedule, at acceptable risk, quality, safety, and security levels. Construction management makes use of various skills and competencies to ensure the achievement of client value systems.

The Construction Management Association of America lists the competencies needed to get the job done, which includes project management, cost management, time management, quality management, contract administration, and safety management, among others.

The Chartered Institute of Building notes that construction management is a professional service that is required during the processes of planning, design, production, adaptation, maintenance, restoration, conservation, management, evaluation, and recycling of buildings.

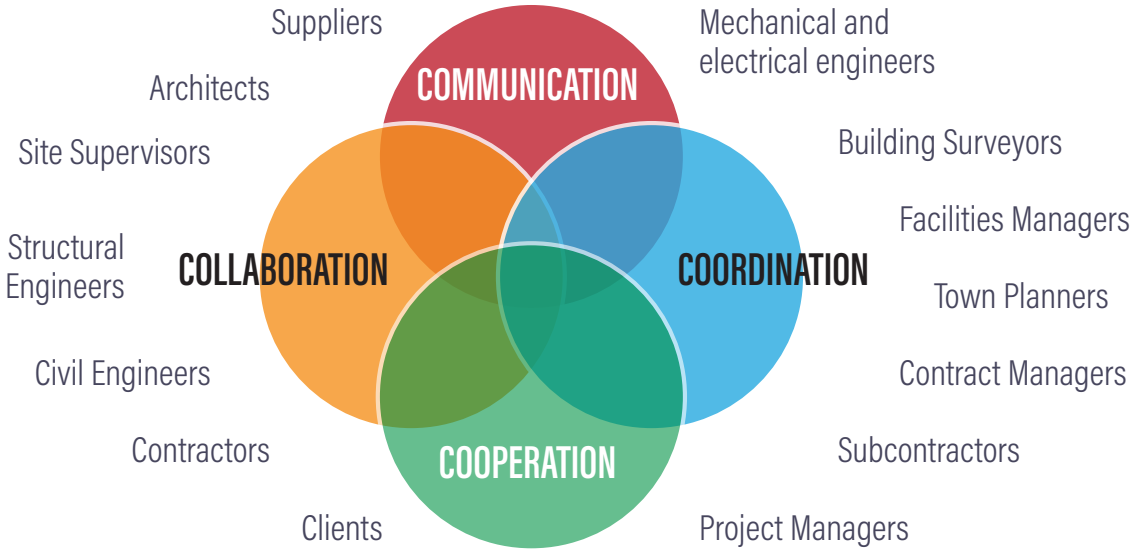

Figure 1: The Construction Manager acts as an intermediary among various stakeholders.

It has to be stated that the greatest threat to the successful completion of construction projects is the lack of data. Normally, the data needed are budget, estimated completion time, and the quality and function of the completed project. The level of data required depends on effort, skills, and knowledge correlated with size, type, complexity, client, and project environment. The amount of data involved in the completion of modern construction varies, especially with changing client roles and complicated project environments.

Data is valuable to construction companies. Data-driven decisions are more accurate and reliable compared to decisions made without considering available data. Traditionally, construction management depends much on conventional data. However, the modern project environment is more complex and sophisticated, and clients are becoming more demanding, making knowledge and the application of Big Data to be increasingly important during decision-making processes.

The construction sector generates and uses huge quantities of data. It is generated in many ways, including during normal operation, site investigations, interim valuations, variations, post-occupancy evaluations, maintenance, and many other activities. There is data in refurbishment costs, operating costs, and waste management costs.

Data can be garnered from design teams, clients, suppliers, contractors, subcontractors, site operatives, sensors, plants, and equipment. The proliferation of large volumes of data lead to the relevancy of Big Data in the construction sector. Data analytics provide the means to generate new information from what is already available. Used at different phases of the project by different stakeholders, it is a complex process that can uncover information to help organisations make better decisions. With the advancement of technologies such as the Internet of Things, the collection, cleaning, storage, processing, analysis, and distribution of huge quantities of data can be carried out more effectively.

The recording and sharing of extremely large data sets make it possible for all teams in a construction project to work collaboratively and quickly, irrespective of where the team members are located. Construction managers can come up with descriptive, predictive, and prescriptive solutions to their problems. For instance, accurate predictions of the cost of a project upon its completion can be calculated very quickly. The energy consumption of a building during its operations can be reliably modelled utilising information from Big Data technologies. With this, capital and operating costs can be computed, which would come in handy when making certain financial decisions.

Construction companies usually handle many construction sites and deal with subcontractors, suppliers, and other stakeholders

STAGE OF WORK	SPECIFIC DUTIES AND RESPONSIBILITIES OF CONSTRUCTION MANAGER
Strategic Definition	Prepare business cases for the construction project. Prepare and monitor the method statement. Conduct feasibility and viability studies, provide planning approval advice, and so on.
Preparation and Briefing	Coordinate the approval of the project brief; establish and monitor deliverable requirements in terms of scope, cost, time. Coordinate the establishment of sustainability targets for the project, advice and recommend on cost planning
Concept Design	Conduct feasibility and viability studies. Advice on the selection of design and construction teams. Supervise and encourage the creation of architectural and engineering concepts. Oversee design review, making sure it is within the business case, and be involved in seeking planning approval.
Spatial Coordination	Recommend, participate and advise on design review. Coordinate spatial design, be involved in planning applications, coordinate the selection of subcontractors, Coordinate the compliance of the design with regulations, coordinate engineering analysis.
Technical Design	Recommend, participate and advise on constructability review. Serves as a value manager/specialist and engineer, monitor and report to the client [programme/portfolio manager] on project details, including progress, risks, and opportunities in a timely manner.
Manufacturing and Construction	Ensures all changes to specifications, work scope, and drawings are documented. Supervise the daily construction processes and functions of the project. Recommend an interim valuation. as a value manager/specialist and engineer.
Handover	Appoint a commissioning manager/engineer, advise and involve them in coordination and collection of commissioning documents and participants, and ensure compliance with planning documents.
Use	Recommend on facilities and maintenance management services, advise and monitor post occupancy evaluation, advice and monitor on sustainability outcomes, develop metric for user satisfactions,

Figure 2: Duties and responsibilities of professional construction managers

simultaneously. Thus, an enormous amount of data, with diverse and disorganised characters, are expected. Big Data analytics can process multiple variables, hence, construction companies can record, analyse, and track emerging patterns in every project with relative ease. Contractors, subcontractors, architects, quantity surveyors, construction managers, engineers, maintenance managers and facilities managers can be involved in this process.

With Big Data, it is conceivable for interactions to happen among software, hardware, people, and machineries. Sensors and telematics are some of the technologies used to generate data during the construction and operation of buildings. Sensors can monitor the health and safety of workers, structures and equipment. Data is usually fed into Big Data analytic platforms like Geographic Information Systems, Building Information Modelling, Radio Frequency Identification, and Global Positioning Systems – each performing a multitude of roles.

