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UTAR UNIVERSITI TUNKU ABDUL RAHMAN

TRANSFORMING LIVES

UTAR REPORT ON SUSTAINABLE DEVELOPMENT GOALS 2019

Broadening Horizons, Transforming Lives

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in 2019 UI GreenMetric World University Rankings

INTRODUCTION

UTAR's Growth Strategies in Alignment with the SDGs

UTAR is highly reputed as one of the fastest growing private higher education institutions in the country with phenomenal growth in all aspects of its development since its inception. Since its inception on 13 August 2002 with 411 students for its first intake, the enrolment has now reached over 22,000 students with campuses located in Kampar, Perak and Bandar Sungai Long, Selangor. UTAR is a not-for-profit private university and is owned by the UTAR Education Foundation. It has graduated over 67,000 students.

Over the years, the University has grown significantly and its strategies are reflected in its 10-Year Strategic Plan (2013- 2022) which defines the strategic directions that are essential to propel the University to greater heights in support of quality education and to train youths to be future responsible leaders and citizens to meet the human resource needs of the nation.

The 10-Year Strategic Plan focuses on four directions which are:

1. Promote holistic development and sustainable growth
2. Generate academic programmes with socio-economic and transformative impact
3. Foster ubiquitous learning and lifelong education
4. Enhance diversification and internationalisation

These strategic directions are guided by the UTAR Six Educational Pillars of Education which are:

- 德 Virtue and Morality
- 智 Knowledge and Intellect
- 体 Physical and Mental Health
- 群 Sociality and Humanitarianism
- 美 Aesthetics and Harmony
- 新 Creativity and Innovation

These core values encompass all the key areas of learning for a holistic education and a balanced life. While it is crucial to attain academic excellence, the development of soft skills, moral values and character building is equally important to be socially responsible members of the society. UTAR staff and students are constantly engaged in community and volunteer projects providing voluntary services and R&D services to instil among students the importance of engaging with the community in support of sustainability, an economically just society and respect for the less privileged.

The implementation of UTAR's strategies embraces the spectrum of university functions and focused areas that are essential for the attainment of the vision and mission of the University to be a global university of educational excellence with transformative societal impact. These focused areas are:

- Governance
- Academic programmes
- Research and Development
- Collaborations and internationalisation
- Staff development
- Student development
- Facilities and services
- Community

The University's strategic plans are also aligned with the universal objectives of the UN's Sustainable Development Goals (SDGs) which seek to end poverty, protect the planet and ensure economic growth and prosperity for all. As a University, UTAR plays a contributing role towards the cross-sectoral implementation of the SDGs, providing an invaluable source of expertise in R&D, sharing knowledge, and guiding students in advancing the SDG agenda while fulfilling its own goals.

UTAR believes that through quality and focused education, youths can be trained and empowered to be responsible citizens who can enable and promote peace, tolerance and respect for the diverse communities, support and implement green practices to ensure sustainability and contribute to the economic and social welfare of the community to eradicate poverty. Youths must recognise the vast and fast-changing dynamics of the global arena that will also affect the local and national communities and the way decisions are made and plans are implemented. The University's initiatives are also interrelated with the goals of the SDGs to advance the 2030 agenda of the SDGs.

The various initiatives of the University incorporate the following objectives:

- Building, strengthening and institutionalising university partnerships with local and foreign universities, industry partners, the government and the community.
- Building sustainable relationships and strengthen engagement with less privileged communities to provide support and assistance training, environmental and health challenges
- Engaging in R & D to study, generate, translate and disseminate knowledge to increase societal impact of research through dynamic partnerships, resource and knowledge sharing to strengthen the understanding of managing interactions between the environment and human health.
- Training and shaping future leaders on sustainable development by integrating some SDGs into curricula to provide students with the knowledge and the skills needed to be responsible citizens and to promote multidisciplinary and systems approaches to solving increasingly complex challenges of society today
- Engaging data analytics to map, track and document the various efforts that link research, knowledge, decision-making and practice to help establish meaningful frameworks to identify, measure and report on the relevant indicators in a valid way. Continuous evaluation of sustainable efforts enables demonstration of commitment and progress which are critical for learning and improvements, promoting transparency and sustaining partnerships
- Recognising the efforts of staff and students in support of the SDGs

University Social Responsibility

In line with its focus on holistic development, sustainable growth and the community, UTAR places great emphasis on social responsibility among its staff and students. Its projects and initiatives cover a diverse spectrum of activities, rooted in its core values and reflected in its voluntary services in support of the people and the community to enhance their quality of living. Activities range from research, R&D projects, consultation, training, conferences, talks and seminars, to voluntary community services in New Villages and rural areas, health campaigns, gotong-royong, free health services, awareness programmes, financial aid and scholarships, leadership and youth camps, and teaching and learning support. From top management to academics, support staff and students, service to the community and even the industry is part and parcel of the University education. From working with the underprivileged in villages and cleaning up homes to collaborations with industry companies to improve products and services and conduct research; these activities are conducted throughout the year, providing value creation for both the givers and receivers.

UTAR has always adopted good governance, responsible management and social responsibility since its inception and has always believed that this approach is essential for long term sustainability, lifelong learning and value creation for its staff, students and the community.

In fulfilling its university social responsibility, UTAR strives to

- Make positive contributions in the campus, in the local communities, to the society and to the nation.
- Focus on continuous improvements and progress
- Minimise environmental impacts and take steps to ensure environmental conservation
- Support and respect diversity, multi-cultural and multi-racial harmony
- Collaborate with international and local university and industry partners for synergy and knowledge exchange
- Train our youths on volunteerism, teamwork, charity and responsible leadership
- Support the educational objectives of the state and nation to ensure peace, harmony and economic growth

Over the years, UTAR has always practised giving back to the community to help the less privileged and providing educational opportunities especially to those who lack the financial means to pursue tertiary education. UTAR has so far disbursed internal study loans amounting to more than RM8 million and given out internal scholarships to students amounting to more than RM230 million benefitting more than 20,200 students.

Some of UTAR's community projects and initiatives in support of SDGs, include the annual Kuala Lumpur Engineering and Science Fair in collaboration with the ASEAN Academy of Engineering and Technology (AAET), Malaysian Industry-Government Group for High Technology (MIGHT), the Institution of Engineers Malaysia (IEM), Malaysian Ministry of Education and Malaysian Ministry of Science, Technology and Innovation to promote STEM education among school children, especially those from rural schools and the community.

It is also UTAR's practice to share knowledge and expertise with the educational community and the public. UTAR's Centre for Extension Education (CEE) has been conducting short courses, training programmes, free seminars and talks to the public which has benefitted more than 160,000 participants since 2003. UTAR's Soft Skills Development Programme and the various community projects with international communities focus on the core competencies that prepare its students to understand and face the global challenges of diverse communities around the world.

Since its early years, UTAR has designed quality programmes incorporating the objectives of the SDGs, practiced good governance, diversified its partnerships and student bodies, employed effective teaching-learning pedagogy, initiated research and publications and expanded its support for the community. All these have come to fruition when the University was awarded self-accreditation status by the Malaysian Qualifications Agency (MQA) of the Ministry of Higher Education.

UTAR has always been committed towards making the world a better place in alignment with the SDG agenda. Its contribution covers various areas such as community engagement, environment conservation and green technology, quality education, medical and health support, economics and commerce, social and multicultural harmony and bursary, and these are reflected on the numerous awards and recognitions received. Among the significant awards received are the Sin Chew Business Excellence Award 2017 - CSR Excellence Award category, and the Sin Chew Education Awards (SCEA) 2018/2019 for Outstanding Educational Institutions in the Private Universities/Colleges Category. UTAR is also ranked 102nd World's Most Sustainable University in the 2019 UI GreenMetric World University Rankings.

UTAR's Policy Commitments to the UN Sustainable Development Goals

Founded with the bedrock principle of by the people, for the people, UTAR, as a not-for-profit university, has always embraced the society through various commitments which are also in line with the United Nations (UN) Sustainable Development Goals. Not limited to empowering students through quality yet affordable education, UTAR plays a contributing role towards the cross-sectoral implementation of the SDGs, providing an invaluable source of expertise in R&D and education, while sharing knowledge, and guiding students in advancing the SDG agenda and fulfilling its own goals. UTAR has throughout the years spearheaded sustainable initiatives which not only broaden the horizons of one generation, but also transform their lives as well as that of the generations to come.

Non-Discrimination and Anti-Harassment Policy

Objective
UTAR, as a not-for-profit private educational institution, is committed to a work and study environment that promotes professionalism and seeks to attract staff and students in support of diversity. This policy shall govern the University in dealing with programme admissions, employment and University operations, and in accordance with the relevant Laws and Regulations of the country.

Policy
This policy is put in place to prevent prejudice, unlawful discrimination or harassment against individuals on the basis of race, religion, and gender. Any person violating this policy will be subject to corrective action as per University rules and regulations.

Any feedback or report on harassment or unlawful discrimination (regardless of verbal, physical or via electronic means), will be attended to and investigations will be conducted. Appropriate actions will be taken accordingly, following the University policies, rules and regulations, and where necessary, in accordance with the relevant Laws and Regulations of the country. The University will take corrective actions to prevent recurrences and will provide counselling support to those affected, if required.

Staff and Students of the University shall undertake to comply with the University policies, rules and regulations, and also in accordance with the relevant Laws and Regulations of the country at all times.

For enquiries or feedback related to this policy, please refer to the Director of the Division of Human Resource or the Head of the Department of Student Affairs.

Environmental Policy

In line with its focus on excellence in teaching and research, Universiti Tunku Abdul Rahman (UTAR) is committed to promoting environmental sustainability and creating environmental awareness among its students, staff, stakeholders and the public to conserve the environment and to prevent environmental pollution.

This policy sets out the six fundamental principles that UTAR accepts to be responsible for the environment and its sustainability.

Principle 1
We are committed to implementing a holistic framework to ensure the systematic management of environmental sustainability through compliance with applicable environmental legislation and standards.

Principle 2
We will undertake to create awareness and the appreciation of environmental sustainability among students, staff, alumni, stakeholders and the public through education, research, consultancy and community engagement.

Principle 3
We will aspire to continuously improve our environmental performance to achieve the objectives of this policy through education, research, consultancy and community engagement, as well as integration of best practices into our campus activities.

Principle 4
We will strive to minimise the adverse impacts on the environment by reducing the use of energy and water, and implement educational programmes to use energy and water more efficiently, while adopting good energy and water management practices.

Principle 5
We will endeavour to eliminate and minimise waste and preserve natural resources, and ensure that the management of materials and disposal of waste is implemented in an environmentally responsible manner.

Principle 6
We will expect our suppliers, vendors and contractors to comply with local environmental laws and regulations to ensure the protection of the environment.

The University is committed to ensuring the protection of the environment to protect its resources and to prevent any adverse environmental impacts.

