[17] SDG17: Partnerships for the Goals
[17.2] Relationships to support the goals
[17.2.4] Collaboration for SDG best practice Through international collaboration and research, review comparative approaches and develop international best practice on tackling the SDGs

Pair Project Agreement – Australia Indonesia Center "*Understanding The Livelihoods and Aspirations of Young People in The Context of Agrarian Change and Development in Maros District, South Sulawesi"*

Research collaboration between Monash University, Melbourne University, Universitas Indonesia, Institut Teknologi Bandung and Universitas Hasanuddin

Researchers:

Wolfram Dressler[a], Reni Suwarso[b], Wilmar Salim[c], Anna Sanders[a], Uly Faoziyah[c], Retno Indro Putri[d], Ariane Utomo[a], Heni Kurniasih[a]

[a]University of Melbourne (UoM), Australia
[b] Faculty of Social Science and Political Science, Universitas Indonesia
[c] Department of Regional and City Planning, Institut Teknologi Bandung
[d] AIC Associate Fellow

"As elsewhere in Indonesia, a quarter of South Sulawesi's (Sulsel) population (2.25 of 8.77 million) is made up of young people (16-30 years) in rural regions experiencing major agrarian changes. Current trends suggest that more young men and women will leave farming in search of wage-based work in cities. Others may migrate in search of work overseas, sending remittances to support their family's changing livelihood needs. However, many of these young people are poorly skilled and adjusted for such transitions. Recognising the structural barriers to youth remaining in farming and regional youth unemployment reaching close to 10%, the SulSel government has mandated new youth policy initiatives that offer employment packages geared to young people's interest, including tourism and English language training. Unemployment and skills deficiencies are likely even higher in rural, hinterland areas. This SIP focuses on young people's involvement in farm and off-farm livelihoods, and how their aspirations, skills, education and labor opportunities align with the economic conditions of rural, coastal and peri-urban fringes of Maros District, where urbanisation and infrastructure development are transforming rural livelihoods and creating new skills and training needs for young people. It aims to identify and examine **i) skills, education, and knowledge** align (or not) with existing and future **ii) livelihood needs and aspirations** and **iii) labor opportunities and constraints** across these different settings. This analysis extends to how young people's livelihoods and skills in these sectors are influenced by changing labour conditions and infrastructure development (e.g., railway, airport, seaport). Our research involves **three interrelated work packages** that cover: 1) ***Aspirations and livelihoods of***

young people; 2*) Skills gap and needs analysis;* 3) *Policy evaluation and gap analysis* with a focus in Maros District. Consistent with stakeholder engagement, Gender Equality and Social Inclusion (GESI) principles, an interdisciplinary research agenda explores how young people's livelihood aspirations, opportunities and constraints align with rural commodity production and infrastructure development, and how this enables and or constrains youth skills, education and labour potential."

[17] SDG17: Partnerships for the Goals
[17.2] Relationships to support the goals
[17.2.4] Collaboration for SDG best practice Through international collaboration and research, review comparative approaches and develop international best practice on tackling the SDGs

Bilateral Strategic Alliance (UI-UiTM BISA)

Research collaboration between Universiti Teknologi Mara (UiTM) with Universitas Indonesia

Research collaboration is the following areas:

i. Advanced nanomaterials;
ii. Biodiversity and natural resources;
iii. Renewable energy;
iv. Big data analysis;
v. Green and smart manufacturing.

Analysis of Solar Photovoltaic Progress in Malaysia and Indonesia: Policies and Recommendation

The Association of Southeast Asian Nations (ASEAN) has experienced speedy social and economic development in the past decades. Therefore, energy shortage, environmental pollution, and climate change are the problem that would be faced regarding a sustainable development process. Hence, the deployment of renewable energy is highly considered an essential aspect. Solar photovoltaic (PV) power is one of the effective alternative sources to assist ASEAN to achieve the aspirational target of 23% renewable energy (RE) in the total primary energy supply (TPES). In this study, a comprehensive analysis is focused on Indonesia and Malaysia to analyze the internal strengths and weaknesses and the external threats and opportunities tightly related to the development of solar PV power. It is expected that policies play significant roles in Solar PV development. Therefore, comparison policies and strategies from Indonesia, Malaysia, and other ASEAN members are fundamental. In addition, other plans include arousing people's awareness of a sustainable development process, government issues, and stable incentive policies, encouraging a solar PV industry chain, and build opportunities via international cooperation. The research result is expected to provide a publication that emphasizes analysis of those matters for further deployment of solar PV power in ASEAN countries.