For instance, Building Information Modelling is useful for class detection optimisation, error checking, and collaboration. To completely utilise the benefits of Big Data, a cogent is needed to integrate software and platforms. Benefiting from Big Data requires proactive digitisation of written and oral communication into electronic information and messages that are accessible, understandable, and usable by everyone in the project team. It is not enough to digitise the construction transaction; the entire process must be digitalised.

As construction companies embrace digitisation and digitalise their construction delivery processes to provide value-added services, the roles of Big Data are becoming more important. Drawings, plans, catalogs, specifications, and other information are stored in digital format and made accessible to all stakeholders.

While the importance of Big Data is recognised in the construction sector, its potential is not fully harnessed yet. In good time, more data scientists and data engineers will be employed in the construction industry, and this will no doubt expedite a wider utilisation of Big Data in the sector.

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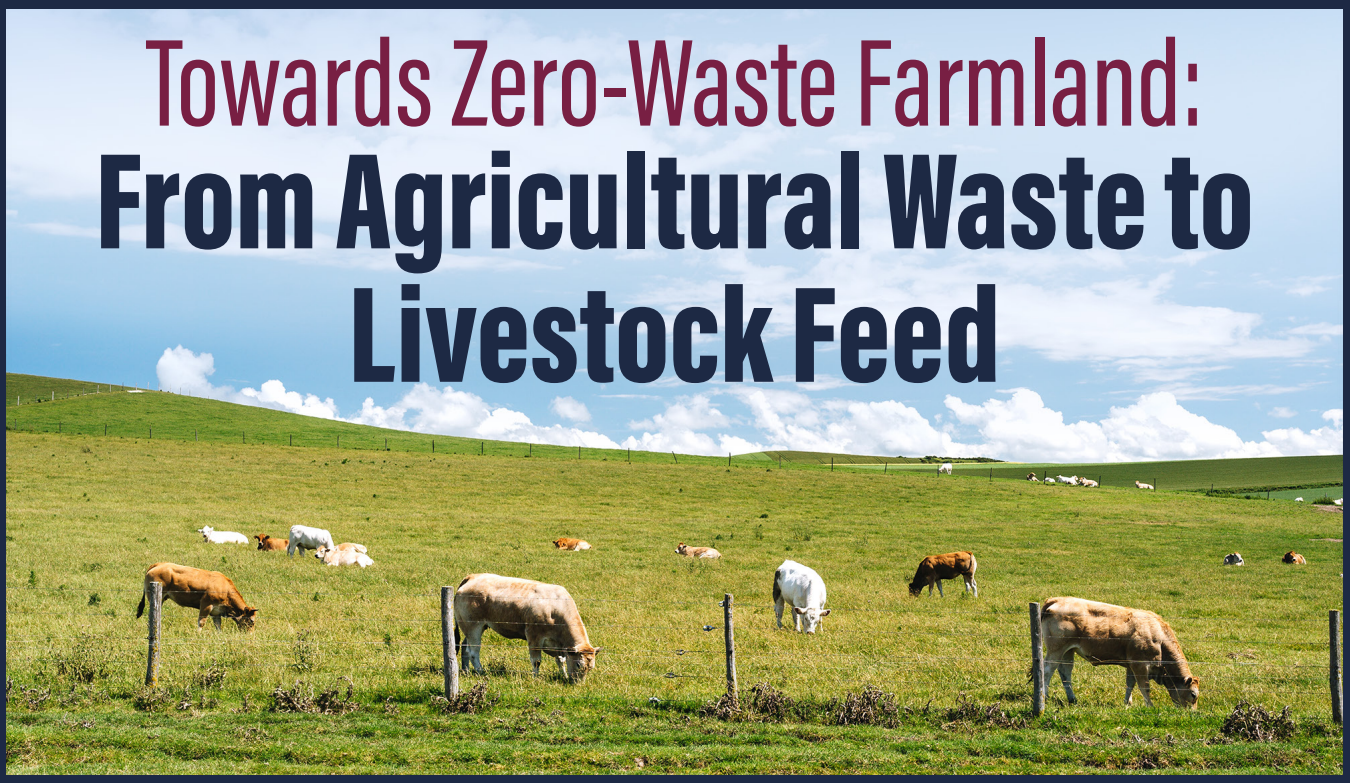
By Ts. Dr. Khomaizon Abdul Kadir Pahirulzaman,
Universiti Malaysia Kelantan

Towards Zero-Waste Farmland: From Agricultural Waste to Livestock Feed



Ruminant farming contributes to the production of milk and red meat. For instance, goats produce mutton and milk for human consumption. By 2050, the world population is expected to reach 10 billion. Thus, a significant increase in demand for red meat and milk from ruminant animals is expected. Although red meat can be grown in laboratories and as such, commercial production of that kind may be possible in the near future, it is very unlikely that the final product matches the characteristics of meats from the farmland.

Ruminant animals need to consume good diet with complete nutrients to make sure their growth and milk production are not compromised. Large land areas are needed for the production of feed, and this is increasingly becoming difficult due to limited land availability. Converting agricultural waste to livestock feed has the potential to overcome this difficulty.

"Zero waste" agriculture is all about converting agricultural waste into useful materials. Some agricultural waste contains important sources of nutrients that are good for livestock. Oil palm fronds, palm kernel cake, rice straw, rice husk and pineapple waste are some agricultural wastes that can be converted into livestock feed or silage.

Silage is produced by converting raw materials such as forage or agricultural wastes into succulent feed for livestock through anaerobic bacterial fermentation. For example, rice straw is converted into silage through fermentation in an anaerobic environment. This process enhances acid production by naturally occurring microorganisms in feed crops or by additional bacterial inoculum, such as using Effective Microorganisms (EM) technology. When the inoculum dominates fermentation, it increases lactic acid and improves dry matter recovery.

In Malaysia, rice is a staple food produced in large quantities each year. After undergoing proper treatment, rice straw becomes a valuable source of roughage for ruminants. It has high dry matter content and low moisture content, which are favourable characteristics of raw materials for silage production. Silage made from rice straw has good smell and is liked by goats.

However, there is a small catch. Despite its abundance in availability, collecting rice straw from paddy fields is technically challenging and costly. This is unfortunate because the successful conversion of rice straw into silage will not only contribute to livestock feed, it also minimises pollution due to the burning of rice straw, which is a normal practice today. Silage production is sometimes regarded as a

“In Malaysia, rice is a staple food produced in large quantities each year. After undergoing proper treatment, rice straw becomes a valuable source of roughage for ruminants. It has high dry matter content and low moisture content, which are favourable characteristics of raw materials for silage production. Silage made from rice straw has good smell and is liked by goats.

