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# CeTMA BULLETIN

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for

CENTRE FOR TESTING, MEASUREMENT & APPRAISAL

UNIVERSITI UTARA MALAYSIA



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UNIVERSITI UTARA MALAYSIA  
06010 UUM SINTOK  
KEDAH DARUL AMAN  
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*One good hand can improve the  
world*



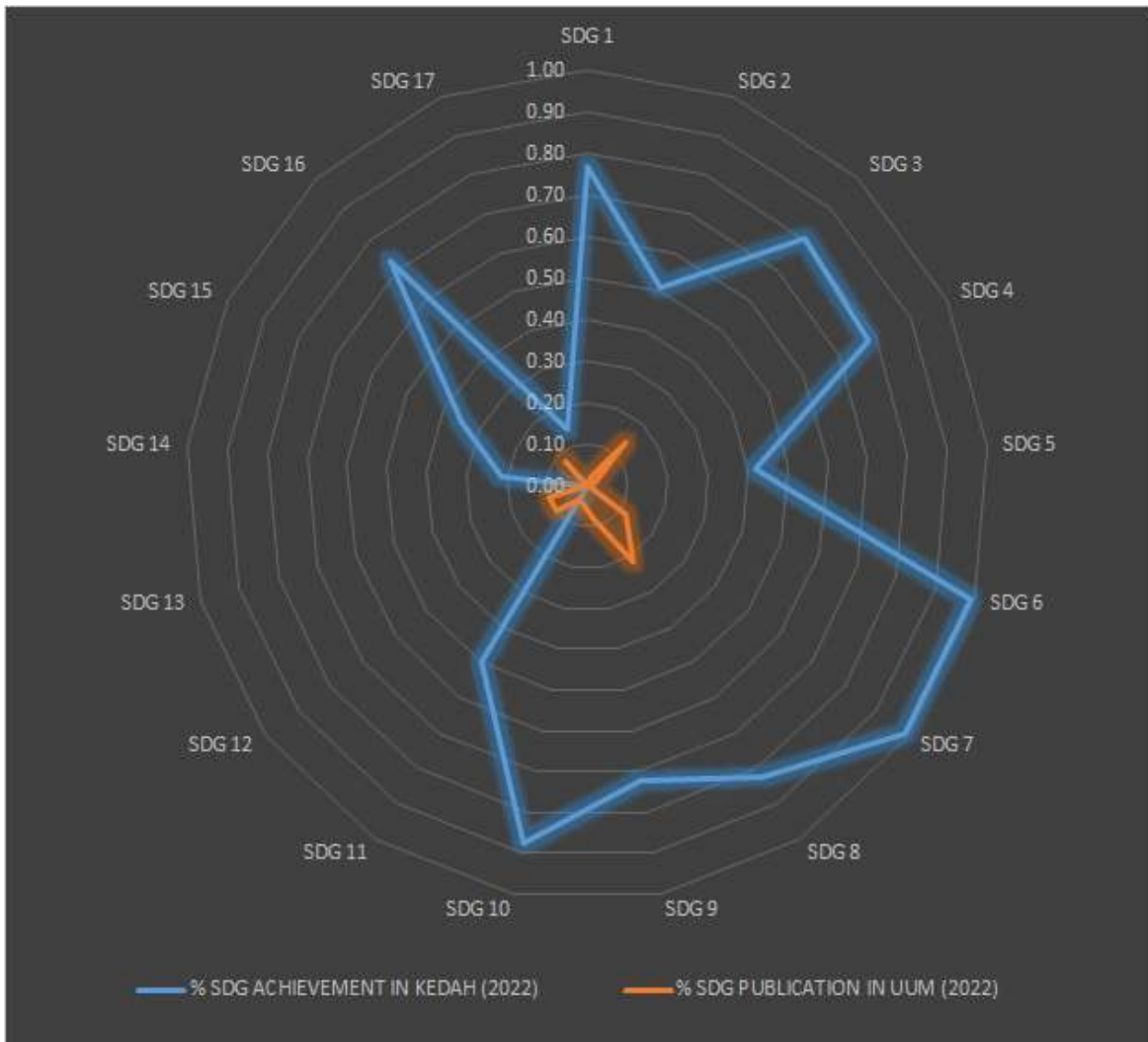


## Strengthening the Function & Direction of CeTMA



Sustainability Office of Centre for Testing, Measurement, and Appraisal (CeTMA) provides the platform to support the Erasmus+ CBHE project "Malaysia Sustainable University Campus Network, or MYSUN," which was created in response to a genuine aspiration to assist the Malaysian higher education system in enhancing the knowledge and skills of their staff, having access to good practices developed in other institutions, and strengthening their ability to cooperate in this matter both locally and on a national level.