Sustainable Food Policy

As a teaching, learning and research institution, with responsibilities to the local community and society, Universiti Tunku Abdul Rahman aims to implement its procurement activities in an environmentally and socially responsible manner. This Policy shall apply to all food operators and other related service providers in the University. All food operators and related service providers are required to comply with this Policy in their daily operations.

The University aims to:
- Educate staff and students on healthy and sustainable food consumption and habits through good health practices, advice and educational events.
- Ensure food safety and nutrition within a sustainable food system.
- Ensure that food operators and service related providers adopt measures that support food sustainability in an environmentally and socially responsible manner.
- Commit to supporting the local community and contribute to the economy in a manner that is economically viable, ecologically sound, and socially supportive.

All food operators and related service providers in the University are required to:
- Develop objectives and make efforts in support of good environmental and social effects associated with the food products and services we purchase.
- Identify and adopt measures to take into consideration environmental and socially responsible factors during the food selection and cooking process.
- Identify and provide a choice of healthy and balanced food options, in support of sustainability, to our students, staff and visitors.
- Promote good health and its educational social benefits through supporting good eating habits and providing a healthy selection of quality and safe food.
- Encourage related suppliers and contractors to minimise negative environmental and social effects associated with the products and services they provide.

Regulations on the Usage of Expanded Polystyrene

1. Purpose

1.1 The following rules and regulations are applicable to all food Cafeteria operators, Push Cart operators, and any food vendors who supplies and selling foods and drinks within the University Premises. It also applied to any types of event and/or activities which held within the University Premises.

1.2 These regulations are made in order to reduce the use of polystyrene in everyday purchasing and encourage consumers to stop using expanded polystyrene packaging. These regulations shall help the University to prevent pollution due to the usage of expanded polystyrene. This initiative is in line with the University's Green Campus Initiative.

2. Authority and Definitions

2.1 The University reserves the right to maintain full jurisdiction over the vendors/users and to take action against all violators of these regulations, and amend these regulations from time to time as deemed by the University.

2.2 The following terms shall have the meanings specified:

2.2.1 "University Premises" means any land or buildings in University ownership or under the control of the University including land or buildings occupied by private individuals or companies whether as tenants or licensees.

2.2.2 "Cafeteria Operators" means all Cafeteria Operators or Stall Operators operate at the Cafeteria within the University Premises.

2.2.3 "Push Carts Operators" means all Push Cart Operators operate within the University Premises.

2.2.4 "Event Organizer" means any organizer or committee or host of any event or activities which approved by the University to be held within the University Premises.

2.2.5 "Customers" means anyone buying the foods and drinks from Cafeteria Operators, Push Cart Operators and Food Vendors within the University Premises.

2.2.6 "Outsiders" means anyone other than Student and Staff with a bona fide reason for entering the University.

2.2.7 "University" means Universiti Tunku Abdul Rahman.

2.2.8 "Staff" means any or all employees of the University whether fulltime or part-time.

2.2.9 "Student" means any or all students registered for programme of study in the University whether on a full-time or part-time basis.

2.2.10 "Expanded polystyrene" means rigid cellular form of polystyrene with low weight/density, and good thermal insulation characteristics in general.

2.2.11 "Polyethylene terephthalate" is a type of thermoplastic polymer resin from polyester family which is widely used for food and liquid containers as well as clothing fibers.

2.2.12 "Polypropylene" is a type of thermoplastic polymer from the group of polyolefin. It is widely used for food and liquid containers, milk bottles as well as stationery. Polypropylene has high melting points thus it is suitable to be sterilized under steam or boiled water.

3. Cafeteria and Push Cart Operators

3.1 The Cafeteria and Push Cart Operators shall not use expanded polystyrene based drinking cups and eating plates for in-house usage. The Cafeteria and Push Cart Operators are encouraged to use recyclable single-use plates and cups for dine-in usage.

3.2 The Cafeteria and Push Cart Operators shall not use expanded polystyrene based food and drink packaging/take-away boxes and cups. The Cafeteria and Push Cart Operators shall use other options for food or drink packaging boxes and cups such as biodegradable paper, polyethylene terephthalate or polypropylene boxes and cups.

3.3 The Cafeteria and Push Cart Operators are not allowed to charge any additional cost for the use of recyclable plates, cups and dishware for dine-in usage.

3.4 The Cafeteria and Push Cart Operators are not allowed to charge any additional cost for the use of paper, polyethylene terephthalate or polypropylene based cups and plates for dine-in usage.

4. Event Organiser

4.1 The Event Organiser shall not use expanded polystyrene based drinking cups and eating plates for dine-in usage. The Event Organiser is encouraged to use recyclable plates and cups for the dine-in usage.

4.2 The Event Organiser shall not use expanded polystyrene based food and drink packaging/take-away boxes and cups. The Event Organiser shall use other options for food or drink packaging boxes and cups such as biodegradable paper, polyethylene terephthalate or polypropylene boxes and cups.

4.3 The Event Organiser is not allowed to charge any additional cost for the use of recyclable plates, cups and dishware dine-in usage.

4.4 The Event Organiser is not allowed to charge any additional cost for the use of paper, polyethylene terephthalate or polypropylene based cups and plates dine-in usage.

5. Enforcement and Investigations Powers

5.1 The Department of Student Affairs of each campus shall enforce the expanded polystyrene usage regulations and have the authority to ensure the compliance of Expanded Polystyrene Usage Regulations.

6. Assistance and Referrals

6.1 Any concerns or queries regarding the expanded polystyrene usage policies, enforcement and operational aspects should be directed to the Head of Department of Student Affairs of each campus.

1 NO POVERTY

Goal 1:
End poverty in all its forms everywhere

PUBLIC ENGAGEMENT

Reaching out to the poor and needy: Home visit

The home visit conducted by a group of academics from the Faculty of Business and Finance (FBF) aimed to identify and collect information on the poor and needy. Their visitation covered the areas of Mambang Diawan and Malim Nawar. The data collected enabled the academics to channel the list to the right charity association for further assistance, whether in the form of monetary or non-monetary. The information will further provide these group of people access to financial sponsorship. The project gained positive feedback. Hence, the project organiser was encouraged to expand the project and collect more data for more development of viable solutions to help the poor and needy.

Research in numbers: SDG1

5 publications

1.03% of all UTAR publications in 2019

Course units on SDG1: 1

SDG1 related activities

12 0.81% of all activities in 2019

1,311 participants

RESEARCH

How do natural disasters influence the rate of poverty?

This study aims to investigate the causal relationship between poverty, growth, financial development and natural disasters in the Philippines from 1970 to 2014. The Toda-Yamamoto version of the Granger causality test was employed. We found that financial development, poverty and economic growth were bidirectionally causal. However, we noted a unidirectional Granger causality from natural disasters to financial development and economic growth. In this regard, effective disaster risk-reduction strategies and risk management practices are proposed to mitigate the influence of natural disasters on the rate of poverty and thus promote sustainable economic growth and financial development in the Philippines.

Quality of life among elderly in Malaysia: The role of financial determinants

In Malaysia, rapid ageing population can be attributed to a fast decline in fertility and an increase in longevity due to better health care and improved living conditions. Recent issues such as the rise of living costs, the increase of health care costs and erosion of traditional family support system have further increased the financial burden of the elderly in Malaysia. Longer life expectancy adds to the problem as elderly citizens in Malaysia find it more difficult to sustain their lifestyles and live comfortably after retirement since they live longer. As older Malaysians have difficulties in maintaining their quality of life (QoL) after retirement, it was vital to look into the adequacy of the current income provision system and voluntary retirement savings among the elderly citizens in Malaysia and understand how these factors affect their quality of life. It was also essential to study the role of financial literacy in affecting the quality of life among older people in Malaysia as retirement savings are inadequate and run out quickly (within 3 to 5 years). The results of the study will provide hints to the Malaysian elderly on the role of financial literacy and voluntary retirement savings in influencing their quality of life after retirement. The findings of the study will also give better insights to the policymakers when it comes to designing and implementing appropriate policies that can ensure good life quality among older population in the country.

2 ZERO HUNGER

Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture

PUBLIC ENGAGEMENT

Soup Kitchen

The Soup Kitchen project organised by Faculty of Business and Finance aimed to raise awareness on the number of people living in extreme poverty in the city. The data collected will provide them vital information on ensuring that these people have access to safe, nutritious and sufficient food supply. The project also saw the volunteers distributing pre-packed meals, clean water and clothing to the homeless and poor. Medical personnel who volunteered in the project also provided basic healthcare products and free basic medical services to the homeless and poor.

Research in numbers: SDG2

7 publications

1.44% of all UTAR publications in 2019

Course units on SDG2 23

SDG2 related activities

11

0.74% of all activities in 2019

2,298 participants

RESEARCH

The influences of thermal processing on phytochemicals and possible routes to the discovery of new phytochemical conjugates

In our diets, many of the consumed foods are subjected to various forms of heating and thermal processing. Besides enhancing the taste, texture and aroma of the foods, heating helps to sterilize and facilitate food storage. On the other hand, heating and thermal processing are frequently reported during the preparation of various traditional herbal medicines. In this review, we intend to highlight works by various research groups which reported on changes in phytochemicals and bioactivities, following thermal processing of selected plant-derived foods and herbal medicines. Relevant cases from plant-derived foods (garlic, coffee, cocoa, barley) and traditional herbal medicines (Panax ginseng, Polygonum multiforum, Aconitum carmichaelii Debeaux, Angelica sinensis Radix) will be presented in this review. Additionally, related works using pure phytochemical compounds will also be highlighted. In some of these cases, the amazing formation of new compounds were being reported. Maillard reaction could be concluded as the predominant pathway leading to the formation of new conjugates, along with other possibilities being suggested (degradation, transglycosylation, deglycosylation and dehydration). With collective efforts from all researchers, it is hoped that more details will be revealed and it will lead to the possible discovery of new, heat-mediated phytochemical conjugates.

Survival and biofilm formation of Listeria monocytogenes on food contact surfaces and application of potential strategies to prevent food contamination

Food contact surface is a potential vehicle for the transfer of psychrotrophic Listeria monocytogenes to food and to other food contact surfaces that may lead to food poisoning or deadly listeriosis outbreak as what recently occured in South Africa. L. monocytogenes adheres to these surfaces, forms biofilms that enhance its capacity to survive food related environments such as refrigeration, salinity, acidity and sanitization. The resistant biofilm-adhered cells can detach from the surface and easily contaminate food as it passes the surfaces with them. In Malaysia, multi-drug resistant L. monocytogenes has been isolated from food processing and food service environments but its survival against commercial disinfectant was not investigated. This proposed study aims to evaluate the capability of L. monocytogenes strains to adhere and form biofilms. All these strains will be isolated from solid surfaces at food service premises and food processing plants located in Perak. The antibiotic susceptibility of the isolates will be determined using disc diffusion method and the presence of virulence genes will be characterised using Polymerase Chain Reaction (PCR) method. The ability to adhere and form biofilm on polypropylene and stainless steel coupons at 4, 25 and 37°C will be assayed in microtiter plates.