“mystical” process, where the outcome may be good or bad, depending on “luck”. The process quite similar to pickling using vinegar. In the case of silage, bacteria is used for fermentation. Inoculation of forage or agricultural waste with the right type of bacteria, if carried out on an experimental scale, always produce good yields.

Unfortunately, the same cannot be said when carried out in the farm because it is too costly and difficult to determine the existence of bacteria in forage or agricultural waste.

Contamination by the wrong type of bacteria will result in poor fermentation, leading to a drop in feeding value.

Thus, an appropriate silage production system needs to be researched and developed. The system must be reliable and reproducible. It should use non-complicated technology with locally available components. Good practice in harvesting forages is required. Appropriate dry matter concentration and particle size are important for higher packing density and lower porosity, which can reduce silage spoilage.

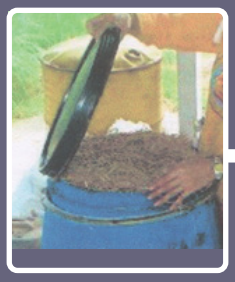
Use of silage additives can improve the process. The choice of chemical and biological additives seems almost limitless and available in the market. Selection is usually made based on factors such as general effectiveness, suitability for certain plant species, ease of use, price, and availability. Some chemical additives are corrosive to the equipment and may be hazardous. On the other hand, biological additives are non-corrosive and safer to use, but they tend to be more expensive. In addition, their effectiveness may be less because they rely on the activity of living organisms. Proper storage of biological additives by manufacturers, distributors and farmers is required. Despite these disadvantages, bacterial inoculants are the most commonly used additives for silage production.

In order for silage to be a marketable commodity, a concerted effort to convert forage and agricultural waste to silage must be carried out. It is not economically viable to construct small-scale silage production plants, rather, a centralised facility would be more cost effective. Workers and farmers can participate in a silage production pilot project so that transfer of technology can be made possible. Education and training of workers are essential to create a well-educated and highly skilled workforce. Introducing the right training programs to agricultural workers will help make the vision of zero-waste farmland a reality. Professional technologists and certified technicians can contribute their expertise in the development of silage production plants. Financial support from the government is the most important factor in the success of this vision of zero-waste agriculture.

Flowchart of Silage Preparation From Rice Straw

Agricultural waste such as rice straw is collected from farm(s) and cut into small pieces

Agricultural waste is mixed with effective microorganism treatment solution



Packing and compaction of the mixture in a plastic drum

The mixture is sealed in a plastic drum and fermented for two weeks

Silage is ready

Leading the Technology Transition:

An Interview with Professor Ts. Dr. Mohamed Ibrahim Abdul Mutalib

By Associate Professor Dr. Mohamad Asmidzam Ahamat
& Nabila Tulos

Professor Ts. Dr. Mohamed Ibrahim Abdul Mutalib is a MBOT Board Member and a Professional Technologist registered with MBOT in the field of Chemical Technology. He is also a Fellow of the Institution of Chemical Engineers (IChemE) UK and a registered Chartered Engineer with the UK Engineering Council.

In May 1988, he began his academic career as Assistant Lecturer at Universiti Teknologi Malaysia (UTM) Kuala Lumpur, right after completing his undergraduate studies in Chemical Engineering at the University of New South Wales, Australia. In 1990, he went for MSc in Process Integration at the University of Manchester Institute of Science and Technology (UMIST). Upon completion in 1991, Professor Ts. Dr. Mohamed Ibrahim was offered research assistantship to continue with a PhD in Distillation Control at the Department of Process Integration, UMIST. He completed his PhD in June 1995, following which he returned to UTM Kuala Lumpur as Senior Lecturer before moving on to UTM Johor Bahru in 1996.

In 1997, shortly before the formation of Universiti Teknologi PETRONAS (UTP), he was offered to join Institute Technology PETRONAS as Lecturer II. In 2002 and 2014 respectively, he was promoted to Associate Professor and Professor. He had been entrusted to hold several key management positions such as Head of Chemical Engineering Department, Director of Research, Development and Consultancy, Head of PETRONAS Ionic Liquid Lab at UTP, Dean of Faculty of Engineering, and Deputy Vice Chancellor of Academic before being appointed as the 4th Vice Chancellor of UTP in 2018.

Interviewers: **Please share with us the day-to-day responsibilities as a Vice Chancellor.**

Professor Ts. Dr. Mohamed Ibrahim: As Vice Chancellor, I am responsible and answerable to several key stake holders, namely:

i. the Board of Directors of Institute of Technology PETRONAS Sdn Bhd (ITPSB), which is the legally registered company managing UTP's operation,
ii. the top management of PETRONAS, our parent company,
iii. the Ministry of Higher Education Malaysia and all relevant accreditation bodies that certify our degree programmes,
iv. students and parents who form our main customer base, and
v. industries and surrounding communities/authorities.

My major role is to provide leadership to ensure that the strategic direction, management and administration of the University and its current and future development are in line with its master plan.

In the execution of my day-to-day tasks, I chair many essential university committees such as the Senate Committee, the Executive Management Committee, the HR Planning and Development Committee, and the Tender Committee through which many key decisions affecting the University's employees and students are discussed and made.
I explore and establish strategic collaborations with selected partners through visits or counter visits, and lead some high-level discussions in accordance to agreed collaboration scopes, followed by MOU or MOA signings and forming joint committees to see through the implementation of the programmes and/or projects.

> "Universities should conduct collaborative or joint research to further develop and enhance some selected technologies and simultaneously study their effects on students and the community-at-large.

Interviewers: **Technology is growing at an exponential rate. In your opinion, how do changes in technology reshape tertiary education? What are the roles of universities in leading the transition in technology?**

Professor Ts. Dr. Mohamed Ibrahim: Under the current VUCA (volatilty, uncertainty, complexity, ambiguity) world, the challenges facing tertiary education is unprecedented.

The traditional teaching and learning (T&L) model, which has been in existence for centuries, has come under intense pressure to be revolutionised. The use of technology is expected to be more extensive, especially in information and communication technology (ICT). Incorporation of virtual or augmented reality to enhance academic delivery, utilisation of integrated learning management systems to simplify and facilitate self-management courses for students, and the exploitation of artificial intelligence as tools for complex analysis are some examples.

In driving the above transformation, universities are expected to collaborate smartly with potential suppliers of technology and other universities in order to derive better value from the investments made either through the sharing of resources or by leveraging on expertise. Universities should conduct collaborative or joint research to further develop and enhance some selected technologies and simultaneously study their effects on students and the community-at-large. The findings will enable progressive and dynamic guidelines to be configured and implemented.