Characterization and Development of 3D Printed PLA/HA Composite for Biomedical Implant

Poly-lactic acid (PLA) is an attractive biopolymer that has biocompatibility concerning biomedical applications. Hydroxyapatite (HA) ceramics are practised as bone substitutes because of their chemical composition that closes to the mineral phase of bone. Indirectly,

the combination of PLA and HA are suitable for medical applications where it meets the condition in repairing the bone. However, the ceramic particles agglomerations and the PLA/HA materials flowability becomes an issue as it will affect the extruding process of the PLA/HA filament and feeding it into the rapid prototyping process using the Fused Deposition Modelling (FDM)technique. The FDM technique allows for fabricated porous and complex designs such as trabecular bone structure. Thus, the main objective is to investigate the polymer stability effect and ceramics concentration on the pseudoplastic behaviour of PLA/HA formulation which will be attributable to the FDM process. In this study, PLA and HA materials will be characterized individually, followed by mixing at different HA compositions(10 wt.% – 40 wt.%). The feedstock will be investigated via a capillary rheometer for viscosity analysis as a function of temperatures and shear rates. The feedstock with optimum rheological behaviour will proceed withfilament production. Then, the proper design of the 3D bone model is performed using CAD software. Lastly, the Response Surface Method (RSM) will be performed to develop a mathematical equation of optimization parameters for the FDM process. The best parameters are then selected to fabricate prototype samples for further testing. This PLA/HA formulation, should in the end, enhance the mechanical behaviour, preserve the degradation rate and improve the particle agglomeration. In the field of medical Healthcare, this project willdefinitely accelerate bone cancer treatments through the rapid printing process of custom-designed bones, which will escalate the IR4.0 digital revolution in healthcare industries.

Determination of abundance of microplastic on macroalgae species and its removal treatment

Marine plastic pollution is an impact from human activities which are also threatening marine life. The estimated amount of plastic waste in the sea reaches 4.8-12.7 and 1.4-3.7 million tonnes each year for Indonesia and Malaysia respectively. Plastic waste could be degraded or fragmented into smaller particles called microplastics, after going through physical, chemical, or biology processes that could be defined as plastic particles less than 5 mm in size. They originate from breakdowns of larger plastic particles, or plastic manufactured into small sizes. Microplastics are found and deposited in aquatic plant including seaweed such as macroalgae. The deposition of microplastic on the edible type of macroalgae as a source of food could harm other organisms including people and animal who ingested them. Macroalgae such as seaweed can be a valuable source of income as it consists of high content of minerals that provides nutrient which can be commercialized and in-trend diet source. To ensure the macroalgae as food intake is safe, the deposited microplastics on the surface of macroalgae should be removed via physical or chemical treatment. The proposed treatment is aimed to remove the deposited microplastics on macroalgae and suspended microplastic particles in

the water environment. The objectives of the treatment include in (1) Identification and abundance of microplastics in macroalgae from Jakarta and Port Dickson, (2) investigating the effectiveness of chemical coagulant and physical sonication treatment for removing the deposited microplastics, (3) investigating the adsorption and degradation of microplastics onto nanoparticles photocatalyst and (4) optimizing the parameters to be controlled during the treatment. The research outcomes are to investigate microplastics in macroalgae and establish an effective treatment at minimal cost for ensuring the safety and quality of the macroalgae in Indonesia and Malaysia.

Chitosan-TiO2 nanocomposite as functional material for hydrazine dehydrogenation reaction.

The use of functional material in order to enhance the catalytic activity in several reaction such as hydrazine dehydrogenation, are raising an awareness. In order to have a good catalytic activity, a material as a support should have a high surface area to accommodate highly dispersed active metal. To address this issues, chitosan-TiO2 nanocomposites will be developed. In order to investigate the characterization of this hybrid biomaterials, instrumental analysis will be used such as Scanning Electron Microscopy (SEM-EDX), Surface Area Analysis (SAA), X-Ray Diffraction (XRD).

