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PENYELIDIKAN DAN INOVASI

CALL FOR PROPOSALS RUTrans

1/2021

PERMOHONAN KERTAS KONSEP SKIM GERAN UNIVERSITI PENYELIDIKAN TRANSDISIPLINARI (RUTrans) TAHUN 2021

PERMOHONAN KERTAS KONSEP SKIM GERAN RUTRANS INI DIBUKA BERDASARKAN KEPADA SEMBILAN (9) "CALL FOR PROPOSALS" SEPERTI BERIKUT:

1. ENERGY (RENEWABLE ENERGY & ENERGY STORAGE SYSTEM)
2. BUSINESS FINANCIAL SERVICES (FINTECH IN ISLAMIC FINANCE)
3. MEDICAL & HEALTHCARE (DIGITAL HEALTH)
4. MEDICAL & HEALTHCARE (PRECISION MEDICINE)
5. AGRICULTURE (LOCAL AGRICULTURE INPUT)
6. AGRICULTURE (HIGH VALUE SEAFOOD)
7. WATER & FOOD (LOCAL SUPERFOOD)
8. WATER & FOOD (WATER POLLUTION)
9. WATER & FOOD (WATER RESOURCES MANAGEMENT)

Pejabat Pengurusan & Kreativiti Penyelidikan (RCMO)
Bahagian Penyelidikan dan Inovasi
Universiti Sains Malaysia

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CLUSTER ENERGY

Picture courtesy: https://wallpaperaccess.com/

Niche : Renewable Energy & Energy Storage System

CALL 1

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PANGGILAN KERTAS KERJA (CALLS FOR PROPOSAL)

SKIM GERAN UNIVERSITI PENYELIDIKAN TRANSDISIPLINARI (RUTrans)

FASA 1/2021

CALL 1

ENERGY (Renewable Energy & Energy Storage System)

1. **Specific Challenge:** ***to demonstrate the applicability of energy generation, storage, distribution, and application in specific device based on renewable resources with proper management of associated environmental and socio-economic issues to attain clean energy.*** Addressing SDG 7: ensure access to affordable, reliable, sustainable and modern energy for all.

2. **Scope:** Research and Innovation must be multidisciplinary and focused on the design, development, and testing of a sustainable renewable energy system from harvesting to storage utilizing advanced materials, bioscience technology, sensor technology, advanced intelligence system and augmented analytics for future sustainable energy supply.

3. **Expected Outcome/Impact:**
   Production of a ***sustainable energy utilization system*** (energy harvesting to energy utilization) ***emphasizing on hydrogen energy, solar energy, battery technology, storage and supercapacitor.***

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PENYELIDIKAN DAN INOVASI

CLUSTER BUSINESS FINANCIAL SERVICES

Picture courtesy: https://wallpaperaccess.com/

Niche : FinTech In Islamic Finance

CALL 2

www.research.usm.my

CALL 2

BUSINESS FINANCIAL SERVICES: FINTECH IN ISLAMIC FINANCE

1. **Specific Challenge:** ***to implement Islamic Fintech in achieving the objectives of Islamic finance mechanism.*** This can be done through addressing syariah compliance issues concerning financing, investment and distribution as to fulfil the target of *SDG #1* No Poverty*; SDG#2* Zero Hunger*; SDG#3* Good Health and Well-being*; SDG#4* Quality Education*; SDG#8* Decent Work and Economic Growth*; SDG#10* Reduced Inequalities*; SDG#12* Responsible Consumption and Production *and SDG#16* Peace, Justice and Strong Institutions*.* The challenge is to enhance, develop or usability of appropriate technology to achieve the above.

2. **Scope:** Research and Innovation must apply multidisciplinary approach with focus on the enhancement, development, and usability of the Islamic Fintech on the welfare of B40 via the use of appropriate technology towards achieving SDG goals. Enablers identified are advanced intelligence system, cyber-security and encryption, blockchain, augmented analytics and data discovery.

3. **Expected Outcome/Impact:**
   Significant increase in the effectiveness and efficiency of the Islamic financial mechanism.

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CLUSTER MEDICAL & HEALTHCARE

Picture courtesy: https://wallpaperaccess.com/

Niche : Digital Health

CALL 3

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CALL 3

MEDICAL & HEALTHCARE: DIGITAL HEALTH

1. **Specific Challenge:** This call is to find solutions to effectively ***monitor diseases remotely, in pandemic situation or with limited accessibility to healthcare facilities.*** The specific challenge is to implement monitoring of disease to attain socioeconomic driver of medical and healthcare (physical, mental, financial and health system). This can be achieved through an effective, intelligent, and secure system which is accessible to all as to fulfil the Target set by SDG 3. The technological challenge is to develop and demonstrate smart monitoring involving technology enablers: advanced intelligent systems, sensor-technology, advanced materials, and cybersecurity.

2. **Scope:** Research and Innovation must focus on the design, development and testing of ***remote monitoring* system** via the use of advanced intelligent systems, sensor-technology and cybersecurity for managing specific diseases.