Another key transformation required is the integration of sustainability into the university ecosystem. Sustainability should be embraced fully by every citizen of the world, hence, embedding it in the education of future generations is vital. It is imperative for the university to not just design its curriculum to incorporate the knowledge aspects of sustainability, but to also ensure that the campus integrates green and sustainable practices as reinforcement to the surrounding community.

Post COVID-19, I have come to the realisation that, as far as T&L goes, there are three possible scenarios:

i. return to full physical interaction,
ii. use of hybrid or blended approach - comprising physical interaction and virtual mode, supported by learning management systems,
iii. full virtual mode with the support of learning management systems.

I always believe that physical interaction is not substitutable as it brings a lot of benefits especially for the student's personal development, which goes beyond knowledge and skills. Physical interaction in campus between the student and various facets of the university community enables the development of social intelligence, which is priceless for the student's work and career advancement later.

The UTP management has the same belief as we continue to execute the University's objective of producing well rounded graduates who exhibit 7 attributes:

i. Technical Competency
ii. Solution Synthesis Ability
iii. Critical thinking
iv. Practical Aptitude
v. Communication and behavioural skills
vi. Long life learning and
vii. Business Acumen.

Physical interaction is the best environment to cultivate a number of these attributes. To add, we provide international exposure to all our students in the hope that they will develop a truly global mind set.

Interviewers: **What are the initiatives taken by UTP to ensure that students are well-equipped with skills that fulfil the needs of industries?**

Professor Ts. Dr. Mohamed Ibrahim: For a start, there has been a well-accepted norm that university education is about developing students holistically, and not just about competency in a specific field. With this in mind, and guided by the UTP Academic Master Plan, which calls for UTP to produce industry-relevant graduates, significant efforts have been made to establish extensive relationship-building with the industry right from the inception of the University.

As UTP is formed by an industry player, namely PETRONAS, our relationship-building process started smoothly with oil and gas companies before it was extended to others. The purpose is to acquire support from the industry for UTP to execute several programmes within its academic curriculum. For example, we have our Industry Adjunct Lecture programme to provide practical

perspectives, which complement knowledge learnt in classrooms. We also have industry external project examiners to strengthen our assessment process, and placement for industrial internship at the industry to enable students to be exposed to actual work life. In addition, UTP encourages practical projects for research and problem solving, hence exposing students to solve real industry problems.

The whole implementation has proven to be a success. UTP students are known to be more industry-ready after graduation, as evidenced by the feedback I have been getting from many of my industry colleagues, who cite this as the main reason for them preferring UTP graduates.

Interviewers: **Research activities at universities need to be aligned to industry needs. Can you share examples of industry-related projects conducted at UTP?**

Professor Ts. Dr. Mohamed Ibrahim: Yes, there are several industry-related projects being researched at UTP, in collaboration with our local as well as international external industry and academic partners. Naturally, our main collaborators are the oil and gas industry players owing to the close relationship that we have built over the years with the support of PETRONAS. As a matter of fact, we have managed to successfully complete and roll out several of our R&D products for real industry applications. ADaPT and DOMAIN are two examples.

ADaPT, which stands for Advance Diagnostic and Prognostic Technology for Mechanical Damages, provides real time prediction of mechanical damage using Acoustic Emission (AE) technology. The technology combines AE bespoke Data Acquisition system with integrated data filtering algorithm, and features analytics for the interpretation of induced waveforms signal from field environments. It provides more accurate life assessment and reliability analysis of specific equipment lifespan, thus eliminating unplanned shutdowns, optimising maintenance resources, and changing maintenance culture from preventive to proactive.

Another example is DOMAIN, which stands for Digitalising Operations and Maintenance via Artificial Intelligence. The application of this technology solution enables the prediction of various machine failures several days before happening, thus allowing operational engineers to carefully plan repair work, which in turn minimises operational downtime. The collection of predictive algorithms developed in the solution suite provides a live prediction for a varying number of critical equipment, such as gas compressors and turbines, through pin-pointing the sensors that could potentially cause failure. Typically, the predictive algorithm is trained using 300 billion rows of historical data feeding from 40,000 sensors located at the field before it is rolled out for application.

> My motivation for applying is to provide me with some base recognition that is held highly at national and perhaps international levels, hence giving me the credibility to execute my work, be it associated with the specific technical field of my expertise, or by addressing my professional engagements at a higher level.

Interviewers: **What is the motivation that make you choose to apply for Professional Technologist?**

Professor Ts. Dr. Mohamed Ibrahim: The title of Professional Technologist is a form of recognition to acknowledge the high level of an individual's achievement in knowledge and competencies associated with a specific technical area. My motivation for applying is to provide me with some base recognition that is held highly at national and perhaps international levels, hence giving me the credibility to execute my work, be it associated with the specific technical field of my expertise, or by addressing my professional engagements at a higher level. Coupled with the status of Fellow of IChemE UK and registered as Chartered Engineer with UK Engineering Council, this provides a good balance in the credentials that I need.

Interviewers: **There are more than 53,000 technologists and technicians registered with MBOT. As Professional Technologists and Certified Technicians, what could they contribute to the transition of technologies?**

Professor Ts. Dr. Mohamed Ibrahim: I always believe that as human beings graced with God-given valuable knowledge and expertise, we have the obligation to share and educate others. This should be the ethos of all, especially when you are accorded with a professional status such as Professional Technologist or Certified Technician.

Qualified professionals who have worked and trained for a number of years should be able to comprehend the direction of technology development with considerable articulation. They should also be able to provide useful advice, especially to policy makers who develop acts or legal guidelines to promote and govern the transition of technologies. In addition, they should be able to lead the authorities and the masses in the application of technologies in order to ensure a safe, ethical, and rightful rollout.

Overall, they are responsible and accountable to the society-at-large in seeing through that the transition of technologies take place smoothly and efficiently.

Interviewers: **As an MBOT Board Member, what do you think can be done to empower Professional Technologists and Certified Technicians in the industry?**

Professor Ts. Dr. Mohamed Ibrahim: I believe that the attainment of Professional Technologist/Certified Technician status is a positive development as it provides recognition to the technology practitioner. To add, it enables proper control on practitioners to perform assessments and approvals to ensure that high professional accountability is exercised when implementing technology solutions to the wider public. Similar to our engineering profession counterpart, strong values such as integrity and professionalism will be appropriately instilled, warranting our practitioners to act according to the precepts stipulated by MBOT and other legal systems governing the profession.

Interviewers: **What is your advice to younger generation?**

Professor Ts. Dr. Mohamed Ibrahim: My advice to the younger generation is to always be willing to seek knowledge to equip themselves better in the future. Whether they decide to choose the path of acquiring a university degree or to go for a specific industry-oriented programme to earn the necessary qualification to secure a job, you must not stop seeking knowledge.