A strategy plan for UUM 2030's sustainability is called Living Campus. The plan contains UUM's overarching vision and establishes university-wide objectives and priorities in the areas of waste management, campus operations, environment and ecosystems, emissions and energy, and culture and learning.



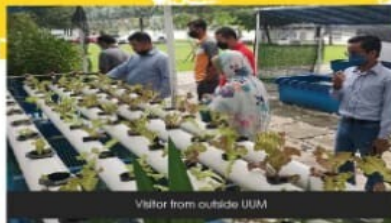
UUM wants to be a champion in SDG 4, 10, 11, 16, and 17. This is a unique opportunity because very little information about the SDGs has been published. And based on the achievement of SDG in Kedah, there is a lot of potential for academic staff at UUM to publish papers on SDG 1, SDG 2, SDG 3, SDG 4, SDG 5, SDG 6, SDG 7, SDG 8, SDG 9, SDG 10, SDG 11, SDG 12, SDG 13, SDG 14, SDG 15 and SDG 16 (Kedah achievements greater than 50%). Based on the Scopus database, UUM academic staff have written articles in SDG12 and SDG13 this year. This is a contribution to the achievement of SDG 12 and SDG 13 in Kedah.





## SECURING FOOD ECONOMICS

Producing our own food supplies is an innovation response to the food economics issue. In aquaponics, two types of food production system can be produces; fresh fish and organically produced vegetables. In Universiti Utara Malaysia, we designing a new aquaponics layout called "Ezee DIY aquaponic Design®" that suitable for home-gardeners.



Production data in one cycle (4 months):

**Income:**

- 1) Fish capacity (400 talapia)... estimate 10% died .... Balance fish: 360 fish
- 2) After 4 months, can get 200g per fish, thus 360 fish x 200g = RM72kg
- 3) Sell ikan pekasam 1kg=RM30, then income RM30 x 72kg = RM2160

In one year, can do 3 cycles - RM2160 x 3 cycles = RM6480

**Overhead cost per year:**

- 1) Electricity RM40 x 12 months = RM480
- 2) Fish pallet RM80 x 12 months = RM960
- 3) Water usage RM6 x 12 months = RM72
- 4) Maintenance per year = RM300

**Total Expenses = RM1812**

**Net profit = RM4668**



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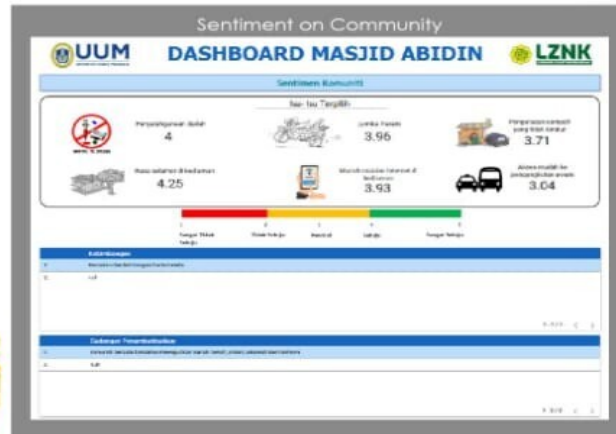
Rajemi, M.F., Yusof, M.M., Ibrahim, H., Ahmad, N., Jalaludin, F.H.

Development and Ecosystem Research Grant Scheme - DEcoR



# MONITORING COMMUNITY AND IMPACT THROUGH ANALYTICS

At CeTMA, we believe that the community can be empowered at the grassroots level, using the bottom-up approach. We are passionate about utilizing the digital revolution through readily available technology that is sustainable and cost-effective to monitor progression, capture sentiments, and identify challenges in the community.