3 GOOD HEALTH AND WELL-BEING

Goal 3: Ensure healthy lives and promote well-being for all at all ages

PUBLIC ENGAGEMENT

Local Herbs Day III: Herbs for better health

Having succeed for the third time, the Local Herbs Day III: Herbs for Better Health was organised by Centre for Bio-Diversity Research (CBR) of Faculty of Science on 19 October 2019. It aimed to facilitate knowledge sharing and create exposure of herbs for health benefits to the local community. Herbs, which can also be referred as herbaceous plates are valued for their savoury, aromatic and medicinal qualities. Participants in the event also learnt that herbs can be utilised in areas such as culinary, skin care and hair care for health optimisation. Herbs can also be complemented with synthesised pharmaceutical drugs. This event enabled participants to consider the usage of herbs for their health and well-being.

Research in numbers: SDG3

87 publications

17.86% of all UTAR publications in 2019

Course units on SDG3 223

SDG3 related activities

175 11.80% of all activities in 2019

33,145 participants

RESEARCH

Nutritional status and dietary intake of Semai indigenous children below five years in Perak, Peninsular Malaysia

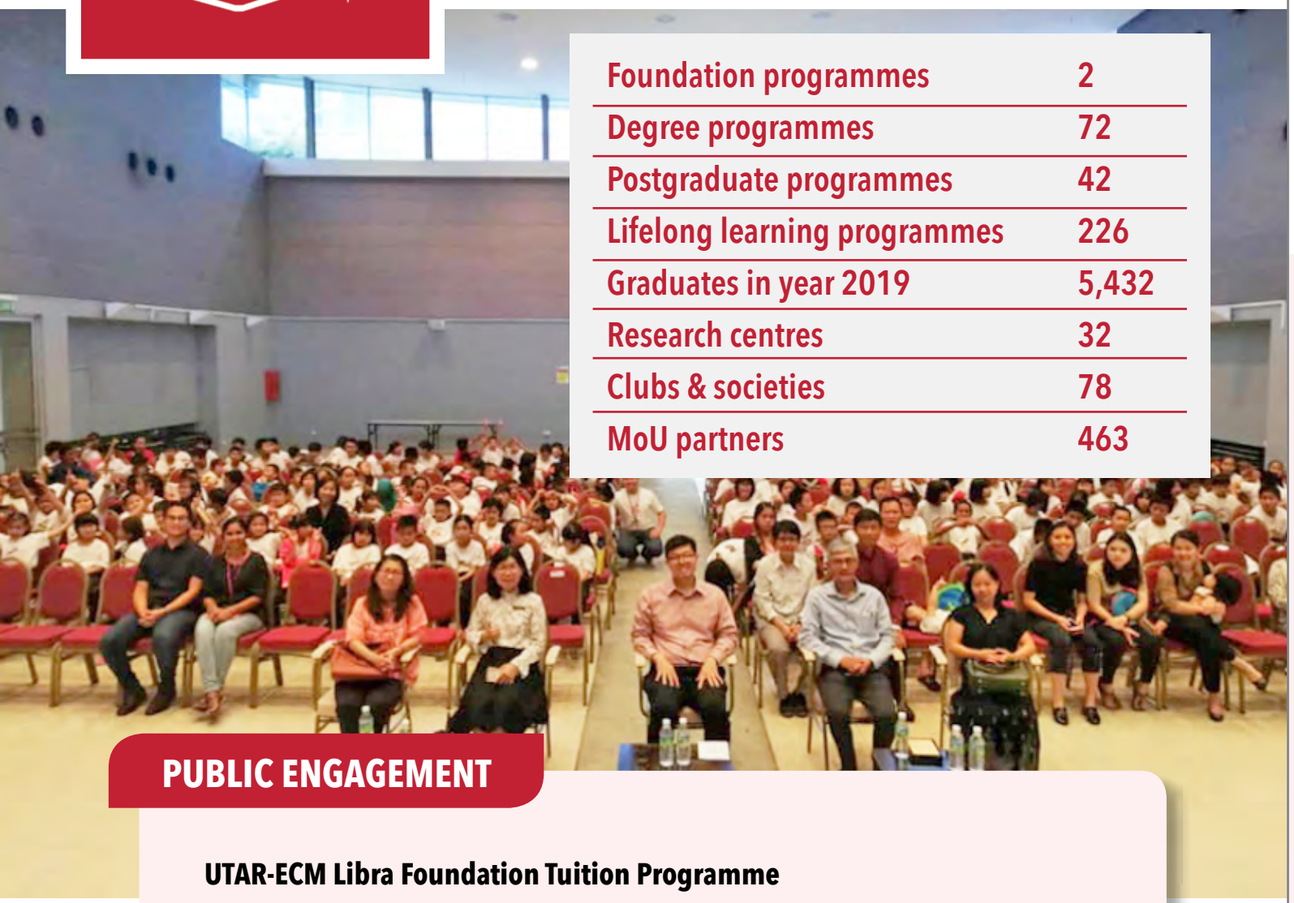
The nutrition transition in Malaysia has had profound impact on the nutritional status of the national population especially among children below five years old. There exists paucity in the data that address the nutritional status of aboriginal children that may impair intervention programme. Hence, the study aims to assess and appraise the nutritional status of Semai Orang Asli children under five years old and identify the determinants of nutritional status to strengthen baseline data. A total of 340 Semai children (179 male and 161 female children) from Perak were recruited for the study. All information pertaining to demographic, socio-economic and educational status were collected using an interviewer-administered questionnaire. All children were subjected to nutritional anthropometry and clinical examination using standard procedures. A one-day dietary record was done on a sub-sample of 140 children between 12 and 59 months. About 32.7% of the Semai children were underweight 28.2% were stunted and 52% showed wasting. The Body Mass Index (BMI) revealed that 52% of children experienced moderate to severe thinness. The existence of malnutrition was higher among female children. Twenty-eight per cent were identified with 'Any Form of Nutritional Deficiencies' and did not meet the 'Recommended Nutrient Intake' for any measured nutrient. Poverty, illiteracy, unavailability of food, location and proximity to procure food, lack of physical activity, poor sanitation and hygiene were the contributors to the poor nutritional status. Nutrition transition has had less or marginal impact on the nutritional status of the indigenous children which calls for immediate action and intervention.

Personality traits, eating behavior, physical activity and genetic correlates of obesity among UTAR staff and students

Obesity has been found to be very prevalent in Malaysia as it affects the quality of life of an individual as well as the country. Therefore, finding the causes of obesity is important to understand how and why obesity occurs so that a healthier community is created. The present study aims to explore the aetiology of obesity (i.e., personality traits - Openness, Conscientiousness, Extraversion, Agreeableness, Emotional Stability; eating behavior; physical activity; and dopamine receptor genotypes) and investigate whether obesity associates with the quality of life of UTAR staff and students. Three hundred participants will be recruited to answer a set of questionnaires and their mouthwash samples will be collected. The collected data will then be analyzed using Haploview, SPSS and AMOS. Determining the causes of aetiology of obesity is essential to create a healthier community with a better quality of life. The findings hope to help the community to live a better life.

4 QUALITY EDUCATION

Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all



Foundation programmes	2
Degree programmes	72
Postgraduate programmes	42
Lifelong learning programmes	226
Graduates in year 2019	5,432
Research centres	32
Clubs & societies	78
MoU partners	463

PUBLIC ENGAGEMENT

UTAR-ECM Libra Foundation Tuition Programme

Joining hands to provide young schoolchildren the access to quality education and improve schoolchildren's English and Bahasa Malaysia subjects as well as Information Technology (IT) skills, UTAR and ECM Libra Foundation co-organised a series of comprehensive English, Bahasa Malaysia and IT tuition programme for selected primary schools in Perak. The tuition programme was used as channel to prepare the school students for Ujian Penilaian Sekolah Rendah (UPSR) and their school final term examinations. Upon entering its sixth year, the UTAR-ECM Libra Foundation Tuition and IT Skills Programme 2019 saw the involvement of several departments, namely Department of Soft Skills Competency (DSSC), Faculty of Information and Communication Technology (FICT), Faculty of Arts and Social Science (FAS) and Faculty of Business and Finance (FBF). The English and Bahasa Malaysia Tuition programme primarily focused on teaching listening, speaking, reading and writing skills to the school students. The components of the IT Tuition programme involved indoor class training on some basic programming and animation skills, and was conceptualised to encourage young schoolchildren to be dynamic, creative and innovative.

Research in numbers: SDG4

29 publications

5.95% of all UTAR publications in 2019

Course units on SDG4 **659**

SDG4 related activities

896 60.38% of all activities in 2019

210,161 participants

RESEARCH

Teaching game development subject: A case study using game engine to perceive learning style and performance

There are many adapted teaching and learning (TL) practices that utilized e-learning tools to teach computer laboratories among the tertiary education students. What is the appropriate approach for the teaching and learning of computing subject catered for the current era of students since information and knowledge can be accessed widely and learnt from the Internet. Kolb's experiential learning and inquiry-based learning approaches had presented several studies area application and resulted to enrich students' hands-on learning . This research aimed to identify the teaching practices for game development related to computing skills subject. Focus is made for educators to adapt the teaching model as a method for students' learning, emphasising on software skills in developing game content. The proposed teaching models are framed as reference from both Kolb's and inquiry-based learning theories to design the lesson plans and lab exercises. Then, a pilot test survey was conducted among the game students to retrieve their perception and experience throughout the learning process. The survey data presented that students' learning are effective by watching and doing. The inquiry-based model is recommended for teaching practices especially to students without any prior knowledge and skills in computing development subject. Therefore, this research suggested both teaching approaches to strengthen students' basic knowledge learning prior to beginner level.

The impact of preferred learning styles among accounting students on soft skills

This study aimed to determine the impact of preferred learning styles among accounting students on soft skills. The independent variables in this study were students' preferred learning styles (visual, auditory and kinesthetic). The dependent variables were students' soft skills (communication skills and critical thinking and problem solving). The first part gathered information related to demographic and the second part gathered information related to students' preferred learning styles and the third part gathered information related to students' soft skills among Malaysian accounting students. The population for this study was drawn from the accounting students in Malaysia. The sample consisted of 316 students that were selected randomly from IPTA (UM and UPM) and IPTS (UTAR). The instruments used in this study were Barsch's Learning Inventory to measure students' learning styles and Malaysian Soft Skills Scale (My3S) instrument to assess the graduates' soft skills attainment level. Validity was assured through the literature review and critical review of the instrument. Each statement was designated to study specific areas of students' learning styles. The data were collected, sorted and tabulated by the researcher. The data were analyzed using Statistical Package for Social Sciences (SPSS) for windows statistical program. An analysis of Pearson and multiple linear regressions were used to answer the research questions what preference, if any, on students' learning. This study was undertaken to determine the preferred learning styles of Malaysian final year accounting students, to describe the differences exist in students learning styles based on their demographic factors (gender, age, type of institution, academic achievement, place of living, planned career field, and parents' education level) and also to investigate whether students' learning styles can influence the students' soft skills (communication skills and critical thinking and problem solving).

