CALL FOR PROPOSALS
(RUTrans GC)
2022

Future Pandemics

Understanding and Mitigating Future Pandemics Utilising Artificial Intelligence (AI)

CALL 1

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SKIM GERAN UNIVERSITI PENYELIDIKAN TRANSDISIPLINARI
GRAND CHALLENGE (RUTrans GC) TAHUN 2022
Panggilan Kertas Cadangan|*Calls For Proposal*

CALL 1

FUTURE PANDEMICS: UNDERSTANDING AND MITIGATING FUTURE PANDEMICS UTILISING ARTIFICIAL INTELLIGENCE (AI)

Specific Challenge: This call aims to catalyze collaborative research activities and advances in AI (statistical learnings, machine learnings, predictive analytics and advanced computing research and software engineering) providing solutions to (1) the challenges of current or future pandemics and (2) the methods for containing and addressing pandemics more generally for longer-term preparedness, including for future pathogens and SARS-like viruses. We call for proposals on understanding and mitigating the spread of current or future pandemics, improving the ability of the public health and medical establishment to respond, and minimizing the impact of this disease on society.

Public health emergencies often affect an individual's health, safety, and well-being due to economic loss, inadequate resources for medical response, and death-related trauma. The specific challenge is to develop a new understanding of the relationship between various factors and the risk of a pandemic or the effects of certain factors on the health outcomes due to pandemics.

The technological challenge is to gather important and relevant factors by real-time technological, environmental or societal enablers; using advanced intelligent systems, sensor technology, bioscience technology, social media or cybersecurity.

Scope: Research and innovation must focus on the novel relationship between factors and risk of pandemic or outcome of a pandemic on individual patients or on a society, development of unique pandemic-focused AI application and delivering it as sustainable digital health application.

Expected Outcome/Impact:

- Transdisciplinary research and innovation output which include in the clinical, epidemiological, statistical, computer science and software engineering fields.

- AI application (predictive analytics or digital health application) in public health for prediction of risk for the pandemic, prediction of outcome due to pandemic and forecasting the impact or future pandemics.

- There should be improved public health, clinical (including psychological management) and technological management at the individual or organizational level during and after the pandemics. The overall improvement includes wellness, family or community adjustment and readiness for employment.

Future Pandemics

The Use of Advanced Materials and Innovative Technology for Facing Future Pandemics

CALL 2

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FUTURE PANDEMICS: THE USE OF ADVANCED MATERIALS AND INNOVATIVE TECHNOLOGY FOR FACING FUTURE PANDEMICS

Specific Challenge: This call aims to attain solutions through innovations for future preparedness in utilising advanced materials to respond effectively and help solve immediate challenges brought about by the pandemics.

The ongoing COVID-19 pandemic emphasises the significance of materials science in delivering tools and platforms for the understanding, protection, detection and treatment of future infectious diseases. As known, materials are important in all areas of antiviral studies (viral structure and biology, virus-detection, treatment and vaccination, future diagnostic, medical reagents, protection gears, anti-viral surfaces etc.). Nonetheless, a complete system requires collaborative effort between experts in various different disciplines. The programme should therefore include health practitioners, engineers (materials, chemicals, mechanical, environmental, electrical & electronics, software etc.) and those in applied sciences (physics, chemistry, biology etc.). The products created should be accepted, adopted, and commercially viable and hence input from social scientists, and those in humanities and business management are crucial. Solution is sought for better designs of products utilising advanced materials and preferably locally made products friendly to the environment using cutting-edge innovative technologies, all of which should fulfil the target set by SDG 3.

The **technological challenge** intends to deliver inventions that utilise environmentally-friendly materials rendering improved protection, functionality and wearing comfort. Improved versions of locally produced innovations (PPE, diagnostic kits, disposables such as swabs, viral transport media, reagents etc.) and future diagnostics involving technological enablers; advanced intelligent systems, sensor technology, bioscience technology and advanced materials.

Scope: Research and innovation must focus on the production of medical reagents, disposables devices etc., environmentally friendly personal protective equipment, the development of precise and affordable virus-detection devices, designing anti-viral surfaces to mitigate spread of future pandemic which may impact policymaking.