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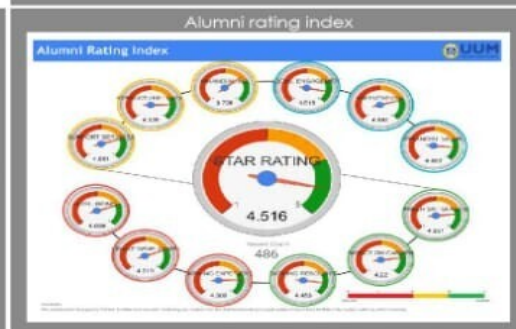
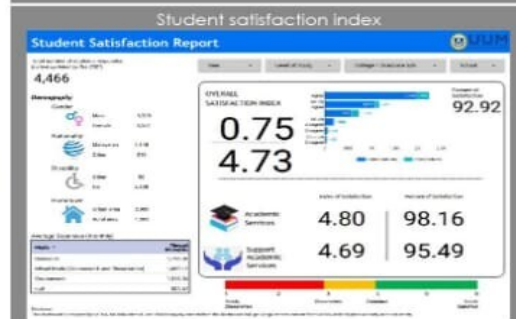
Misiran, M., Mahat, N.I., Mohamad, N.

Centre For Testing, Measurement & Appraisal - CeTMA



# QUANTIFYING PERFORMANCE THROUGH ANALYTICS

Performance measures are critical agenda in an organization. At CeTMA, we are the solution provider for the University in various index measurements. The data are visualized in a manner that is transparent, objective, easily accessible, and real-time.



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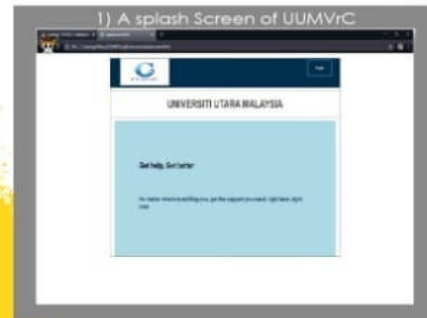
Mahat, N.I., Kamaruddin, S.A., Abdullah, R., Khan, S.J.M., Mohamad, A.M., Shanmugam, S.K.S., Azizan, N.H., Kamaruddin, R., Samsudin, S., Shafie, S., Majid, M.F.A., Bakar, L.J.A., Lamsali, H., Mokhtar, S.S.M., Ghani, A.B.A., Misran, M.

Centre For Testing, Measurement & Appraisal - CeTMA



## PROVIDING PLATFORM FOR MANAGING PSYCHOLOGY HEALTH

Virtual counselling is an online counselling and therapy, which referring to individual or group contact, using either synchronous or asynchronous communication mode in. Virtual Counsellor improving the services and other aspects including confidentiality. Five main categories are included in the Virtual Counsellor; personal, academic, health, financial, and counselor's room. These categories are designed in different sessions by using live-chat facilities. The prosed design of Virtual Counsellor has been evaluated through two main aspects; functionality and its usability involving 33 respondents among UUM community. Responses show that UUM community are highly aware of the concept of Virtual Counselling. They agreed that the proposed Virtual Counsellor is useful and easy to be used.