3. **Expected Outcome/Impact:**
   - ***Remote Monitoring System including e-consultation and pharmaceutical.***
   - Significant increase in population well-being – reduction of disease morbidity, mortality, and costs.

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PENYELIDIKAN DAN INOVASI

CLUSTER MEDICAL & HEALTHCARE

Picture courtesy: https://wallpaperaccess.com/

Niche : Precision Medicine

CALL 4

www.research.usm.my

CALL 4

MEDICAL & HEALTHCARE: PRECISION MEDICINE

1. **Specific Challenge:** This call is to ***find solutions to effective targeted approaches of chronic diseases, cancer, infectious diseases, mental health, and well-being***. The specific challenge is to ***implement precision medicine in managing chronic diseases, cancer, infectious diseases, mental health, and well-being*** to attain socioeconomic drivers of **medical and healthcare (physical, mental, financial and health system)**. This can be achieved through an effective targeted approaches which is accessible to all as to fulfil the Target set by SDG 3. The technological challenge is to develop and demonstrate effective targeted approaches involving technology enablers: sensor technology, advanced materials, advanced intelligent systems, augmented analytics and data discovery and bioscience technology.

2. **Scope:** Research and Innovation may focus on ***the design, development and or testing of precision medicine*** via the use of sensor technology, advanced materials, advanced intelligent systems, augmented analytics and data discovery and bioscience technology for managing chronic diseases, cancer, infectious diseases, mental health and well-being.

3. **Expected Outcome/Impact:**
   - Significant ***increase in disease detection and customized treatment***.
   - Reduction of disease morbidity, mortality and costs to ***establish smart, efficient and practical technology for disease management.***

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PENYELIDIKAN DAN INOVASI

CLUSTER AGRICULTURE

Picture courtesy: https://wallpaperaccess.com/

Niche : Local Agriculture Input
(Advanced Technologies and Precision Agriculture)

CALL 5

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CALL 5

AGRICULTURE (LOCAL AGRICULTURE INPUT)

Advanced Technologies and Precision Agriculture

1. **Specific Challenge:** Agriculture sector is facing huge challenges in terms of technology advancement, productivity, cost-efficiency and increasing labour shortage. Malaysia is lacking in the utilisation of Robotics, IoT, Automation Technology, Drone and Sensors for Precision Farming and more Technological-Based Supply Blockchain System. These technologies can increase crop yield allowing Malaysia to overcome the labour shortage problem and less relying on foreign labour. ***This Call covers any technologies which can lead to more resource-efficient agricultural*** to fulfil the Target set by SDG Target [SDG 2 (2.4)]. The technological challenge is to develop and demonstrate high levels of efficiency and effectiveness in farming, production and distribution processes.

2. **Scope:** USM researchers from all fields can collaborate to ***design, develop and apply advanced technology for precision farming*** via advancement in Robotics, IoT, Drone, Sensor, Bioscience Technology, Advanced Materials, Advanced Intelligence Systems together with Urban Agriculture Architecture, and Blockchain Technology for Supply Chains.

3. **Expected Outcome/Impact:**
   - ***Precision agricultural technology that can significantly increase crop yield, production and distribution***
   - Increase in the ***safety, reliability and manageability of agricultural technology, reducing excessive human burden for laborious tasks.***

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PENYELIDIKAN DAN INOVASI

CLUSTER AGRICULTURE


Picture courtesy: https://wallpaperaccess.com/

Niche : High Value Seafood

CALL 6

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CALL 6

AGRICULTURE (HIGH VALUE SEAFOOD)

1. **Specific Challenge:** The blood cockle (*Tegillarca granosa)* is one of the major aquaculture species in Malaysia. Within the west coast region of Peninsular Malaysia, blood cockle aquaculture flourishes due to the large number of juvenile cockles. The juveniles are seeds for aquaculture grounds within the west coast zone. However, the decline of blood cockle production is seen in recent years, attributed to the combined effects of environmental stressors, including pollution of coastal waters; degradation and erosion of mudflats and deterioration of shallow coastal habitats due to extreme weather events; overstocking of *T. granosa* seed; high ammonia concentrations in the aquaculture systems; and rapid changes in sea surface temperature. The specific challenge for this call is to ***enhance efficiency and increasing production of cockles through application of frontier technologies***, as to fulfil the target set by #13 (Climate Action) and #14 (Life Below Water).

2. **Scope:** To achieve stable production in cockle aquaculture, it is important to measure and control factors that negatively influence the growth and survival of these organisms. USM researchers from all disciplines and research clusters can collaborate as the Research and Innovation Actions are ***focused on monitoring, improving the natural culture sites, and increasing the survival and production of cockles, via the use of frontier technologies.***

   Tentative Approaches:

   - Monitoring system at sites e.g. degradation and erosion of mudflats
   - Environmental monitoring system e.g. ammonia sensor, pH, temperature, pollution
   - System to protect the site from direct contamination from environment (industrial release)
   - Precision aquaculture for improved environment for cockle production
   - Conduct evaluation of ecosystem for efficient and increasing production of cockles (environment, quantity, quality, practical frontier technology) in coastal environment
   - Develop a collaborative platform for cockle production
   - Conduct forecasting/benchmarking of cockle production