5 GENDER EQUALITY

Goal 5: Achieve gender equality and empower all women and girls

PUBLIC ENGAGEMENT

Re-launching of OWSD MNC to empower women in Science

The Organization for Women in Science for the Developing World (OWSD) Malaysia National Chapter (MNC) was relaunched at Berjaya Times Square Hotel, Kuala Lumpur on 21 August 2019. The launch was held after the 8th year of establishment of the OWSD MNC in facilitating the advancement of women in science and technology in Malaysia since its establishment on 11 August 2011. A new logo was launched for the women empowering organisation on the same day. The event also witnessed further enhancement of women's capabilities and contributions particularly in the field of science in developing nations, as OWSD MNC continues to work closely with OWSD International. Present at the event was OWSD Malaysia National Chapter Chairperson Prof Dr Lim Yang Mooi and Faculty of Medicine and Health Sciences (FMHS) Dean Emeritus Prof Dr Cheong Soon Kheng.

Research in numbers: SDG5

4 publications

0.82% of all UTAR publications in 2019

Course units on SDG5 6

SDG5 related activities

3 0.20% of all activities in 2019

142 participants

RESEARCH

An empirical investigation on the adoption of ICT into teaching based on gender differences

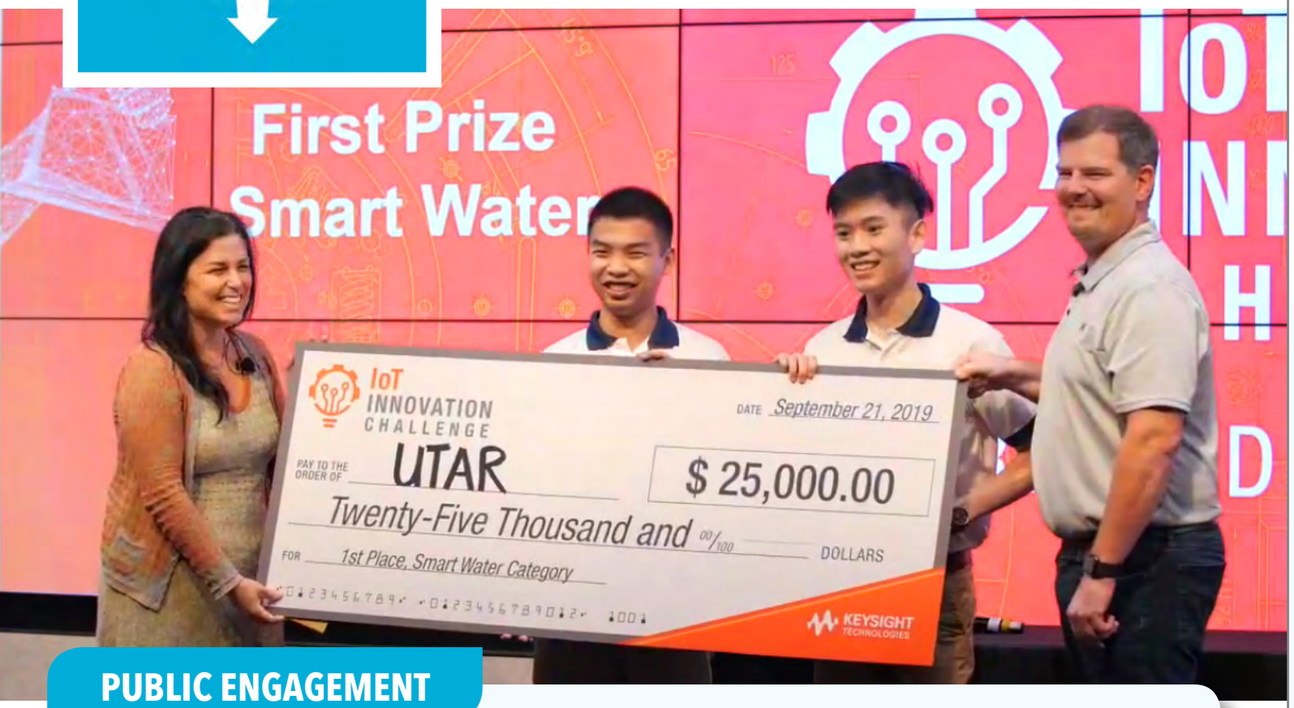
The Information and Communication Technology (ICT) has proved to be a useful tool in various fields. It has also been incorporated into education as part of the practice in knowledge society. One of the strategies by the Malaysian government involves upgrading the education system by incorporating ICT into its syllabus. However, certain problems could appear if the teachers or students are not prepared for the implementation. Previous studies have proved that some issues will be raised when ICT is introduced in the classrooms. Past studies also showed that teacher's ability, teacher's emotion and teacher's self-esteem contain positive relationship with the teacher's intention to incorporate ICT in their teaching. Yet, the research did not consider the gender differences among the teachers. Therefore, this research will explore whether the adoption of ICT in teaching can be affected by the gender of teachers in Malaysia. The objectives are to identify the teachers' gender, attitude, emotion and self-esteem when incorporating ICT in their teaching. Technology Acceptance Model and Theory Reason Action are applied in this research in order to test the hypotheses. Based on the results shown, only Hypothesis 1 was accepted for male teachers while all three hypotheses were accepted for Female teachers. It proved that teachers of different gender have different views when incorporating ICT in their teaching. The current research finding is only applicable for the schools in town because the ICT facilities in rural areas are different.

Factors influencing young women's decision making in pursuing Science, Technology and Engineering (STE) education: Gender gap in STE education

Despite women's increasing participation in the higher education, they are still significantly under-represented in the area of Science, Technology and Engineering (STE). The Ministry of Education Malaysia (2013) showed the enrolment of women in eight major fields of studies in Malaysia in which they were traditionally under-represented. The areas include Science, Engineering and Technology. Despite joining the educational pipeline as equals to their male counterparts, Malaysian women were persistently under-represented in the STE fields. This could be due to a variety of reasons, but mostly related to the roles allocated to women in the modern society as well as pre-existing prejudices and the missing of good role models in STE. Parents and teachers play an important role in assisting or hindering the way young women chose their career paths and that choice begins early from school, all the way through their higher education. Therefore, it is important to understand the forces at play that drive women in STE and affect their initial chosen career. Choice is an important factor that determine and encourage women's participation in Science, Technology and Engineering. The research investigates the participation of young women in STE education from high school level and the factors influencing the young women's decision-making in the early stages of choosing their career paths to STE education. The under-representation of women in STE translates into the loss of a critical mass of talent, thoughts and ideas, which hinders countries from reaching their maximum development potential. The research targets 600 young women in 12 high schools, aged between 16 to 18 years old. The findings of the research would provide novel insight that can be developed for a better understanding about women's participation in the STE. The findings would also assist the policymakers in tackling the gender gap in STE education in Malaysia.

6 CLEAN WATER AND SANITATION

Goal 6: Ensure availability and sustainable management of water and sanitation for all



PUBLIC ENGAGEMENT

IoT Detachable Waterway Monitoring Device with LoRa and Self-Sustainability

UTAR Lee Kong Chian Faculty of Engineering and Science students Lim Wen Qing, Au Jin Cheng, Yap Sheng Yao, Tan Kai Siang and Khor Jun Bin invented *IoT Detachable Waterway Monitoring Device with LoRa and Self-Sustainability*, a smart device that can monitor water pollutants in rivers and lakes with readings that can be downloaded (through an app) by the community to monitor the quality of water. The device uses natural energy sources from the sun, wind and water. It consists of four major component functions which are, monitoring of the water contents - its acidity, temperature, turbidity, etc; reporting of the data using peer-to-peer LoRa Mesh network; analysis of data collected in the cloud using machine learning algorithm; and energy harvesting system which includes solar, hydro and wind energy for self-sustainability of the device. According to the team, the node to node communication present in each device enables it to form a large sensor monitoring network. Moreover, Machine Learning is used to analyse the data collected for anomaly detection.

The data collected can be used to predict the future condition of waterways for preventive purposes. It is self-sustainable with the help of renewable energy integrated into the system. The monitoring device is modular and can be modified based on the environment. Another feature of the system device also allows the public and community to report on any pollution found in waters, hence making it more community-driven. By creating a massive monitoring network, the team believes that the system will be able to monitor every single point from all around the world and an immediate response can be taken whenever the water quality reaches a critical stage.

Research in numbers: SDG6

47 publications

9.65% of all UTAR publications in 2019

Course units on SDG6 16

SDG6 related activities

3 0.20% of all activities in 2019

184 participants

RESEARCH

Treatment of tropical stabilized landfill leachate using palm oil fuel ash: isothermal and kinetic studies

Landfill leachate is a hazardous by-product of landfills which can lead to surface and groundwater contamination if not properly managed, bringing a series of adverse effects to the natural environment, welfare, and human health. Landfill leachate must be treated to meet the discharge standards before discharging to the environment. This study aimed to treat stabilised landfill leachate using palm oil fuel ash (POFA). The adsorbent used in this study was POFA activated via KOH (treated palm oil fuel ash (TPOFA.KOH)) with impregnation ratio of POFA:KOH equal to 1:1. Batch adsorption studies were conducted to evaluate the effect of contact time, shaking speed, and adsorbent dosage. Removal efficiencies of chemical oxygen demand (COD), colour, and ammoniacal nitrogen (NH 3 –N) achieved in this study were 75.44%, 85.37%, and 18.68%, respectively. Isothermal study was conducted to examine the adsorption capacity of POFA by Langmuir and Freundlich models, whereas the kinetic study was conducted to examine the adsorption mechanism of POFA by pseudo-first and pseudo-second-order models. Consequently, the adsorptive removal of colour, COD, and NH 3 –N onto POFA were favourably fitted to Langmuir isotherm with maximum adsorption capacities of colour, COD, and NH 3 –N at 28.329 Pt-Co/g, 27.778, and 0.0508 mg/g, respectively, indicating that TPOFA.KOH has high adsorption capacity for organic compounds compared with NH 3 –N. The kinetic data agreed satisfactorily with the pseudo-second-order which indicated that the adsorption process was controlled by chemisorption.