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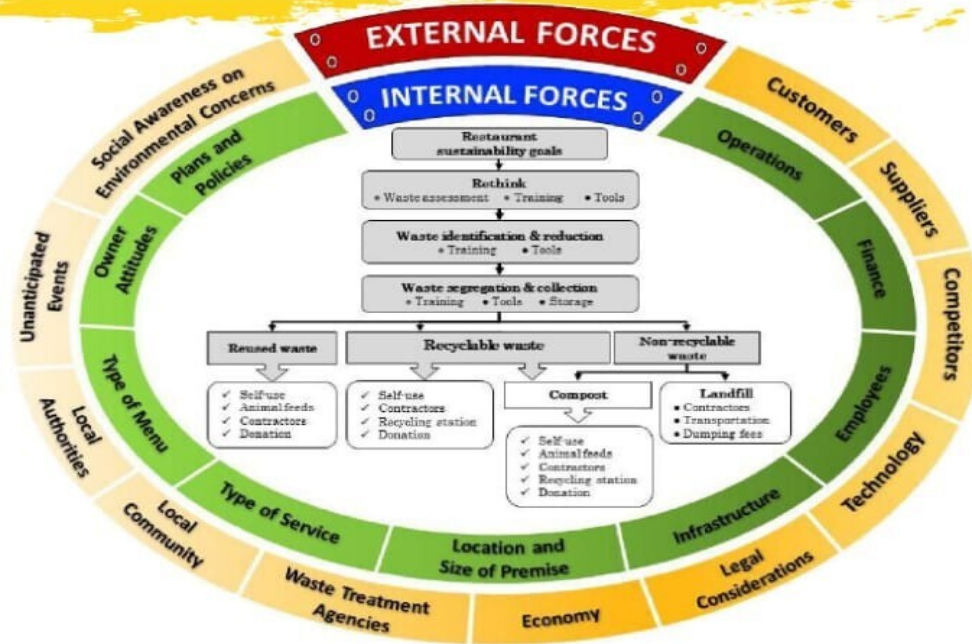
ChePa, N., Mahmuddin, M., Abu Bakar, N.A.

Graduate Development Research Grant - GraD



# GUIDING PRINCIPLES TO CREATE GREEN RESTAURATEUR

The model provides the systematic approaches and steps to manage food waste sustainably through 4Rs (Rethink, Reduce, Reuse, and Recycle) strategies by considering both external and internal forces that might affect food waste prevention performance. This ultimately helps in reducing the volume of food waste, save the natural resources, and contribute to environmental conservation.



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Yean, T.F., Johari, J., Hassan, Z., Alias, N., Abdullah, N.A.C., Rahman, H.A.

Development and Ecosystem Research Grant Scheme - DEcoR





# DETECTING WASTE OF NATURAL RESOURCES

Water loss is an issue which has received huge attention not only in Universiti Utara Malaysia (UUM) but worldwide over the years. It is a phenomenon referred to as Non-Revenue Water (NRW) losses that describe water loss due in distribution systems due to background leakage or pipe burst. In 2019, UUM suffered losses of up to about 15% of water in the distribution network and estimated to worth as much as RM 675, 000.00. To overcome this problem, this research had proposed a smart water reticulation leakage detection model using pressure sensors to accurately detect water leakage location based on the reading of water pressure. The main objective of this research is to develop a prototype of Smart Water Reticulation Leakage Detection System. The prototype is developed in five phases that are (i) theoretical study; (ii) empirical study; (iii) model development; (iv) prototype development and (v) prototype evaluation. Initial finding has shown that the prototype is able to detect water leakage in near real time and this potentially is capable to resolve the NRW issues. In conclusion, this research is able to increase efficiency in water management especially for Universiti Utara Malaysia.

## SMART WATER RETICULATION LEAKAGE DETECTION SYSTEM

UUM has spent RM4.9 million a year to accommodate water usage, about 15% of water in the distribution network is lost and estimated to worth as much as RM 675 000.

UUM require effective methodologies of leaks control to prevent water loss and

Develop a prototype of Smart Water Reticulation Leakage Detection system

GPS locate leakage area

Mobile alert function to notify leakage around campus

IoT based Water Leakage Detector

Report Summary accessible by mobile apps



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Zulkifli Abai, N.H., Mohd Shabli, A.H., Rejab, M.M., Chif, S.C., Rahman, H.A.

Development and Ecosystem Research Grant Scheme - DEcoR



## Collaboration between CeTMA and RECSAM - STEM Module



The Center for Testing, Measurement, and Appraisal (CeTMA) held a courtesy call and discussion session with SEAMEO RECSAM on April 7, 2022 (Thursday) at 11.00 am at the Malaysia Room to establish a strategic partnership towards efforts towards educational sustainability throughout the ASEAN region. The meeting was led by the Director of CeTMA, Prof. Prof. Dr. Masnita Misiran, and the Director of the SEAMEO RECSAM Center, Dr. Shah Jahan bin Assanarkutty.

In the discussion, SEAMEO RECSAM is very interested in STEM education efforts, campus sustainability, and the Kedah Digital Plan conducted at UUM.