3. **Expected Outcome/Impact:**
   - Improving the environment for ***higher yield of cockle production***;
   - Establishment of ***smart, efficient and practical technology for cockle culture in coastal environment and stimulated condition.***

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PENYELIDIKAN DAN INOVASI

CLUSTER
WATER & FOOD


Picture courtesy: https://wallpaperaccess.com/

Niche : Local Superfood

CALL 7

www.research.usm.my

CALL 7

WATER & FOOD (LOCAL SUPERFOOD)

1. **Specific Challenge:** In general, the challenge is on ***finding game-changing new uses for local superfoods, leading to products with significant market demand.*** The specific challenge is to develop an innovative ***locally-recognized functional food product with bioactive compounds*** that have health enhancing properties destined ***for the vulnerable group of the society.*** This would include on the formation of such functional food and methods to deliver it to the ***vulnerable group with hidden hunger [examples; pregnant women, elderly people, malnourished people, and people who are ill, immunocompromised or with risks of diseases].*** This is as to address SDG #2: zero hunger and SDG #3: good health and well-being.

2. **Scope:** Research and innovation will focus in addressing the nutritional and/or beyond nutritional needs of the vulnerable group, to produce the innovative food and to develop delivery methods to enable the vulnerable group to get easy access to the superfood. Enablers identified are bioscience technology, neuro technology, advanced materials, advanced intelligence systems, block chain, and sensor technology.

3. **Expected Outcome/Impact:** ***New food technologies with improved nutritional content with health-enhancing properties and delivery technologies to enable easy access to the vulnerable group.***

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PENYELIDIKAN DAN INOVASI

CLUSTER
WATER & FOOD

Picture courtesy: https://wallpaperaccess.com/

Niche : Water Pollution

CALL 8

www.research.usm.my

CALL 8

WATER & FOOD (WATER POLLUTION)

1. **Specific Challenge:** The specific challenge is ***to significantly reduce various streams of pollution into water bodies in order to improve water quality*** while preserving the environment and ensuring ecosystem sustainability. This can be accomplished through ***intelligent integrated wastewater management, which encompasses management of both industrial and domestic wastewater***, in order to meet SDG #6 Target 6.3. (by 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally). The technological challenge is to develop and ***demonstrate treatment technology, early warning system, pollution prevention technology, an intelligent monitoring system that is appropriate for water pollution, water and wastewater quality monitoring, wastewater reuse, sewerage management system and circular economy of wastewater. Study on the health effect of consuming polluted water is also sought after further enhancing on the need of clean water.*** The technologies to be developed will involve advanced intelligent systems, nanotechnology via advanced materials development, sensor technology, blockchain technology and biotechnology.

2. **Scope:** USM researchers from all disciplines and research clusters can work together on the pollution source identification, design, development and testing of ***essential solutions to prevent water pollution from domestic and economic activities and the danger in the consumption of water pollution*** via the use of advanced materials, advanced intelligent systems, sensor technology, blockchain technology and biotechnology.

3. **Expected Outcome/Impact:**
   - Significant reduction of water pollution
   - A sustainable ecosystem protection program
   - Development of ***polluters inventories***
   - Development of intelligent water quality monitoring, water/wastewater treatment technology, recycling and reuse technologies.
   - A framework for developing community water strategies.

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CLUSTER
WATER & FOOD


Picture courtesy: https://wallpaperaccess.com/

Niche : Water Resources Management

CALL 9

www.research.usm.my

CALL 9

WATER & FOOD (WATER RESOURCES MANAGEMENT)

1. **Specific Challenge:** The specific challenge is ***to accommodate the impact of changes in the world's hydrological pattern on water resource availability to attain water demand for domestic, agricultural, industrial, and other economic activities.*** This has been achieved through intelligent integrated water resource management as to fulfil SDG #6 "Ensure availability and sustainable management of water and sanitation for all." The technical challenge is to develop and demonstrate technology that is appropriate for water resource efficacy, water quality improvement, water stress protection, water shortage mitigation, flood mitigation, water pollution protection, and water body efficacy. Involving advanced intelligent systems, nanotechnology via advanced materials development, sensor technology and biotechnology. Apart from surface water availability, there is a need to explore the use of water harvesting technologies on other type of water resources, especially in water-stressed states but have high water demand for their consumption.

2. **Scope:** Transdisciplinary research and innovation actions includes design, develop and application of necessary solutions to ensure sustainable water supply and optimising water usage. This includes on the improvement of processing, treatment, and distribution of water by the use of advanced materials, advanced intelligent systems, sensor technology and biotechnology.

3. **Expected Outcome/Impact:**
   - ***Sufficient water for domestic, agricultural, and industrial consumption***.
   - The forecast of return periods of floods and streamflow simulation for calculating the water shortage risk during flood and drought.
   - Development of climate-smart, environmentally and socially sound infrastructure.
   - A framework for developing community water strategies.
   - Integrated approach to optimise the resources of water used in all areas.
   - Capturing water for non-potable purposes in agriculture, industry and domestic for preventing wastage of clean water and maximising usage of resources.