Development and performance evaluation of concentrated Solar Power (CSP) and Phase Change Material (PCM) assisted portable solar desalination system for freshwater production in coastal area

Our research mainly focuses on developing a low-cost, easy handling and easy maintenance water production system. Unlike the available fixed structure, we aim to design a portable distillation unit which can be used/installed in the area that is mostly exposed to the sun considering the change in the exposure of sun according to season. No moving part will be associated (i.e., recirculating pumps) and the design should be very convenient and user-friendly. The solar still based water purification method in Malaysia is still developing and we would like to take this opportunity to utilise the abundant solar heat available across the country to produce drinking water for the marginal people in the coastal area. Toward the successful completion of the project, the available solar energy based companies will be contacted for the commercialisation of the product.

7 AFFORDABLE AND CLEAN ENERGY

Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all

PUBLIC ENGAGEMENT

ISGST 2019

The International Symposium on Green and Sustainable Technology (ISGST) 2019 was the third symposium since 2014. It aimed to provide a platform for researchers to discuss on the development, implementation, economic and potential outlook of green technologies. The general public also gained insights into how green and sustainable technology could be employed as alternative technologies that could help the world to meet the growing needs of society without damaging or depleting the natural resources on earth and prevent any further damage to health and environment. ISGST 2019 hosted six parallel sessions altogether and the sub-themes presented throughout the conference were 'Renewable Energy and Energy Efficiency', 'Environmental Technology', 'Green Materials', 'Sustainable Development' and 'Smart Manufacturing'.

Research in numbers: SDG7

45 publications

9.24% of all UTAR publications in 2019

Course units on SDG7 **12**

SDG7 related activities

18 1.21% of all activities in 2019

770 participants

RESEARCH

Numerical analysis with experimental verification to predict outdoor power conversion efficiency of inverted organic solar devices

Inverted organic solar cell (IOSC) devices with different volume ratios of In2S3 nanoparticles have been studied under the local spectral irradiances in Malaysia with respect to that of AM1.5G. The J-V curves of encapsulated IOSC devices were measured outdoor using an Ivium Potentiostat and the local spectral irradiances were acquired using an AVANTES spectrometer concurrently. All of the IOSC devices experienced significant improvement in power conversion efficiency (PCE) under both local sunny and cloudy conditions with respect to the AM 1.5G, by 22–35% and 31–65%, respectively. From spectral analysis, the area under the graph of spectral irradiance in UV–visible region is significantly higher compared to infrared region for both local sunny and cloudy conditions, by 44.6% and 55.9%, respectively, while it is only recorded as 12.9% for AM 1.5G. Last but not the least, we have successfully verified the numerical analysis to predict device performance by comparing the simulated and measured PCE values for different irradiance intensities whereby the prediction of PCE is better under sunny condition with a deviation of 3.4–10.8% compared to cloudy conditions, with deviation of 28.9–30.5%.

Development of low frequency vibration energy harvester using stretchable electronic

In this project, the researcher will use a novel vibration energy harvester based on low frequency human mechanical motion using stretchable electronic. To emphasise the device robustness, a spiral coil pattern microchannel (filled with conductive liquid) in the stretchable material cut the electromagnetic flux of the permanent magnet when the device is subjected to mechanical motion. The cutting flux mechanism produces electricity based on Faraday's Law of electromagnetic induction. Numerical simulation will be performed to study the electrical flux distribution and to optimize the geometrical parameters of the spiral coil (such as number of turn, channel dimension and etc.). To realize the energy harvesting concept, a prototype will be microfabricated through lithography process using Eco-flex rubber as the microchannel structure.

8 DECENT WORK AND ECONOMIC GROWTH

Goal 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

PUBLIC ENGAGEMENT

Social Entrepreneurship Project

Offered as one of the elective courses by the Department of Soft Skills Competency, the Social Entrepreneurship Project aimed to assist the underprivileged individuals from B40 to set up a micro business, mainly selling crafts, foods and beverages. This project is planned to create a positive impact and provide a quality life to the needy individuals and families. Under the project, UTAR students helped the underprivileged people to set up and run micro business based on their resources and strengths. The project also helped to increase job opportunities for the underprivileged people, improve the quality of their lives and enhance their confidence to start a micro business.

Research in numbers: SDG8

17 publications

3.49% of all UTAR publications in 2019

Course units on SDG8 **104**

SDG8 related activities

60 4.04% of all activities in 2019

6,306 participants

RESEARCH

Do trade partners' labour standards affect ASEAN's labour standards?

This study investigates the impact of foreign labour standards on domestic labour standards in ASEAN countries. The study employs a set of cross-sectional time series data that covers the period from 1995-2008 for its empirical analysis. Three different labour standards indicators, namely numbers of strikes and lockouts, cases of occupational injuries, and trade union density rates are used as a proxy for labour standards. The results evince a race to the bottom for labour standards, represented by cases of injuries. In contrast, the effect of trade partners' trade union density rate was negative and significant; however, the number of strikes and lockouts had an insignificant effect. The findings of the study suggest that there may be a race to the bottom in terms of working conditions among ASEAN countries, but not on the standards that measure the rights of workers.

The assessment of Malaysian oil palm industry competitiveness due to El Nino, ageing crops and plantation area constraints

Oil palm industry becomes very competitive due to the growing demand of oil and fats consumption in the world. Malaysia is the second largest palm oil producer contributing about 38% of the total international palm oil trade after Indonesia. The global temperature is increasing gradually over years and affecting the production of the world's agriculture sector. El-Nino is a natural phenomenon leading to an extreme hot and dry weather with insufficient irrigation to inhibit the plant growth and reduce production. As such, the production of palm oil in Malaysia was also affected due to past El-Nino events. Very strong El-Nino events in 1997/98, 2008/09 and 2015/16 had proven to affect both the fresh fruit bunches and palm oil production of Malaysian oil palm industry which led to a shortage of palm oil supply globally. By then, crude palm oil prices fluctuated and rose tremendously. As a result, Malaysia experienced an opportunity loss in GDP due to the low palm oil production. While climate scientists and researchers focus to come up with climate change adaptation and mitigation plan, another group of researchers cited ageing crops as key factor that affected Malaysian palm oil yield.

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

Goal 9: Build resilient infrastructure, promote sustainable industrialization and foster innovation

PUBLIC ENGAGEMENT

Collaborative SSP 2019 workshop by UTAR and SIT

Collaborating for the fifth time, UTAR and Shibaura Institute of Technology (SIT) carried out a workshop under the Sakura Science Plan (SSP) to provide architectural and construction knowledge of Japan and to compare the lessons learnt in UTAR. The workshop saw students brainstorming ways to transform Olympic venues into public places for common use. This lesson was added in view of the 2020 Olympic which was to be held in Tokyo, Japan, and how past Olympic venues in other countries were left abandoned and unused. The workshop stimulated their critical thinking, problem solving and creativity skills, encouraging them to think of practical solutions to transform the post-Olympic venues into community-friendly places. The skills acquired will enable the students to apply latest technology to build better and sustainable buildings in the future.

Research in numbers: SDG9

119 publications

24.44% of all UTAR publications in 2019

Course units on SDG9 453

SDG9 related activities

26 1.75% of all activities in 2019

4,407 participants

RESEARCH

An alternative design for the variable sample size coefficient of variation chart based on the median run length and expected median run length

Control charts for monitoring the coefficient of variation (CV) are attracting increasing attention in recent years. These charts are able to monitor processes with an unstable mean and/or standard deviation, but has a stable CV. Existing CV charts are designed based on the average run length (ARL) criterion. However, this study has shown that designs based on the ARL criterion could result in misinterpretation of the chart's actual performance. Hence, this study proposes alternative designs for the VSS CV chart, based on the median run length (MRL) and expected median run length (EMRL) criteria. This study also compares the performance of the VSS CV chart with that of the Exponentially Weighted Moving Average (EWMA) and Shewhart CV charts, based on the proposed designs. Subsequently, this study shows the implementation of the proposed designs on an industrial example.

Design and Characterization of Intelligent Leak Detection System in Water Distribution Network

This project proposes an intelligent system in detecting pipeline leak using acoustic sensor. In field, fluid transportation system consists of branches of pipelines which made up a network. Leak signal at fault location incurs multiple multidirectional waves into the network system. Therefore, to detect the leakage in pipeline, most of the monitoring system is implemented using sensors network, whereby each sensor acts as a node in the network system. The sensors are distributed so that each and every section of the pipeline is supervised. When leak occurs, the signal of abnormity reaches the nearby sensors and fades off as it travels further away from the fault location. Thus, the locating of the leak point can be done by performing cross correlation of the adjacent signals. However, the multi-directional waves of the abnormity signal tend to travel in different path of the network to reach each adjacent sensor. The instinctive reason that the wave is prone to choose the shortest transmission path is taken account. Therefore, in this project, comparison of possible paths taken are compare to the shortest path algorithms such as Dijkstra's algorithm and A* algorithm. Besides, the possibility that the wave signal is subjected to delay and damping due to the elbows and connections within the path cannot be unseen. Therefore, this project proposes a new algorithm to trace all possible paths taken by the wave transmission during the leakage. The result of detection will be compared to the shortest path algorithms, in terms of the accuracy of the leak location. More importantly, the path finding algorithm is highly adaptive to various water distribution network.

10 REDUCED INEQUALITIES

Goal 10: Reduce inequality within and among countries

PUBLIC ENGAGEMENT

"It's OK to be U" Campaign: Malaysia Wheelchair Basketball League

Malaysia Wheelchair Basketball League (Balakong Circuit) 2019 was held in conjunction with "It's OK to be U" Campaign and was participated by professional wheelchair basketball players including the national team. The main goal of the event aligns with the effort to achieve one of the sustainable development goals, namely SDG 10, which is to reduce inequalities. The competition was an effort to practice inclusion and stop discrimination against the disabled. Overall, the event emphasised on the importance of treating everyone, regardless of body limitations, with love and equality.

Research in numbers: SDG10

5 publications

1.03% of all UTAR publications in 2019

Course units on SDG10 5

SDG10 related activities

27 1.82% of all activities in 2019

2,754 participants

RESEARCH

Discrimination perceived by child refugees in Malaysia: From the views of representatives from refugees' community service centres and non-government service

Discrimination perceived by refugee children in Malaysia is seldom reported. This study used an interview method to understand the types of discrimination perceived by refugee children in Malaysia. Eight representatives from different refugees' community service centres and non-government service centres were recruited by using the purposive sampling method. Three sources of discrimination were identified from the results: education, health care and locals and other fellow Myanmar refugees. It is recommended that more programmes be conducted to create awareness among members of the public to understand the sources of discrimination perceived by refugee children in Malaysia. Without proper strategies to reduce discrimination, refugee children may suffer both physically and mentally and may be a liability rather than an asset for society in the future.