CeTMA has agreed to work with SEAMEO RECSAM in the development of academic modules that support the sustainability of STEM education and that can be used by teachers in Kedah, Malaysia and throughout ASEAN.

SEAMEO RECSAM also invites all UUM residents to visit and use the facilities available in the SEAMEO RECSAM Library, which is a professional reference among educators, teachers and administrators in science, mathematics, and technology education from all over ASEAN. The collection is unique and contemporary to meet the needs of educators, classroom teachers, lecturers, and researchers seeking resources in the pursuit of excellence in education.

In the meantime, the Publication Manager of SEAMEO RECSAM also invites all UUM residents and the public to browse the link to the SEAMEO RECSAM Library website at [http://www.recsam.edu.my/sub\\_library/](http://www.recsam.edu.my/sub_library/) to register and use the facilities in the library. For any further information regarding the services and collections of the SEAMEO RECSAM Library, you may contact Nur Ezdiani Bt Yusoff, Knowledge Management Officer, SEAMEO RECSAM, Penang.

Meanwhile, Dr. Shah Jahan expressed his appreciation and gratitude to CeTMA for this collaborative initiative and welcomed various other forms of collaboration leading to STEM education and sustainability efforts.

## Collaboration between SOC and SAPSP - A Smart Food Bank application for UUM



To deal with concerns of food insecurity, most countries have formed a network of organisations (Bierma & Bazan, 2019). Setting up a food bank, which is a non-profit charitable organisation that gives food to those who are unable to purchase enough to avoid hunger, is the most prevalent approach. The St. Mary's Food Bank, created by John Van Hengel in Phoenix, Arizona in 1967, is the world's first food bank. Food banks have sprung up all over the world.

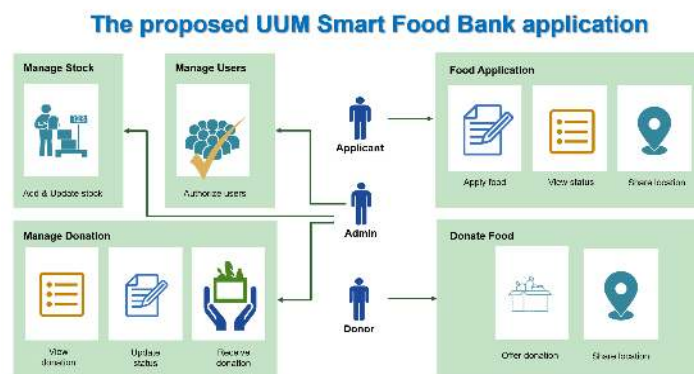
Universities have followed suit in catering students who are food insecure on campus. In addition to food banks, they established on-campus gardens, which allowed students to share meal plans, recover food, and learn about federal food aid programmes (Woerden, Hruschka & Bruening, 2018). However, the efficacy of any of these interventions in reducing food poverty among university students has yet to be investigated. Some universities have begun to address student food poverty by establishing food banks on campus that give emergency food assistance.

On September 15, 2019, His Majesty the Sultan of Kedah officiated at the inauguration of Universiti Utara Malaysia (UUM), the fourth university in Malaysia to open a food bank for its students. The development of a student foodbank project can serve 200 students from low-income families (B40) at this early stage. Econsave Cash & Carry Sdn Bhd, Gardenia Bakeries (KL) Sdn. Bhd, 99 Speedmart, Legacy Z Sufi Group, AEON Sdn Bhd, Hasani Group firm, and UNIC Leisure have all supplied UUM with dried food.

UUM is lucky to receive a range of donations for UUM community members stranded on campus since Movement Control Order (MCO) 1.0 starting March 18, 2020. The donations are managed by the Students Support and Services Division, Student Affairs Department's (SSSD) (HEP). Due to an influx of donations from a variety of sources, SSSD is having difficulty organising the donations, notably the Food Bank. The manual technique to managing donations has caused SSSD many problems.