In seeking knowledge, there are now more accessible ways through various platforms, particularly the online means. You will, however, need to adjust the way you adapt to the techniques that will enable you to learn effectively.

It is unfortunate that there is now a multitude of problems facing the world. Financial crises and geopolitical conflicts are getting more and more common, and this may eventually pave the way to war. As life gets more challenging, you will need to build stronger integrity and resilience in order to survive and to propel yourselves forward in life.

By Datin Ts. Dr. Norsaadah Zakaria
CText ATI-UK

Malaysian Fashion Coalition

Developing the Future Sustainable Fashion Business Hub

Fashion is a global business worth USD1.3 trillion. At least 100 million people are involved in fashion industry, which makes it a substantial economic force and an important driver of the world GDP. Unfortunately, despite its contribution to economic development, the fashion industry plays a role in the destruction of the environment and the ensuing climate change. Reports indicate that it is the second largest contributor to pollution, just after the oil industry. As the fashion industry grows, its contribution to environmental damage would be more significant.

Thus, it is necessary to mitigate bad environmental effects while enjoying the economic benefits brought by the fashion industry. The first step lies in creating awareness and willingness to change the way the industry is operated. The truth about its dark side must be disseminated to all parties involved. A concerted effort is needed to make a difference to the ecosystem of the industry.

A coalition is a group of individuals or organisations that work together to achieve a common goal. The formation of a coalition is very important to spearhead drastic changes amongst players of the fashion industry. The Sustainable Apparel Coalition and the Fashion Pact are examples of efforts to create a more sustainable and resilient fashion industry.

Figure 1: The Fashion Pact movement 2020

Sustainable Fashion Business Hub Movement

Sustainable fashion is an understanding to promote change to fashion products and production systems in a way that minimises damage to the environment. In Malaysia, there is the Sustainable Fashion Business Hub that aims to increase awareness and build a stable and sustainable fashion ecosystem after the world economy has been hit by the Covid-19 pandemic. It hopes to ensure that the way fashion products are produced and marketed meet individual needs without compromising the environment. It also emphasises social equity, economic growth and commercial development.

Since March 2020, sales in fashion related industries in Malaysia hit rock bottom. Many small and medium scale fashion business owners carry enormous financial burden to survive the pandemic period. Forced closure of most shops have caused production to stop and retailers to close, resulting in a tumbling demand.

Formed in 2009, the Sustainable Fashion Coalition is a ground-breaking industry collaboration between brands, retailers, and manufacturers. To add, there is another faction called the Fashion Pact, which was established in 2020 after the surfacing of Covid-19. It comprises peers, competitors, established brands, high end labels, mainstream retail chains, manufacturers, and fashion designers. The main agenda is to produce a more resilient and ecologically responsible sector where all parties can flourish.

Figure 1 shows the initiatives developed by the Fashion Pact.

Malaysian Sustainable Fashion Business Hub agenda

The national agenda of the Sustainable Fashion Business Hub are:

i. Offering Fashion TVET Professional Programs
ii. Assisting fashion businesses towards global market penetration
iii. Developing a sustainable business fashion business hub
iv. Setting up research and development sections for innovative products

The main drive is to transform future fashion businesses to have two important knowledge areas to thrive in the post - COVID world. The two knowledge areas are technical product knowledge and business techniques.

The goals of the hub are:

- to build a community who owns successful businesses
- to transform B40 communities to become high income earners
- to churn out skill-sound fashion business owners
- to develop the first fashion business hub for the nation
- to establish a TVET training centre for skill development
- to gather all stakeholders in the fashion industry in an environment of professionalism and camaraderie

Figure 2 depicts the goals to be achieved by the fashion industry.

In conclusion, the fashion industry needs to move forward towards the agenda set in the Sustainable Fashion Coalition, the Fashion Pact and the Malaysian Sustainable Fashion Business Hub. The collective agendas are not just on the economic aspect of the fashion industry. Rather, environmental and social aspects are also taken into account. Growth in revenue should in no way compromise environmental and social aspects. Hence, a holistic approach should be taken, whereby players having a multitude of education backgrounds and experiences work together to achieve mutual economic and environmental goals. By working together towards a common target, the fashion industry will be revolutionised, benefiting all stake holders. In time, damage to the environment will hopefully become a thing of the past.

Bibliography:

Datin Ts. Dr. Norsaadah Zakaria CText ATI is the founder of Clotech Atelier Academy-Telestia Malaysia. She has been actively involved in TVET education for the apparel industry and MBOT since 2019. She has international experience developing a fashion academy, where she then became the academic director. Her vision is to nurture more apparel technologists to become innovators. She holds a PhD and a TVET professional qualification in Clothing Technology. Ts. Dr. Norsaadah is a Chartered Clothing Technologist from the Textile Institute, UK. She is also the Regional Telestia Educational Consultant with Telestia AB Education, Greece.

- Goal 11 Sustainable community
- Goal 4 Sustainable manpower
- Goal 8 Sustainable supply chain
- Goal 9 Sustainable manufacturing
- Goal 12 Sustainable products
- Goal 17 Sustainable business

Achieving Malaysian Sustainable Fashion Business Goals

Goal 11- Create *career opportunities and build resilient societies* and economies

Goal 4- Promote *lifelong learning skills*

Goal 8- Promote sustainable economic growth *productive employment*

Goal 9- Build resilient infrastructure *sustainable industrialization* and *foster innovation*

Goal 12- Ensure *sustainable consumption* and production

Goal 17- Revitalize *global partnership* for sustainable development

Figure 2: Malaysian Sustainable Fashion Business Goals

By Ts. Mohd Fitri Bin Edros, Mohamed Roshimi Bin Md Shahor, Ifahana Binti Ishak,
Universiti Malaysia Perlis.

Aplikasi Data Analitik dalam Pengurusan Institusi Pengajian Tinggi

Data diumpamakan sumber minyak yang baharu pada era digital. Data boleh diperolehi daripada organisasi atau individu. Untuk mendapatkan manfaat, data perlu diproses untuk menzahirkan maklumat yang boleh digunakan dalam pelbagai sektor termasuk di institusi-institusi pengajian tinggi.

Data analitik atau analisis data adalah proses kualitatif atau kuantitatif dalam menganalisis data mengikut keperluan untuk meningkatkan produktiviti dan prestasi organisasi. Pelbagai perisian seperti Microsoft Excel dan Phyton boleh digunakan untuk menjalankan analisis data.