The impact of entrepreneurial competencies on firms' sustainability growth: A study of Malaysian Women entrepreneurs

Entrepreneurship has been the major driver of innovation, competitiveness among firms which generates to a nation's economy and create more job opportunities through the business activities. As in Malaysia's context women have prolific potential to uplift national economic and innovative growth by participating in entrepreneurship development. The growth in entrepreneurship in 29th century stimulate many women entrepreneurs to be more aggressively start their own businesses. The objective of present research to examine the impact of entrepreneurial competencies on sustainability growth of firm. In this respect, some of the entrepreneurial competencies namely network competency, leadership competency, commitment competency, strategic competency and social capital as moderator will be used to examine the sustainability growth of firm women entrepreneurs from Kedah and Kelantan states in Malaysia.

11 SUSTAINABLE CITIES AND COMMUNITIES

Goal 11: Make cities inclusive, safe, resilient and sustainable

PUBLIC ENGAGEMENT

Culture sharing at SJK(T) Ladang Tong Wah, Tapah

With the aim to protect and safeguard world's cultural and natural heritage, the Department of Soft Skill Competency (DSSC) of Kampar Campus organised a cultural sharing session at SJK(T) Ladang Tong Wah, Tapah. The schoolchildren, along with the participation of Japanese and Indonesian exchange students, were able to learn more about the international cultures as they too shared their Malaysian culture with the international students. The event was important to form a common ground for everyone to share their respective culture, while living together to achieve sustainability. It is believed that increased understanding of one's own culture and others would facilitate the collaboration and integration of cultural understanding in order to achieve sustainability.

Research in numbers: SDG11

50 publications

10.27% of all UTAR publications in 2019

Course units on SDG11 116

SDG11 related activities

32 2.16% of all activities in 2019

4,426 participants

RESEARCH

Analysis of natural gas vehicle acceptance behavior for Klang Valley, Malaysia

Natural gas vehicles (NGVs) have been regarded as one of the most promising alternatives to tackle the concern on energy dependence and climate change. Despite various efforts in promoting NGVs, the acceptance of NGVs as an alternative fuel vehicle still remains as a challenge to many countries (including Malaysia). As such, an up-to-date and in-depth analysis was required to analyze the market penetration of NGVs especially in the developing countries. In particular, for the context of Malaysia, this study aims to examine the acceptance behavior of private car users on NGVs (in comparison to conventional vehicle) for which the targeted respondents comprises current NGV users as well as non-NGV users. The acceptance behavior analysis also examines numerous aspects in affecting the perceptions of car users on NGV usage. Besides, the intention of NGV users to recommend NGV to the others was investigated. The acceptance behavior analysis was carried out by using discrete choice approach based on the undertaken revealed and stated preference survey. Concisely, the results showed that it was promising to boost the NGV usage in Malaysia. The findings revealed that the perceptions of car users towards NGV usage are greatly influenced by numerous factors, namely government policy, market value of NGV, convenience & accessibility, green technology concern and also the influence of family, friends & colleagues. It is anticipated that the findings are useful to the stakeholders, especially policymakers, in stimulating the usage of NGVs.

IoT data design for smart cities big data analytics

This poses the major stumbling block to a universally interoperable intelligent system. For things to understand each other so as to support semantic reasoning to obtain higher-level actionable knowledge from low-level sensor data, we take the position that not only a high level information structure or model needs to be formulated using some common vocabulary, there also need to be a scheme to determine which among the types of IoT data may remain in their original form with a scheme and interface to translate them to a universally understandable form. This is with the assumption that it is not possible to completely unify and standardize all systems to a global standard judging from the mixed success of the various standardization endeavors that have been in place for the past years. Such a scheme or model may also support the creation of solutions that can be easily customized for different smart cities use cases.

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

Goal 12: Ensure sustainable consumption and production patterns

PUBLIC ENGAGEMENT

My Green Space-Green Building Innovation Competition

UTAR Engineering Society, in collaboration with GreenRe Shd Bhd, organised "My Green Space-Green Building Innovation Competition" to encourage creativity and innovation in researching sustainable energy usage and enhance soft skills among the participants. It also required participants to brainstorm for ideas on how they could improve the efficiency of energy usage in a house in different ways. Skills and knowledge acquired by the participants will enable them to further promote green technologies and renewable energies, and raise awareness on the importance of protecting the Earth while providing the essential of livings to human beings.

RESEARCH

SDG12 related activities

18 1.21% of all activities in 2019

1,914 participants

Research in numbers: SDG12

37 publications

7.60% of all UTAR publications in 2019

Course units on SDG12 **51**

A review on the removal of hydrogen sulfide from biogas by adsorption using sorbents derived from waste

Biogas is a vital renewable energy source that could play an effective role in fulfilling the world's energy demand, not only in heat and power generation but also as a vehicle fuel in the future. Unfortunately, due to impurities, biogas requires a series of upgrading steps, which affects its economics and sustainability. Hydrogen sulfide (H2S) is one of the impurities that economically and environmentally hinder the biogas utilization as a source of energy. H2S removal from biogas using different technologies was extensively studied and established. One of such technology is adsorption. Adsorption by solid sorbents is considered as a suitable removal technique for toxic gases such as H2S because of its simplicity, easy handling, and environmental friendly sorbents. In this review, the utilization of waste material-based sorbent for H2S removal was appraised. Other gas components of biogas such as siloxanes, CO2, etc., are out of the scope of this work. The potential and effectiveness of the waste-derived sorbents, either raw waste or modified waste, were summarised in terms of its characteristics, suitability and sustainability. The review provides an insightful analysis of different types of wastes such as sewage sludge, food waste, forestry waste, fly ash and industrial wastes as an alternative to commercial adsorbents to adsorb H2S gas. Based on the analysis, it was concluded that if these sorbents are to be successfully commercialised, its economic analysis, regeneration conditions and potential utilisation of the spent sorbents has to be further exploited. Nevertheless, there is a great prospectus in the future for these waste materials to be utilised as sorbents for H2S removal.

Improvement of cellulose production from lignocellulose feedstock via ultrasonic-assisted extraction

Cellulose extraction technology is emerging due to the increasing demands in cellulose-related products. This is mainly due to the global goal on sustainable and non-toxic materials from biomass for sustainable development of living environment. Recently, cellulose extraction from agricultural lignocellulose residues is fast becoming a popular alternative due to the intensive demand for cellulose and abundance of lignocellulose agriculture residue. Lignocellulose residue mainly consists of lignin (15-35 wt%), hemi-cellulose (25-40 wt%) and cellulose (40-50 wt%). Direct extraction of cellulose without treatment is not applicable as the lignin and hemicellulose inhibits the extraction process. Most of the current studies involve high usage of chemicals with extreme operating conditions to obtain cellulose, which lead to complex purification process, high usage of energy, generation of huge amount of chemical wastes as well as wasted the valuable byproducts lignin. Ultrasonic-assisted technology is an emerging technology to solve the bottleneck of current cellulose extraction technology. The technology applies mechanical strength naming ultrasonic irradiation to break down the plant structure, thus dissolve the impurities that eventually extracted the cellulose which is not soluble in most of the solution. In this technology, the factors such as wastes, toxicity, solvent recovery and environmental friendly, are taken into consideration to minimise any harmful substances that may produce. Despite that, the technology is more economic and environment effective to integrate with other process to fully utilise the byproducts especially lignin for production of green materials. The effect of extraction processing conditions will investigate at various conditions including ultrasonic amplitude, concentration of reagent, ultrasonic duration and temperature. The effects of the processing condition will characterised and investigated through its functional group, crystallinity, thermal stability and cellulose content by FTIR, DSC, TGA, XRD and HPLC. The properties of cellulose are correlated to the extraction technology using response surface methodology, a promising statistical software. This correlation information for production of quality cellulose is scarce for different sources of cellulose feedstock. The information is crucial to industrialise the ultrasonic-assisted extraction in cellulose production.

13 CLIMATE ACTION

Goal 13: Take urgent action to combat climate change and its impacts

PUBLIC ENGAGEMENT

International Conference on Tropical Biodiversity 2018

The first-ever international biodiversity conference was jointly organised by UTAR Centre for Biodiversity Research (CBR), South China Botanical Garden (SCBG) (Chinese Academy of Science), Bogor Agricultural University, Society for Conservation Biology, Malaysian Society of Applied Biology, Rimba Ilmu (University of Malaya), Universiti Malaysia Terengganu, University Kuala Lumpur (UniKL) MICET, The University of Nottingham Malaysian Campus, Monash University Malaysia, Yayasan Bina Lestari and Pulau Banding Foundation. It was highlighted in the conference that biodiversity is equally important to ecotourism, as it provides different resources for livelihood, culture and food security. In fact, unsustainable development may cause an imbalance in the ecosystem, thus resulting in the loss of many precious biodiversities that are important to mankind's wellbeing. Therefore, the sustainability of biodiversity and conservation are needed to enable humans and nature to live sustainably.

Research in numbers: SDG13

13 publications

2.67% of all UTAR publications in 2019

Course units on SDG13: 7

SDG13 related activities

4 0.27% of all activities in 2019

618 participants

RESEARCH

Establishing a daily rainfall occurrence simulation model for the Langat River catchment, Malaysia

For the study of water resources of a catchment, an immediate task would be to establish a good model for predicting the probable daily rainfall occurrence and rainfall amount. This study presents the simulation of daily rainfall occurrence using the generalized linear model (GLM), the non-homogeneous hidden Markov model (NHMM) and the bootstrap aggregated classification tree (BACT) model. The major challenge of NHMM is the determination of optimum number of hidden states, which can be achieved using the Bayesian information criterion score. While the determination of number of grown tree is another challenge for BACT model, this critical task can be achieved with the help of out-of-bag classification error. Both the NHMM and BACT model outperformed the GLM to capture the rainfall persistence and spell lengths distribution. Through the validation phase, the BACT model exhibited better performance with the higher indices of probability of detection, critical success index, Heidke skill score and Peirce skill score, than other models. The prediction ability of the NHMM is equivalent to an unskilled random forecast with the skill scores nearly equal to zero. At the end, the BACT model was recommended as the appropriate daily rainfall occurrence model for this study.

Investigation on the utilisation of power electronic devices in the new generation surge protection devices (SPDs)

Surge protection devices (SPD) are made to shunt away the excessive current to the ground whenever surge current or voltage is induced at power or signal line. Traditionally, these SPDs are built based on metal oxide varistor (MOV), spark gap or gas discharge tube (GDT). For the past decade, industry technology revolution has transformed most of the analogue device into IC base module. These IC are vulnerable to static charge and lightning surge attacks. Based on the report done by many researchers, it is found that these SPDs failed to provide protection under repetitive surges and excessive surge condition which led to the failure of SPD and control system. In current project, the potential of power devices as new generation SPD such as MOSFET and IGBT in term of response time, power handling capability will be explored. Hybrid test surge waveforms based on 1.2/50μs and 8/20μs according to IEC61643 and IEC61000 standard will be used to test the power devices performance. The primary investigation shows power devices exhibit good power handling capability, fast response time and high efficiency. It is expected that SPDs based on MOSFET and IGBT are potential candidate as a new generation surge protection device suitable for Category A and Category B as stated in IEEE C62.41.