In order to overcome the problems, it is necessary to automate the management of UUM's Food Bank. The FoodBank at UUM should be able to track donations and handle records more efficiently with smart management (type of goods, date of donation, date for the goods to be shipped out, date of distribution to students). Students in need can also request food or any type of assistance through Food Bank mobile application. UUM's Food Bank restocking and donor requests will be easier to be managed with systematic reporting. In addition, if a gift is not received by a given date, the smart system alerts management, allowing them to arrange for the purchase of shortfall supplies.

To implement a smart management of UUM's Food Bank towards achieving zero hunger among UUM community, three researchers lead by Noraziah Che Pa from School of Computing (SOC), Nur Azzah Abu Bakar (SOC), and Associate Professor Dr Rajwani from School of Applied Psychology, Social Work and Policy (SAPSP) who is also a former Director of SSSD has initiated the effort to design and develop a Smart Food Bank application in mobile environment, specifically to cater UUM community. The proposed application consists of ten main functions which will be operated by three main users; admin (SSSD staff), applicant, and donor.



Among the special features of this application are; staff at student's INASIS can apply food on behalf of the students at their respective INASIS, students can also apply for their friends by sharing their location. Admin from SSSD will process the applications and take necessary actions.

Two requirement gathering sessions have been conducted on 15 and 22 December 2021 involving staff at SSSD, HEP who will be the admin of the proposed application, admin staff from INASIS, and students who will be the applicant and potential donor. To test the developed application, another two series of mobile application testing have been conducted on 9 and 12 May 2022 involving the same respondents as system testers.

The application is the main outcome of Graduate Development Research Grant (GraD) with the objective to provide a platform in improving students assistance towards achieving zero hunger for UUM community. It is developed by Tan Jia Earn, a final year student of SOC.

A smart Food Bank application has been successfully designed, developed, and tested. It is a collaboration effort between SOC and SAPSP towards providing a platform in facilitating students and staff of SSSD in assisting those in need. This effort is significant towards achieving SDG Goals 2 (Zero hunger) and Goal 3 (Good health and well-being).



## Green Construction of STHM



A new building for the School of Tourism, Hospitality and Event Management (STHEM) is situated along Jalan Bukit Tinggi and facing the view of an established palm oil plantation.

The development's design takes into consideration its location, surroundings, weather, climate, and construction techniques. The external and internal wall are finished with painted concrete, which is regarded as a low-maintenance material. The development cost of the building is about RM38 million.

The building is using up to 75% Industrial Building System (IBS) as a main construction component of the building. It is made up of fabricated steel structures for the roof and precast component systems for post and beams. This construction method is cost-effective and requires minimal construction techniques.

The five-storey building has a total area of 9,220 square metres and two (2) lifts. The building is also equipped with generator set (gen-set) with capacity of 250KVA as a backup for electrical system operation if the main electrical supply suddenly failed to operate. To minimize the use of energy, the building has been designed with automatic lighting system by using photocell sensor for street & compound lighting. Meanwhile, for interior, the automatic lighting system has been installed with motion sensor at corridor, toilet, & lecture halls.

The building consists of three sections – administrative, kitchen restaurant and lecture halls. The first floor as ground floor has been designed to be perceived as an interconnected landscape, with internal covered courtyard being decorated as a lounge of the building. The training hotel has everything you need, including front desk, hotel lounge, management office, hotel rooms, housekeeping room and a utility room.

The concept of having an internal covered courtyard, to create an open space and a new ambiance to the building is one that can maximize the usage of daylight and create a functional space that combines interior landscaping and water features.

Blended with the backdrop of hilly site at the rear block, there are two lecture halls that can accommodate 460 students at one time. One of the lecture halls has been designed for demonstration kitchen complete with all kitchen equipment and audio system. An acoustic wall panel has been installed to help prevent distractions from exterior sounds and curb the noise levels by cancelling reverberations to make the sound quality crisp and clear. The building automation system (BAS) has been equipped for monitoring & control the air-conditioning system for these lecture halls.

Not like other academic blocks, this building not only come with an eating area, but it complete with four kitchens to support the programme and courses offered by the school. There are commercial kitchen, training kitchen, pastry kitchen and cold kitchen. These kitchens are fully equipped with suitable cooking equipment.

On the second floor of the building, a smart access card reader system has been installed for eight (8) tutorial classes and two (2) examination halls to control the usage of these facilities. Meanwhile, at the third and fourth floor has been set up with fully furnished lecturers' room to accommodate 78 lecturers.