Improving the Deep learning architecture performance for cancer detection on histopatologi images -- and -- Development of Feature Selection Optimization Model on Histopathology Images for Cancerous Segmentation

Cancer is a disease that has a high mortality rate in the world so this remains a challenge. One way to diagnose cancer is to do an analysis using histopathological images. A histopathological image is an image taken from a patient's body tissue suspected of having cancer by using a device with varying resolution and then given a certain coloring. Analysis using conventional histopathological imagery will depend very much on the experience of the pathologist. The presence of various deep learning techniques provides an opportunity for the field of computer science to have a stake in providing alternatives to resolve theseproblems. However, to be able to decide whether tissue has been identified as cancerous or not, it takes 5-6hours for each sample and the classification and clustering of the images is extremely difficult due to hugedissimilarities and high resolution of the features. The computation and the accuracy for handling large imageson deep learning are still becoming challenging. Therefore, the research aims to propose an effective andefficient deep learning architecture and enhanced methods for classification and segmentation of the cancerstatus. This research also addresses issues of feature extraction influences that have

resulted in fewerperformances of the CNNs. Benchmark and a real dataset of histopathological images will be used. Theutilization of GPU machines and GPU clusters in terms of processor and memory during the training of highresolution histopathology images will be analyzed. Performance evaluation of architecture, validation andtesting accuracy will be performed. A feature selection optimization model will be constructed to reduce thedissimilarities. The model will be evaluated and the output will be used for classification and segmentation.The best model as output of training will be stored and reproduced to predict the status of new histopathologyimages. This research outcome is expected to improve the accuracy of the classification and segmentationand reduce the computational time.

Comparative Performance Assessment of Grid-Connected Photovoltaic System in Tropical Region: Case studies in Malaysia and Indonesia.

This research presents a comparative study on the Performance Assessment of Grid-Connected Photovoltaic (GCPV) system under tropical climate region. GCPV system performance is very climatic dependent. Limited investigations have been found in comparing PV system performance indices for two or more case studies that crosses country boundaries within the same tropical climate region. Furthermore, numerous studies have reported that PV module temperature is the main de-rating factor on PV system energy output. Nevertheless, the weightage of this de-rating factor that represent tropical region is limitedly reported to confidently becomes the reliable estimated value that can be used in PV system energy output prediction model. The uniqueness of this study is the availability of two GCPV system case studies; one representing system located to the north of equator line (Kelantan, Malaysia) and another one to the south of equator line (Depok, Indonesia). The performance assessment will be appraised from the typical performance indices to gauge the overall performance, and subsequently narrowed down to thermal performance indices. Specifically, the first objective will be on determining the Specific Yield, Performance Ratio and Capacity Factor of both GCPV systems. Subsequently, the second objective will be on determining the weightage of PV module temperature de-rating factor on estimating energy output of GCPV system. The research methodology comprises literature analysis, data filtration, mathematical formulation, comparative on the performance indices and thermal indices, result interpretation and finally concluding the overall performance comparison for both case studies. This study should come out with reliable range of Specific Yield, Performance Ratio and Capacity Factor to represent performance indices of GCPV systems for tropical climate region. Furthermore, this study should also contribute to determine reliable weightages for PV module temperature de-rating factor on the energy output prediction that is reliable to be proposed representing tropical region.

Development of A Smart Bed Resting Ankle Foot Orthosis

A bed resting Ankle Foot Orthosis (AFO) is an assistive device to avoid the foot drop problem for prolong bedridden patient. The immobilization has also caused muscular complications such as muscle atrophy and muscle shortness. Variety of passive and active AFO are available for walking assistance but not for bedridden patient. Thus, this project aims to develop an affordable, ergonomic, and smart bed resting AFO to assist the ankle rehabilitation therapy. The product will be customized to meet the patient-specific product and integrated with Internet of Things (IoT) system for smart controlling. The project methodology involved three phases. Phase 1 involves the engineering design process to explore the concept generation. Important parameters will be identified in producing the 3D printing product such as material selection, parameter setting and safety issues. Phase 2 will involve (i) the embodiment design process to develop the 3D model, (ii) finite element analysis to predict the effects of material selection and different parameter setting, and (iii) design optimization to enhance the bed resting AFO design. Phase 3 will be the fabrication process using 3D printing technology, integration with control and IoT system, and product testing and evaluation. A customized bed resting AFO with integration of IoT system is expected to successfully develop and fabricate upon completion of this project. The workability of the smart device will be tested and evaluated to encourage the product effectiveness. The implementation of patient-specific product by utilizing the IR4.0 at cost effective will be significance for the project. It will full filling the World Health Organization (WHO) global disability action plan 2014–2021 by improving the accessibility of assistive adaptive devices (AAD) and addressing Sustainable Development Goals (SDG): Healthcare Coverage.