> Data analitik boleh dibahagikan kepada jenis deskriptif, diagnostik, prediktif dan preskriptif

Data analitik boleh dibahagikan kepada jenis deskriptif, diagnostik, prediktif dan preskriptif. Teknik paling asas dalam data analitik ialah jenis deskriptif, seperti analisis terhadap penyata untung dan rugi bulanan atau demografi pelanggan. Data analitik diagnostik pula membolehkan seseorang penganalisis mengurai dan mengasingkan punca masalah dengan menggabungkan pembacaan data siri masa dan teknik drill down. Prediktif analitik pula meramalkan kejadian yang akan berlaku pada masa hadapan dengan bantuan model matematik yang telah disahkan ketepatannya. Preskriptif analitik membantu pengguna menentukan tindakan terbaik yang harus diambil menggunakan pemahaman tentang apa yang telah terjadi, mengapa ia berlaku dan apa yang mungkin berlaku. Sebagai contoh, teknik preskriptif analitik digunakan untuk membantu seseorang pemandu kenderaan memilih laluan yang terbaik dengan mengambil kira jarak, kelajuan kenderaan dan keadaan lalu lintas semasa.

Antara peranan data analitik ialah untuk mendapat pemahaman tersirat, menjana laporan, melaksanakan analisis pasaran dan menambahbaik keperluan organisasi. Pemahaman tersirat daripada data dikumpul dan ditafsirkan mengikut keperluan organisasi. Laporan dihasilkan daripada data dan dihantar kepada individu dan pasukan tertentu untuk tindakan selanjutnya bagi menghasilkan impak yang tinggi dalam pengurusan organisasi. Dalam bidang perniagaan, analisis pasaran boleh dilaksanakan untuk mengenalpasti kekuatan dan kelemahan pesaing.

Proses Data Analitik

Kegunaan data analitik dalam persekitaran institusi pengajian tinggi (IPT)

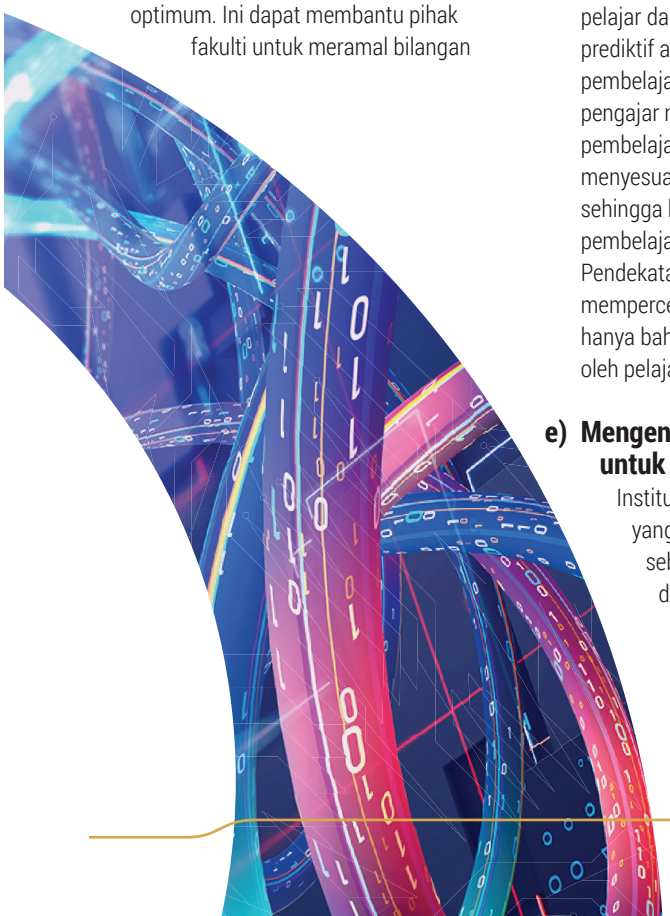
Institusi pengajian tinggi boleh menggunakan data analitik sebagai cara untuk bertindak balas terhadap pelbagai perubahan organisasi dan operasi yang berlaku dalam sektor pendidikan. Berikut adalah beberapa kegunaan data analitik dalam membantu pengurusan institusi pengajian tinggi:

a) Penambahbaikan urusan pengambilan pelajar

Dengan mewujudkan satu set permodelan yang mengambil kira demografi, sejarah akademik dan faktor-faktor, institusi pendidikan tinggi dapat mensasarkan calon yang mempunyai kebarangkalian tertinggi untuk menerima tawaran dan hadir semasa hari pendaftaran.

b) Perancangan pendaftaran pelajar

IPT juga boleh menggunakan prediktif analitik untuk membantu merancang pengurusan pendaftaran pelajar dengan optimum. Ini dapat membantu pihak fakulti untuk meramal bilangan kelas yang diperlukan. Ia juga dapat digunakan untuk menjalankan promosi bersasar kepada calon-calon yang diramalkan mempunyai kecenderungan yang tinggi untuk mendaftar di IPT. Selain itu, data analitik dapat menjangkakan keperluan kewangan dan meramal kelayakan calon untuk menerima bantuan kewangan.



c) Mengenalpasti pelajar yang memerlukan khidmat nasihat

Terdapat IPT yang mempunyai bilangan penasihat akademik yang terhad. Ini mengakibatkan pelajar yang sepatutnya menerima nasihat akademik tidak disenaraikan sebagai menti kepada penasihat akademik. Kajian yang dikendalikan oleh National Academic Advising Association (NACADA), sebuah persatuan berpangkalan di Amerika Syarikat. mendapati nisbah pelajar kepada penasihat akademik di negara itu ialah 296:1. Bagi menangani perkara ini, penggunaan data analitik jenis prediktif boleh digunakan untuk mengenalpasti ciri pelajar yang benar-benar memerlukan bantuan penasihat akademik.

d) Pembelajaran Adaptif

IPT boleh menggunakan prediktif analitik untuk mengembangkan perisian pembelajaran adaptif untuk mengubahsuai laluan pembelajaran pelajar berdasarkan interaksi antara pelajar dan teknologi. Penggunaan prediktif analitik dalam platform pembelajaran adaptif dapat membantu pengajar menentukan jurang pembelajaran pelajar dan kemudian menyesuaikan pengalaman akademik sehingga lebih sesuai dengan teknik pembelajaran yang digunakan. Pendekatan ini membantu pelajar mempercepat pembelajaran kerana hanya bahagian yang sukar difahami oleh pelajar akan diberi tumpuan.

e) Mengenalpasti pelajar berisiko untuk berhenti

Institusi boleh mengenalpasti pelajar yang berisiko untuk berhenti sebelum semester baru bermula dengan merujuk kepada sejarah prestasi akademik, rekod kehadiran ke kelas atau perpustakaan, dan rekod prestasi aktiviti ko-kurikulum pelajar. Setelah dikenalpasti, penasihat akademik boleh mengambil langkah proaktif seperti menghubungi kaunselor untuk memberi motivasi kepada pelajar yang terbabit.