The fifth floor is the highest level, with 1,157 square metres dedicated to the main office and two meeting rooms. The office has been designed with huge glass wall can maximize the use of daylight and can enjoy the panoramic view of palm oil plantation.

There are three new technology advancements that has been implemented to this building. STHM is a tourism and hospitality school is equipped with industrial kitchen facilities. The good fire protection system should be incorporated to reduce damage to expensive equipment, documents, and inventory while keeping building occupants safe.

The installation of Intelligent Firefighting system such as Fire Addressable systems can accommodate a lot more fire alarm devices and fire zones. An addressable system utilises a loop configuration containing all the fire alarm devices, including sounders and beacons/VAD. A loop wired system uses less cable compared to that of a more extensive conventional system.

There are five (5) benefits of using this intelligent firefighting system. It can identify exact locations of fires, open/closed circuit faults and false alarms. Besides it can cover a large fire alarm system capacity. The installation can be cheaper than a conventional system. It is suitable for any size project and more system capabilities.

Meanwhile the disadvantage of using this system is, the replacement cost of fire alarm devices is expensive, and the commission of the system takes longer time.

Another technology advancement that has been installed in this building is a smart access card for each lecture halls, tutorial rooms and exam halls. The objective of having this smart system is to fully-control the lighting operation in these rooms. These rooms is only can be operated when the lecturers swipe the card.

The installation of photocells and motion sensors can manage the use of indoor or outdoor lighting. These sensors improve the security and safety of the building, automatically turning on lights when it gets dark, or they detect motion. They also save energy by turning themselves off when extra light is unnecessary.

There are six elements of Green Construction that has been considered in this development. One of the elements is the use of sustainable material. The selected materials must be approved and certified as a save products to the environment. Another element that has been considered is to management the waste construction. By using up to 75% Industrial Building System (IBS) as a main construction component of the building, we manage to reduce waste material on site. To ensure the good indoor air quality, this building has been designed with minimum levels of hazardous dust and chemicals. The copier and printers room was isolated with workplace to avoid chemical leakage.

For energy efficiency, we have installed the photocell sensor for street and compound lighting and motion sensor at corridor, toilet, and lecture halls. In the meantime, for water efficiency, the use of press tap in all toilets can reduce the water waste. In order to achieve good standard for heating, ventilation and air conditioning level, we only approved to supply and installed an Energy Star Appliances and Equipment for this building.

UUM Department of Development and Maintenance (JPP) will prepare the preventive maintenance schedule for the building to make sure the building is in good condition. JPP also will assign person in charge from each discipline to monitor any corrective maintenance that is required.

In conclusion we have achieved two (2) related SDG Goals for this project, which is SDG 4 and SDG 9.

SDG 4 : Quality Education - Ensure inclusive and quality education for all and promote lifelong learning

**a. using good quality equipment's to comply with courses offered by the school**

- i. kitchen equipment's equal to hotel standard
- ii. projector and audio visual system for teaching and learning

**b. provide good facilities to comply with courses offered by the school**

- i. lecture halls
- ii. computer labs
- iii. training hotel
- iv. training restaurants
- v. training kitchens

SDG 9 : Industry, innovation and infrastructure – Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

**a. There are 6 benefits of using IBS in construction:**

- improve quality
- reduce costs
- save the need for foreign labour
- accelerate construction timelines
- simplify on-site management and safety
- reduce the environmental impact of the construction industry

**b. maximize the use of daylight – reduce electricity usage**

**c. smart sensor lighting - control electricity usage**

**d. smart access card - control electricity usage**

**e. smart photocell sensor – recycle and reuse energy**

## ICT Solutions for a Greener Planet: Understanding Natural Hazards, Disasters and Risks

In March 2022, Institute for Advanced and Smart Digital Opportunities (IASDO) through its fellow representatives has been invited by Erasmus+ to participate in the 2nd educational training at the University of West Attica, Athens Greece (UNIWA). UNIWA, in collaboration with Programme Country partners, contributed to capacity-building activities by organizing training for academic, administrative, and technical staff in Partners Country HEIs. This training aimed to introduce the participants to ICT solutions, methods and approaches to deal with natural hazards, disasters, and risks.