Expected Outcome/Impact:

- Transdisciplinary research and innovation actions include better environmental-friendly devices or items that reduce pollution and climate change.
- Provide alternatives (e,g, diagnostics) for rapid and accurate, efficient diagnostic tools (more functions at one go) which can target many parameters.
- Anti-viral surface designs to help curb the spread of disease
- Expected output may also encompass policies addressing environmental issues related to the pandemic, locally produced materials for facing future pandemic and mitigation in spreading future pandemic.

Climate
Crisis

Mitigating the Changes Through Adoption of Innovative Measures : Mitigating the Severity

CALL 3

CALL 3

CLIMATE CRISIS: MITIGATING THE CHANGES THROUGH ADOPTION OF INNOVATIVE MEASURES: MITIGATING THE SEVERITY

Specific Challenge: This call is to find local solutions to cut the current green house gas (GHG) emission rates towards meeting the governmental pledges under the 2015 Paris Agreement. Specific areas relevant to the call are innovations in energy, agriculture, manufacturing and transport sectors. The specific challenge is to develop effective systems that can reduce GHG emission or utilize them to produce value-added products, policies towards transition into less carbon-intensive economy and paradigm shift in thought and action of society towards playing our individual roles to fulfil the target set by SDG 13. The technological challenge is to establish an effective system that is cleaner and more sustainable to run for energy production and utilization without compromising the economic aspects, agricultural practices with more interesting carbon footprint, a new manufacturing system with better efficiency and more environmentally sustainable transportation systems. The solution proposed should be innovative, knowledge-based, feasible and the benefits or significance can be systematically demonstrated.

Scope: Research and innovation must focus on the establishment of unique innovative solutions that are relevant to Malaysia as well as to other emerging economies in tropical regions to address the main causes of global warming that eventually leads to climate crisis. It may encompass various aspects of energy generation, agriculture, transportation, deforestation or manufacturing activities.

Expected Outcome/Impact:
- Transdisciplinary research and innovative solution leading to the significant reduction in the current levels of of greenhouse gases release.
- Possible wealth creation in terms of value-added products or business opportunity from the effective solution developed.
- Local approach to effectively address the problem with international relevance.

CALL 4

CLIMATE CRISIS: WEATHERING THE CLIMATIC CHANGES WITH MINIMUM IMPACT ON LIFE THROUGH DECISIVE SOLUTIONS: ADAPTATION TO THE CLIMATE CHANGES

Specific Challenge: This call is to find solutions to deal effectively with the impacts induced by climate change with regards to food security, water scarcity, storm water management, economic losses and displacement. The specific challenge is to develop innovative product, policy or management systems that are effective to fulfil the target set by SDG 13. The technological challenge is to establish an effective product, policy and management system that can curb, delay or mitigate the effects of climate change with little compromise of the well-being and livelihood of the people. The solution proposed should be innovative, knowledge-based, feasible and the benefits or significance can be systematically demonstrated.

Scope: Research and innovation must focus on the formulation of decisive solutions that can reduce the severity of the impacts of climate change to the well-being and livelihood of people in Malaysia as well as in other emerging economies in tropical regions. It may encompass the necessary response to the climatic changes, coastline threats, stormwater problems, current reliance to poor resistant crops etc with the expectation that issues related to flooding, food insecurity, water scarcity, economic losses and displacement can be sufficiently addressed.

Expected Outcome/Impact:
- Transdisciplinary research and innovation solution to minimize compromise needed in terms of well-being and livelyhood of the people to the impacts induced by climate change.
- Demonstration of tangible benefits of the approaches.
- Local approach to effectively address the problem with international relevance.