Goal 14: Conserve and sustainably use the oceans, seas and marine resources

PUBLIC ENGAGEMENT

Beauty and Our Beach

Corporate Communication students from Faculty of Creative Industries (FCI) organised a beach cleaning project called "Beauty and Our Beach". The main objective of the project was to raise awareness on the impact of plastic debris on marine life. Held in partnership with the Malaysian Nature Society (MNS) and sponsored by IOI Group, the students, lecturers and representatives from MNS and IOI Group gathered at Pantai Bagan Lalang, Sepang to carry out the project. A warm-up session consisting of Zumba Dance was held before they got down to work. They picked up rubbish weighing up to 60kg from the shore, of which 369 items were made of plastic. Among the waste collected were plastic bottles, plastic bags and packaging, food wrappers and cigarette butts. The garbage collected was then analysed using the Clean Coast Index.

RESEARCH

SDG14 related activities

1 0.07% of all activities in 2019

83 participants

Research in numbers: SDG14

6 publications

1.23% of all UTAR publications in 2019

Course units on SDG14 4

Using DNA Barcodes to Aid the Identification of Larval Fishes in Tropical Estuarine Waters (Malacca Straits, Malaysia)

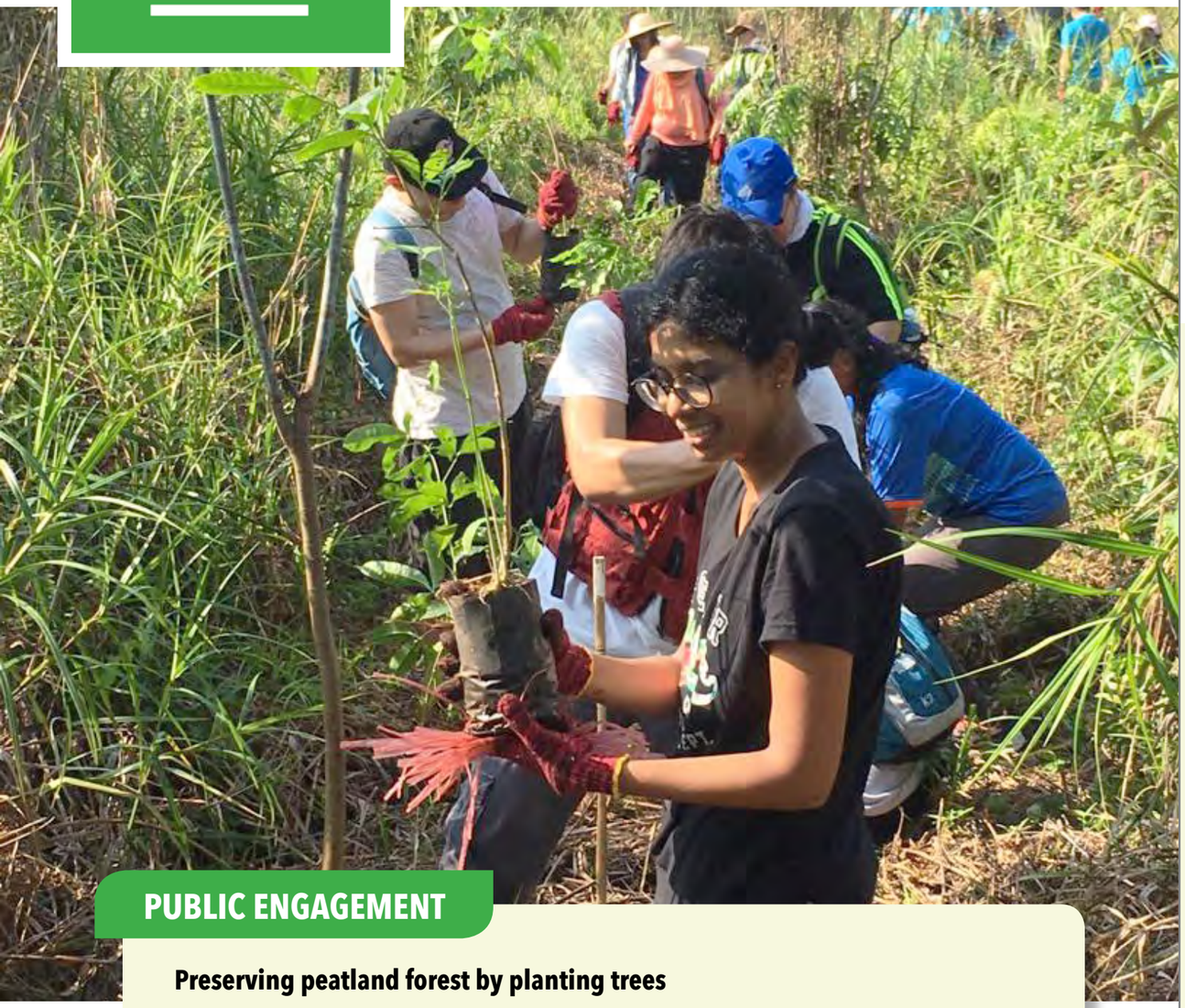
Larval descriptions of tropical marine and coastal fishes are very few, and this taxonomic problem is further exacerbated by the high diversity of fish species in these waters. Nonetheless, accurate larval identification in ecological and early life history studies of larval fishes is crucial for fishery management and habitat protection. The present study aimed to evaluate the usefulness of DNA barcodes to support larval fish identification since conventional dichotomous keys based on morphological traits are not efficient due to the lack of larval traits and the rapid morphological changes during ontogeny. Our molecular analysis uncovered a total of 48 taxa (21 families) from the larval samples collected from the Klang Strait waters encompassing both spawning and nursery grounds of marine and estuarine fishes. Thirty-two (67%) of the larval taxa were identified at the species level, two taxa (4%) at the genus level, and 14 taxa (29%) at family level. The relatively low rate of species-level identification is not necessarily due to the DNA barcoding method per se, but a general lack of reference sequences for speciose and non-commercial fish families such as Gobiidae, Blenniidae, and Callionymidae. Larval morphology remains important in species diagnoses when molecular matches are ambiguous. A lower ethanol percentage (50%) for larva preservation is also useful to keep the body of larvae intact for morphological identification, and to preserve DNA for subsequent molecular analyses. The 10% Chelex resin used to extract DNA is also cost-effective for long term monitoring of larval fishes. Hence, the DNA barcoding method is an effective and easy way to aid the identification of estuarine larval fishes at the species level.

Potential use of live mealworm feeding for giant freshwater prawn, Macrobrachium rosenbergii: Health, growth performance, feed utilisation and nutritional content

Aquaculture is the fastest growing global food production industry. The giant freshwater prawn, Macrobrachium rosenbergii, is becoming an increasingly important aquaculture species throughout the tropics. This species is especially popular throughout Asia for its good taste and ability to be integrated with farms such rice or fish production, as well as being an alternative to marine shrimp production that have been affected by diseases. It has been reported that for this industry to continue expanding, it will become necessary to adopt more sustainable practices. In particular, identifying alternative food to the increasingly costly and less available marine-based diets represents an essential part in achieving this goal. On the other hand, large amounts of food and non-profitable side streams from industrial processes are currently wasted, but this could be used as feed for insects, which can convert diverse waste streams into protein. Edible insects are therefore gaining attention among the research community. The nutritional components of mealworms can be classified as "high in" and "source of" according to the thresholds for World Health Organization and Food and Agriculture Organization of the United Nations food labels. Considering that feeding costs represent the major operational costs of a modern prawn farm, any savings in feed costs can translate to substantial savings for the industry, therefore the development of a sustainable and health promoting feed for giant freshwater prawn is imperative. In the past two years, several studies have shown that mealworm meal, to a certain extent, can be utilised as fishmeal alternative for marine shrimps and fish. Yet no scientific data is available on the feeding the giant freshwater prawn with live mealworm. This study is aimed to investigate the potential use of live mealworm feeding for giant freshwater prawn M. rosenbergii. The growth performance, feed utilisation, immune response and nutritional content of the prawn will be studied. This study also aims to produce high quality mealworm with food/agricultural waste, to examine if administration of live mealworm feeding with and without probiotic enrichment benefit the giant freshwater prawn.

15 LIFE ON LAND

Goal 15: Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss



PUBLIC ENGAGEMENT

Preserving peatland forest by planting trees

As part of the continuous community outreach effort, the Department of Building and Property Management (DBP) of the Faculty of Accountancy and Management (FAM) participated in a tree planting activity to preserve and restore the fire deteriorated area into its former glory after a devastating fire took place in 2014. Peatland forests or peat swamp forests are a unique wetland ecosystem where partially decomposed organic matter accumulates over thousands of years under waterlogged conditions to form carbon-rich soil, or "peat". Peatland forests are crucial for biodiversity because it is a natural habitat for numerous flora and fauna which only exist in the particular area.

Research in numbers: SDG15

6 publications

1.23% of all UTAR publications in 2019

Course units on SDG15 **15**

SDG15 related activities

18 1.21% of all activities in 2019

1,502 participants

RESEARCH

Phylogenetic relationships of Actinacantha Simon, Gasteracantha Sundevall, Macracantha Hasselt and Thelacantha Simon spiny orbweavers (Araneae: Araneidae) in Peninsular Malaysia

Spiny orb-weavers of the genera Actinacantha, Gasteracantha, Macracantha, and Thelacantha are spiders with rigid abdomens and prominent spines that are mostly endemic to Asia. The taxonomy and phylogeny of these spiders are poorly studied due to their intraspecific morphological variations, the rarity of male specimens in collections and the lack of distinctive morphological characters in older descriptions. Therefore, this study has employed for the first time, a multigene approach using three mitochondrial (CO1, CO2 and 16S) and two nuclear-encoded (H3A and 18S) molecular markers to aid in the identification and phylogenetic reconstruction of these spiny orb-weavers collected from Peninsular Malaysia.

Population genetic assessment of ×Gigantocalamus malpenensis (Poaceae, Bambuseae), a bamboo hybrid of silvicultural potential in Malaysia

This study aims to enhance our understanding of the genetic resources of a natural bamboo hybrid species, ×Gigantocalamus malpenensis, which is native to Peninsular Malaysia. It is a hybrid between two common bamboo species, Dendrocalamus pendulus and Gigantochloa scortechinii, and has been found in the forest remnants along the Tapah-Cameron Highland Road and the old Ulu Gombak Road, where both parental species are found in abundance (Goh et al. 2011). Recently, a new population of this hybrid species was observed in Sungai Siput, Perak, and this has brought to the attention of a local bamboo material company, SEAD Industries S/B (Loo, pers. comm.). SEAD Industries is looking for some scientific assessments on whether this hybrid species could be used for sustainable silviculture. In this study, population structure of the hybrid individuals in Gombak and Sungai Siput will be assessed using molecular approach. The molecular methods involve high-throughput DNA sequencing and DNA profiling analyses on the hybrid individuals and selected individual of the parental species. The multiplex-genotyping by sequencing (MIG-seq) will be performed.