### DAY 1

#### **I. Session 1 (Natural Hazards, Disasters & Risks)**

The participants have been introduced to natural hazards, disasters, and risk issues. This session discussed hazard assessment including when the hazard happened? and where is the location? Data acquisition from historical data, earthquake, and socio-economic data. Early warning hazards are usually based on historical data. Usually used Sendai Framework for detected multi-hazard. Appropriate disaster prevention, mitigation, preparedness, and response build people's capacities and tackle the causes of vulnerability.

#### **II. Session 2 (GNSS for Natural Disaster Monitoring)**

This session sharing about the role of GNSS in advancing natural hazards monitoring and risk assessment. For example, NAVIC (IRNSS) and satellite-based augmentation system (SBAS).

#### **III. Session 3 (GIS applications in Flood management)**

Sharing about using GIS applications in flood management. The framework of spatial analysis including frame the questions, exploring and preparing data, choosing methods and tools, performing the analysis, and examining, refining, and reviewing the results of flood management. Choose a suitable distance for setting the buffer zone. Then, use a model builder in ArcGIS to models for automating processes.

## DAY 2

### **I. Session 1 (Micro-zonation study using microtremors (HVSR method))**

Focused on data acquisition using microtremors. The ideal recording instruments are considered the seismometers with 3 components. Then, it's also depending on the fundamental frequency of the soil formations, short or long period seismometers can be used. Unfortunately, there are some drawbacks to using long-period seismometers as the time it takes to come to the rest (from of few to tens of minutes) and measurements are avoided during rainfall and/or strong winds. In addition, measurements above underground structures (garages, sewers) and near sources of man-made activity such as bridges and industrial buildings are avoided.

### **II. Session 2 (Natural disasters: Evaluation of losses and design of structures)**

FEMAS software program for estimating potential losses from disasters. Nationwide database is needed for evaluation of losses and design of structures including demographics (population, employment, housing), building stock (residential, commercial, industrial), essential facilities (hospitals, schools, police stations, fire stations), transportations (highways, bridges, railways, tunnels, airports, ports & harbors, ferry facilities), utilities (wastewater, portable water, oil, gas, electric power, communication facilities) and high potential loss facilities (dams and levees, nuclear facilities, hazardous material sites, military installations).

### **III. Session 3 (IoT based Landslide early warning system using low-cost solutions)**

The IoT-based landslide prevention, technology is reliable, responsive, covered a large area, provides accurate data, and looks more promising for future work. Landslide monitoring systems are low-cost compared to conventional monitoring systems such as IIT Mandi's landslide monitoring system.

### **DAY 3**

#### **I. Session 1 (Security of Critical Infrastructure of the Transport Sector)**

This session explained about five (5) strategic pillars of global road safety. There are road safety management, post-accident management, safer road users, safer vehicles, and safer mobility and road.

#### **II. Session 2 (New trends in remote sensing applications)**

Remote sensing is becoming more common in both the commercial and personal sectors, and it has the potential to take us into the metaverse. Images in this metaverse must be credible, which can only be achieved with remote sensing and geospatial technologies. As these types of metaverses become more prominent, there will be greater demand for scans in a variety of locales. The realism of these virtual properties will add to their worth, especially for those looking to commercialize virtual tourism through advertising or entrance fees. Remote sensing images can be freely downloaded at Copernicus Hub and the United States Geological Survey (USGS) Explorer.

The sessions were conducted as planned and all the sessions converged on research governance. The question-and-answer sessions were lively with active participation from the participants. Participants particularly gave positive reviews on thinking outside the box and how interaction and intercultural communication had been enhanced during the Study Tour.

The participants were eventually trained on ICT solutions, methods and approaches to deal with natural hazards, disasters, and risks.



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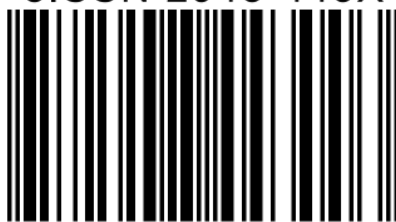
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