INCOME DISPARITY: REVISITING INCOME DISPARITY AND INEQUALITY FROM A MULTI-DIMENSIONAL APPROACH

Specific Challenge: One of the target of the Shared Prosperity Vision 2030 is to reduce household income inequality by reducing the Gini coefficient to 0.340 by 2030. In Malaysia, the Gini coefficient is calculated from the Household Income Survey (HIS) (Department of Statistics, Malaysia). Gini coefficient or ratios of different parts of the income distribution (for instance, the ratio of the bottom 10 percent to the top 10 percent), can provide some indication of the level of inequality and the magnitude of inequality, respectively. Essentially, a decreasing Gini coefficient indicates increasing income equality in a country. However, comparisons of these numbers over time do not indicate equality of income growth and how inequality changed over time. That is to say, although such measures can indicate differential growth rates, they do not indicate what an equitable rate would have been and calculation of the Gini is too limited and restricting its view on income inequality. For instance, the HIS does not account for various income sources or multiple income earners in the same household and fail to measure inequality within the household, and therefore can produce estimates of inequality that are understated. Malaysia's HIS may be suffering from under-sampling and under reporting of households in the upper end of the income distribution. Only small percentage of households in Malaysia are categorized as high income, so, randomized samples may not accurately represent the whole range of the top income group. Changes in income inequality among individuals are not necessarily correlated with changes in household income inequality, signalling that the HIS does not fully capture fluctuations in the distribution of wages earned by individuals across a country. Changes in the wage distribution are important to evaluate because those changes could reflect the pressure members of low-income households feel to take on additional jobs. If growth in wages for lower-income jobs is lagging behind that of high-income jobs, or behind price inflation, employees in low-income jobs may feel pressured to take on more work to keep up with the economy. The purpose of the HIS Gini coefficient is to track Malaysia's progress in income inequality, but if this indicator fails to capture the reality of wide swaths of the Malaysian population, the government must consider other forms of measurement.

The challenge is to develop a new definition, measurement, software, computation, formula and model for income disparity and inequality by revisiting and improvising income inequality measures among demographic groups (gender, racial and ethnic minorities), as well as wage

inequality/wage distribution, wealth inequality, the growth rate of consumer prices or health care prices or the income growth of a specific group, inclusively. This is in line with theme 5 of the Twelfth Malaysia Plan (12MP) – Addressing Poverty and Building an Inclusive Society (Strategy A6: Narrowing Household Income Inequality). Additionally, it also address SDG1 No Poverty and SDG10 Reduce Income Inequalities.

Scope:

The proposed research must respond to the following objectives:

1. To devise a new definition of income disparity and inequality from the viewpoints of sciences, engineering, social sciences, management, business and humanities.
2. To develop a new software to measure income disparity and inequality and generate a new measurement in terms of computation, formula and model of income disparity and inequality from the viewpoints of sciences, engineering, social sciences, management, business and humanities.
3. To propose the action plans to address the shortcomings of existing definition and measurement of income disparity and inequality from the viewpoints of sciences, engineering, social sciences, management, business and humanities.

Expected Outcome/Impact:

1. Transdisciplinary approaches when devising the new definitions of income disparity and inequality - from the viewpoints of sciences, engineering, social sciences, management, business and humanities.
2. Innovative measurement of income disparity and inequality in terms of software, computation, formula and modelling from the viewpoints of sciences, engineering, social sciences, management, business and humanities.
3. The action plans to address the shortcomings of existing measurements from the viewpoints of sciences, engineering, social sciences, management, business and humanities.

CALL 6

INCOME DISPARITY: IMPACT OF THE COVID-19 PANDEMIC TOWARDS INCOME DISPARITY & INEQUALITY IN MALAYSIA

Specific Challenge: Alongside a public health crisis, the COVID-19 pandemic has had a destructive impact on poverty levels and inequality. Department of Statistics, Malaysia in 2021 estimated that the outbreak of the COVID-19 pandemic has had a significant impact on the household income and subsequently affected the structure of household groups. With more households experiencing declines in income, there have been calls to investigate the impact of the COVID-19 pandemic on income disparity and inequality in Malaysia.

The challenge is to investigate the extent to which the COVID-19 pandemic has impacted the income distribution level across the household's income structure in Malaysia and the livelihoods of the most impacted income groups. This is in line with theme 5 of the Twelfth Malaysia Plan (12MP) – Addressing Poverty And Building An Inclusive Society (Strategy A6: Narrowing Household Income Inequality). Additionally, it also address SDG1 No Poverty and SDG10 Reduce Income Inequalities.

Scope:
The proposed research must demonstrate how the COVID-19 pandemic affects the household's income structure and the livelihoods of the most impacted income groups by responding to the following objectives:

1. To identify the emerging gap between the income groups after the COVID-19 pandemic and the most impacted income group.
2. To investigate how the emerging income gap affects the livelihood of the income group(s) that is/are most impacted.
3. To effectively address the impacts of the COVID-19 pandemic towards income disparity and inequality in Malaysia.
4. To recommend a recovery plan to address the adverse impacts of Covid 19 in the form of strategic plan / innovation / product / intervention / model etc.

Expected Outcome/Impact:

1. Statistical evidence to demonstrate the emerging income gap due to the impact of the COVID-19 pandemic measured from the perspective of sciences, engineering, social sciences, management, business and humanities.