16 PEACE, JUSTICE AND STRONG INSTITUTIONS

Goal 16: Promote just, peaceful and inclusive societies

PUBLIC ENGAGEMENT

Promoting unity through Unity Internship Programme

Prime Minister's Department of National Unity and Integration (Jabatan Perpaduan Negara dan Integrasi Nasional, JPNIN), in collaboration with UTAR, organised "Program Interaksi Latihan Industri Perpaduan Bersempena Sambutan Tahun Baru Cina". The objectives of the event were to provide a platform for the students from both public and private universities to explore more career opportunities through the Unity Internship Programme (Program Latihan Industri Perpaduan, PLIP) as well as to promote the national unity among the younger generations. The event offered a great opportunity to increase the interaction and network among higher learning institutions and companies. It is hoped that private sectors, business organisations and NGOs could also organise such programmes as it contributes to a stronger unity. It is believe that the programme could also strengthen the social harmony and contribute to the productivity and economic growth of the country.

Research in numbers: SDG16

6 publications

1.23% of all UTAR publications in 2019

Course units on SDG16 21

SDG16 related activities

6 0.40% of all activities in 2019

1,762 participants

RESEARCH

Efficiency, firm-specific and corporate governance factors of the Takaful insurance

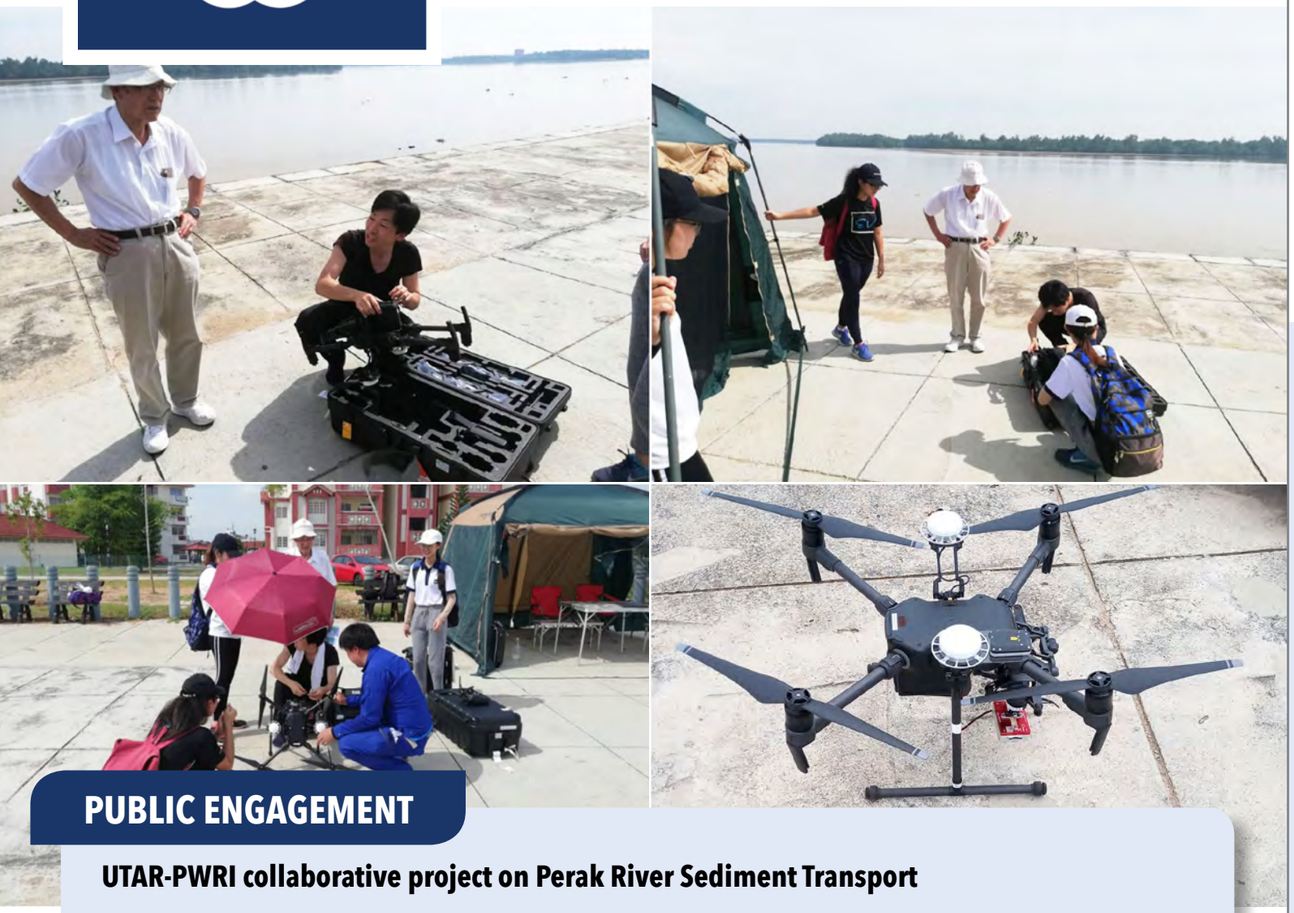
Malaysia is recognised as an emerging country with a large Muslim population, making the Malaysian Takaful industry the largest Takaful market in the Southeast Asia region and, notably, one of the fastest growing markets globally. Malaysia is also the first country globally to implement a risk-based capital framework for Takaful. Therefore, the purpose of this study is to identify the factors that influence the efficiency level (cost efficiency and technical efficiency) of the Takaful industry and to examine the effects of Takaful insurance firms' specific factors and corporate governance factors that influence the efficiency of Takaful insurance in Malaysia.

The role of asymmetric modelling, institutional quality and external shock to optimal fiscal policy in developing countries

Phenomenon showing that public debt-to-GDP and deficit-to-GDP ratios of most countries in the world since the global recession in the late 2000s had been over the prudential limit and they are expected to maintain an increasing trend. This research analyses how the developing countries should optimally respond, through long-run fiscal policy, to the business cycle, institutional quality and external shocks. After synthesizing the previous studies of public finance, this study has concluded that fiscal discipline, fiscal sustainability, and fiscal space are the major issues in optimal long-run fiscal policy. Each issue is related and connected to different factors. Firstly, the response of fiscal discipline to business cycle (nature of asymmetrically) need a modelling reformation. Secondly, the high incentive of the government to keep fiscal deficits demand coordination from institutional quality. Finally, external shocks may play an important role in fiscal space. Since the stylized facts had proved fiscal data are nonlinear, this research will adopt the current and advanced method to investigate these three issues: the recently developed Nonlinear Autoregressive Distributed Lags (NARDL) Model to examine the respond fiscal discipline to the business cycle; secondly, the running of Panel Threshold Regression to examine whether the fiscal sustainability varies with levels of institutional quality; last but not least, the application of Structural Vector Autoregressive (SVAR) to investigate the impact of external shocks to fiscal variables. The finding of this research is expected to solve the model misspecification problem in order to provide more accurate estimation and guideline to policymakers. Furthermore, this study which extends the study perspective which includes institutional quality and external shocks will help to design a sustainable budget and optimal fiscal policy in the long run.

17 PARTNERSHIPS FOR THE GOALS

Goal 17: Revitalize the global partnership for sustainable development



PUBLIC ENGAGEMENT

UTAR-PWRI collaborative project on Perak River Sediment Transport

The Faculty of Engineering and Green Technology (FEGT) and Japan's Public Works Research Institute (PWRI) collaborated on a project to understand the nature of the sediment transport as well as to find the management methods and its sediment in the lower Perak River. The Perak River basin is the second largest in Malaysia with a series of dams in the upstream reaches for power generation which constitute a large fraction of hydropower in Malaysia. They are used for flood control as well as supplying water. The sediment loads of this river and its tributary Kinta River are very high especially the fine sand and silt particles from the limestone of the basin geography washed down by frequent heavy rainfalls. The downstream reaches are influenced strongly by the sediment transported from upstream. This influences the bank stability during floods and navigation passages during low waters. Frequent dredging around the meandering passages near Teluk Intan is one of the problems. A separate study of satellite images by Yorozuya and International Centre for Water Hazard and Risk Management under the auspices of UNESCO (ICHARM) indicates that there is a special feature for the confluence and meander downstream of Tanjung Tualang. The collaboration with ICHARM has also assisted the team in finding methods to solve the problems of Perak River and contributed to advancing the fundamental knowledge of sediment loaded river flow in winding river reach on low land. One of the outcomes from the survey was providing basic knowledge about flow and sediment in the Perak River to appropriate government agencies, and the scientific aspects will be published in technical writings.

Research in numbers: SDG17

4 publications

0.82% of all UTAR publications in 2019

Course units on SDG17 23

SDG17 related activities

174 11.73% of all activities in 2019

17,730 participants

RESEARCH

Systematic literature review of knowledge sharing barriers and facilitators in global software development organisations using concept maps

Knowledge is the most important resource in software development. The success of software development relies on knowledge sharing between software developers working across the globe. Global software development has brought many benefits to the software industry; however, at the same, time knowledge sharing across diverse team members is one of the main concerns of global software development organisfations. This study provides a systematic literature review of 42 studies on knowledge sharing barriers and facilitators from 2010 to 2017 and classifies them into five main categories: Individual, Organizational, Technological, Cultural, and Geographical. In order to synthesize and represent the complexity of the knowledge sharing factors in a more manageable and visual manner, this study proposes concept maps for each category. The identified factors can be strategically used as the guidelines in the global software development organisations to boost the culture of knowledge sharing.

Am I right? Factors influences the upsurge of unethical practices in Malaysia hotel industry

Past researches demonstrated that personal moral philosophy is crucial in evaluating ethical differences between individuals and significantly affect the ethical beliefs and perception of the "rightness" /"wrongness" of the action under question. It suggested that research concerning the role of personal moral philosophies on ethical decision making continues to produce positive direction regarding the relationship between idealism and ethical decision making and negative results relating to the association between relativism and ethical decision making. In addition, past studies strongly indicated that the influences of ethical climate on ethical decision making. For instance, ethical climate dimensions of both benevolence and principles were related to the higher level of ethical decision making, whereas the egoistic ethical criterion was related to the lower levels of ethical decision making. This research propose an empirical model on the ethical decision making among hotel first line managers. This model will be analysed by the Structural Equation Modeling techniques. In order to provide statistical evidence for each research questions underlined in this proposed study, a sample study of 500 first-line managers from five different regions' 4-star and 5-star rating hotels will be employed. The results of this proposed study shall be the interest of MAH (Malaysia Association of Hotels), hotel organisations, Malaysia Institute of Human Resource Management (MIHRM).

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