Mechanical Properties of Surface Treated Arenga Pinnata Natural Fibre Silica Nanogranite Nanocomposites

Natural fibres have attracted researchers and manufacturers attention due to their numerous advantages such as abundance of resources, environmentally friendly, low cost, good mechanical properties and low density. In order to increase the usage of natural fibre for high performance structures and applications, lots of research have been done on natural fibres as reinforcement to polymer matrix. In this study, plant based natural fibre called Arenga Pinnata is selected due to its remarkable characteristics especially high durability and resistance to sea water. However, the main challenge of using natural fibre is compatibility of the hydrophilic fibre to the hydrophobic epoxy. Therefore, the objective of this research is to determine the best formulation of chemical treatment for arenga pinnata fibre surface (Lead by UI). The brittleness of the epoxy matrix will be improved using a newly

synthesis nanosilica using granite precursor (Lead by UITM). Therefore, the combination of surface treated arenga pinnata fibre and nanogranite modified epoxy is expected to produce a high strength, high modulus natural fibre reinforced composite material. The methodology involves processing of nanosilica or nanogranite filled epoxy polymer using a threerolled milled machine, surface functionalization of arenga fibre using multistage treatment such as alkalization (NaOH), oxidation (NaClO) and hydrolysis (H2SO4). The physical, chemical characteristic and morphological structure of the fibre, and mechanical properties of the composites will be evaluated and analysed. This newly formulated natural fibre-based materials namely silica nanogranite filled arenga pinnata composites has huge potential in replacing synthetic composites. Thus, this project supports the government's initiative on green materials and national agenda of Frontier Technologies & Advanced manufacturing.

Preparation, Characterizations and Kinetic study of Nanofibers from Agricultural Waste (Pineapple Leaf Fibers) and Aloe Vera.

Nanofibers are one of the emerging technologies in nanotechnology. Featuring thin web-like structure mats with high surface area per volume, high porosity, nanofibers successfully penetrate through the large industrial market. There are four main applications of nanofibers which are environment & bioengineering, defense & security purposes, biotechnology, and Energy & Electronics. In this study, nanofibers from natural resources which are pineapple Leaf Fiber (PALF) will be fabricated via the electrospinning method. Aloe vera will be added as additional features to the nanofibers. The chemical, morphological, structural, wetting and thermal properties (isothermal crystallization kinetics) of the nanofibers will be studied. The relationship between structure and the properties of nanofibers will be determine using kinetic study (Avrami and Igor model). It is
expected that ultrathin nanofibers from PALF and aloe vera will shows great properties in isothermal crystallization kinetics, wetting and anti-bacterial. Nanofibers from natural based could be the next technology in membrane and biomedical application.

Intuitive Eating Behaviour Model for Malaysian and Indonesian Obese Adolescents

Malaysia has witnessed a sharp increase in the prevalence of overweight and obesity in the past decade and named as the highest rate of overweight and obesity among all Southeast Asian countries by WHO in 2018. This has contributed significantly to the parallel increase in the prevalence of non-communicable diseases. Despite the importance of the dietary knowledge intervention, there is a lack of study on intuitive eating behaviour among Malaysian adolescents. Most of the existing overweight and obesity intervention was targeted to adolescents without considering the different psychological, cultures, religions, and ethnicities, making the current approaches less suitable for Malaysian adolescents.

Therefore, it is important to understand how the Malaysian obese population benefits from the comprehensive, intuitive eating behaviour intervention. The main objective of this study is to understand the factors contributing to intuitive eating behaviour among the Malaysian obese population and how it benefits the Malaysian obese population.

A mixed-method approach involving 250 obese adolescents from higher learning institutions in Klang Valley comprises public and private universities using the purposive sampling technique for the quantitative survey. Observation, face to face interviews, focus group and survey will be conducted. Semi-structured interview questions will be used upon saturation points. Qualitative data will be transcribed and analyse using thematic analysis (Atlas. ti). The survey will be analysed using descriptive and inferential statistics (SPSS version 24). The expected output of this study is an improvement intervention based on intuitive eating behaviour that caters specifically towards Malaysian obese and overweight adolescents. This work may contribute to the development of effective healthcare intervention on obesity and overweight to ensure sustainable development of the community through prevention and control of non-communicable disease as well as enhancing population health safety through food consciousness in line with the National Policy on Non-Communicable Diseases (NSP-NCD, 2016-2025).