f) Mengenalpasti penderma dalam kalangan alumni

Dalam penjanaan sumber kewangan, IPT boleh menggunakan prediktif analitik untuk mengenalpasti alumni yang mempunyai kecenderungan untuk memberikan sumbangan kepada IPT. Analisis preskriptif dapat menawarkan cara untuk memastikan mereka menyumbang secara aktif dan berterusan. Hasilnya, lebih ramai penderma akan menghulurkan bantuan kewangan dalam jangka masa yang panjang.

g) Penjimatan kos penggunaan tenaga

Data analitik boleh mengurangkan kos dan penggunaan tenaga di IPT. Dengan menggunakan data masa nyata dari sensor, penggerak, meter dan data harga dinamik, pola penggunaan tenaga dengan kos terendah boleh dirancang. Selain itu, bangunan yang tidak cekap tenaga boleh dikenal pasti. Pendekatan data analitik diagnostik dapat menentukan punca yang menyumbang kepada penggunaan tenaga yang tidak cekap.

Kesimpulannya, data analitik berupaya memberi manfaat yang besar kepada organisasi seperti IPT jika dilaksanakan secara betul. Pendekatan analisis data berpotensi digunakan dalam pelbagai aspek pentadbiran. Ia mampu menyelesaikan permasalahan yang dihadapi oleh pengurusan IPT. Perisian yang sesuai membolehkan saiz data yang besar dikendalikan oleh seorang penganalisis, seterusnya menjimatkan tenaga kerja dan masa. Pendekatan teknik analisis data yang sesuai adalah diperlukan untuk memastikan tafsiran dan maklumat yang diperolehi adalah relevan dan tepat, sesuai dengan usaha meningkatkan prestasi pengurusan sesebuah organisasi.

By Kapt Ts. Ghazali bin Yusof (3013637)

ENVIRONMENTAL MANAGEMENT IN UNIFIL OPERATION AREA: CHALLENGES AND ACHIEVEMENTS

The Malaysian Battalion 850-8 (MALBATT 850-8) played the role of peacekeepers for one year, starting November 2020, as mandated by the United Nations Interim Force in Lebanon (UNIFIL). During the mission, it conducted various activities as per UNIFIL's directives. The Engineer Element was responsible for the upkeep of the soldiers' living conditions, while the Workshop Element was responsible for the maintenance of vehicles. The Medical Element took care of health issues, which heightened during the COVID-19 pandemic. There were four MALBATT camps, namely, UNP 2-1 (Ma'arakah Camp), UNP 6-43 (Tibnine Camp), UNP 6-40 (Hariss Camp) and EP 00 (Tayr Falsay).

During the mission, MALBATT was subjected to the Environmental Unit's (EMU) environmental assessment. The assessment covered a number of aspects comprising hygiene, scheduled waste management, domestic waste management, energy saving management, waste recycling management and clinical waste management.

In June 2021, UNP 6-43 and EP 00 passed the assessment with flying colours, and were awarded Environmental Clearance Certificates. It was declared that EP 00 collected and recycled plastic bottles, timbers, and plywood. It also gathered wastewater in a septic tank, which was then emptied regularly by UNIFIL trucks. The area around the camp was always clean and tidy.

“In June 2021, UNP 6-43 and EP 00 passed the assessment with flying colours, and were awarded Environmental Clearance Certificates. It was declared that EP 00 collected and recycled plastic bottles, timbers, and plywood. It also gathered wastewater in a septic tank, which was then emptied regularly by UNIFIL trucks. The area around the camp was always clean and tidy.

As for UNP 6-43, it placed its used oil barrels on trays, and consigned generators on concrete slabs equipped with a proper drainage system. Spill kits and absorbent materials were available nearby, while medical waste bins were stored under the shed. In addition, recycling was done on plastic bottles, timbers and plywood. Around workshop areas, safety data sheets were available. The assessment team reported that, since all was in good order, no recommendations were issued.

However, several recommendations at Camp UNP 2-1 still needed to be closed. The recommendations related to the provision of absorbent materials and safety data sheets at workshop areas. Also, infectious waste should be stored in a refrigerated area within an identified hospital. Initially, it was felt that the recommendations were impossible to comply because the date of Transfer of Authority (TOA) was only about 32 days more. Fortunately, the spirit of team work among the Engineer Element, Workshop Element and Medical Element was strong enough such that

> "The EMU then declared that this was the best environmental practice among all contingents, and hence MALBATT was nominated to receive the 'UNIFIL Troop Contributing Countries Environmental Focal Point Award' for the Year 2022.

a scheduled waste storage area at the Workshop Element was successfully built in less than 10 days.

The completion of the project meant two of the assessor's recommendations were now fulfilled. Next, safety data sheets were compiled, drums containing contaminated soil were labelled, and lubricating oil, contaminated rags, and absorbent materials with spill kits were placed in one location in an orderly manner, so that the incoming contingent could fully utilise this one-stop centre set-up with ease. The EMU then declared that this was the best environmental practice among all contingents, and hence MALBATT was nominated to receive the 'UNIFIL Troop Contributing Countries Environmental Focal Point Award' for the Year 2022.

The most interesting challenge was to close the recommendation to relocate infectious waste to a refrigerated area. It was reported that the accumulated infectious waste storage had reached 191.5 kg of clinical waste and 6.5 kg of sharps. This was solved after a chiller was bought to store the infectious waste at 4°C. Hence, Camp UNP 2-1 was now in full compliance to the Department for Peacekeeping Operations and UNIFIL's Environmental Rules and Regulations.

In Camp UNP 6-40, the generator's bund area wall was yet to be plastered, and spill kits and absorbent materials were to be provided in the generator area. In addition, fuel storage and an extra generator set were to be placed inside the bunded area and connected with an oil separator. All these recommendations were worked on and were finally duly closed.

After all the hard work, the four camps under MALBATT 850-8 had successfully gained Environmental Clearance Certificates before TOA. This was the first time since MALBATT was deployment 13 years ago that all its camps acquired the certificates in one go. It proves to show that compliance to environmental regulations, no matter how difficult, can be achieved with staunchness and dedication.

*UNP – United Nations Position
**EP – Entry Point

"FOSTERING PEACE AND SUSTAINABILITY"

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MBOT NEWS (1ST QUARTER 2022)

COURTESY VISIT TO PETRONAS SENIOR VICE PRESIDENT (PROJECT DELIVERY & TECHNOLOGY)

Datuk Ts. Ir. Dr. Siti Hamisah Binti Tapsir, President of MBOT together with the top management of MBOT has paid a courtesy visit to Tuan Haji Bacho Pilong, Senior Vice President (Project Delivery & Technology) of PETRONAS at the Petronas Twin Towers. The meeting discussed the recognition of PETRONAS' skilled workforce especially in the field of oil and gas technology as well as Deep Technology areas such as Cyber Security (CyberSecurity), Data Science and information technology.

COURTESY VISIT FROM THE ROYAL MALAYSIAN NAVY

MBOT received a courtesy visit from the Royal Malaysian Navy (TLDM) led by Laksamana Muda Datuk Ir. Ts. Mohd Shaiful Adli Chung bin Abdullah, Chief Engineer of TLDM at the MBOT Office in Putrajaya. Among the matters discussed was the strategic cooperation between the Engineering Division of TLDM and MBOT in encouraging the staff of the TLDM to obtain professional recognition while in service. In addition, MBOT also welcomes and supports the proposed involvement of TLDM staff in the Community of Practice (CoP) to develop best professional practices for related technology areas, especially Maritime Technology.

Photo: Ministry of Transport Malaysia (MOT)

COURTESY CALL OF THE PRESIDENT OF THE MALAYSIA BOARD OF TECHNOLOGISTS (MBOT) TO THE SECRETARY GENERAL, MINISTRY OF TRANSPORT MALAYSIA (MOT)

Datuk Ts. Ir. Dr. Siti Hamisah Binti Tapsir, President of MBOT paid a courtesy call to Datuk Isham bin Ishak, Secretary General of the Ministry of Transport Malaysia (MOT) to discuss the potential cooperation between MBOT and MOT. The online meeting began with an introduction on the functions and roles of MBOT as well as partnerships on current initiatives. MBOT and MOT also discussed closed Working Group activities that will involve the Community of Practice among Professional Technology (Ts.) and Certified Technicians (Tc.) in the field of aerospace and aviation technology.

COURTESY VISIT OF THE MBOT REGISTRAR OF TO THE OFFICE OF THE DIRECTOR GENERAL OF AELB

Dr. Md Fauzi Md Ismail, Registrar of MBOT has paid a courtesy visit to the Office of the Director General, Atomic Energy Licensing Board (AELB), Tuan Haji Hasmadi bin Hassan today. The purpose of this courtesy visit is to formulate strategic cooperation between the two agencies. MBOT also recommends professional recognition as Professional Technology (Ts.) and Certified Technician (Tc.) to AELB staff especially to future retirees.

COURTESY VISIT OF UUM STEM ACADEMY TO THE PRESIDENT OF MBOT

MBOT President, Datuk Ts. Ir. Dr. Siti Hamisah Tapsir today received a courtesy visit from the School of Computing (SOC), Universiti Utara Malaysia (UUM) led by the Dean of SOC UUM, Assoc. Prof. Ts. Dr. Azham Hussain. During this session, Assoc. Prof. Ts. Dr. Azham shared on the accreditation of technology and technical programs under SOC UUM. He said SOC UUM is in the process of obtaining accreditation from the MBOT Technology and Technical Accreditation Council (TTAC) to ensure that the graduates produced can meet the needs of the industry.

MEETING BETWEEN THE MBOT AND THE DEPARTMENT OF AGRICULTURE

MBOT held a meeting with the top management of the Department of Agriculture chaired by Dato' Zahimi bin Hassan, Director General of the Agriculture Department in Putrajaya. The meeting discussed cooperation on talent development and the application of technology in the agricultural sector in Putrajaya. According to Dato' Zahimi, the use of modern technology in agriculture with the application of Information Technology (IT) such as drone technology, Artificial Intelligence (AI) and the Internet of Things (IoT) can improve the productivity and quality of agricultural production.

MBOT PRESIDENT'S COURTESY VISIT TO THE DEPUTY VICE-CHANCELLOR OF UNIVERSITI UTARA MALAYSIA

Datuk Ts. Ir. Dr. Siti Hamisah Binti Tapsir, MBOT paid a courtesy visit to YBhg. Prof. Dr. Shahimi Mohtar, Deputy Vice-Chancellor (Academic & Internationalization), Universiti Utara Malaysia (UUM). The meeting held at Anjung Tamu of the institution was to share on the latest developments of MBOT with UUM's top management. As a professional body that carries out the accreditation of technology and technical programs, MBOT has always been actively working with educational institutions to strengthen academic quality while improving the employability of graduates.

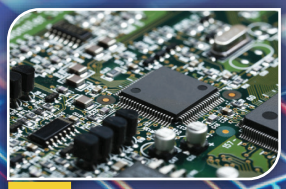
Photo: Lt. Kol. Prof. Ts. Dr. Zaliman Sauli

MBOT PRESIDENT'S COURTESY VISIT TO UNIMAP VICE-CHANCELLOR

Datuk Ir. Ts. Dr. Siti Hamisah Tapsir, President of MBOT was present at the Office of the Vice-Chancellor of Universiti Malaysia Perlis (UniMAP) today to meet with Lt. Kol. Prof. Ts. Dr. Zaliman Sauli, Vice-Chancellor of UniMAP. This courtesy visit from the President and the MBOT delegation is to share on the functions and roles of MBOT in recognizing technology and technicians as well as conducting accreditation of academic programs. To date, UniMAP offers six technology programs accredited by MBOT.

24 FIELDS OF TECHNOLOGY & TECHNICAL

RECOGNISED BY MBOT



EE Electrical & Electronics Technology

IT Information & Computing Technology

CM Chemical Technology

TB Telecommunication & Broadcasting Technology

BT Biotechnology

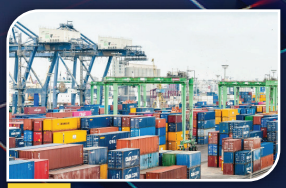
BC Building & Construction Technology

RB Resource Based, Survey & Geomatics Technology

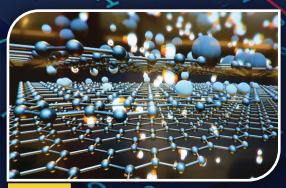
ME Manufacturing & Industrial Technology

AF Agro-based Technology

CS Cyber Security Technology



TL Transportation & Logistics Technology



MT Material Science Technology

MR Marine Technology

MI Maritime Technology

AC Atmospheric Science & Environment Technology

GT Green Technology

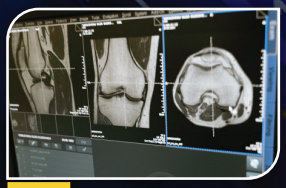
OG Oil & Gas Technology

AT Automotive Technology

AV Aerospace & Aviation Technology

FT Food Technology

NT Nanotechnology



NR Nuclear & Radiological Technology

AM Art Design & Creative Multimedia Technology

HM Health & Medical Technology

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