

Issue #2 | October 2022

Catalysing Global Research Excellence

101

## Go Green for Our Future Innovation, Transformation & Sustainability



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## **ABOUT THE MAGAZINE**

RISE Magazine is published by Office of the Deputy Vice-Chancellor (Research and Innovation) with aims to highlight a research and innovation on multidisciplinary expert of fields in UiTM. It serves as a platform for researcher to showcase their high quality and impactful findings, activities and innovative solution through publication. Contribution of these ideas come from academicians, researchers, graduates and universities professionals who will enhance the visibility of research and stride to elevate Universiti Teknologi MARA to global standards. This is an effort to promote research as a culture that is accepted by all expertise.

## ABOUT UITM

Universiti Teknologi MARA (UiTM) is a public university based primarily in Shah Alam, Malaysia. It has grown into the largest institution of higher education in Malaysia as measured by physical infrastructure, faculty and staff, and student enrollment. UiTM is the largest public university in Malaysia with numerous campuses throughout all 13 states in Malaysia. There is a mixture of research, coursework and programmes offered to the students. Office of the Deputy Vice-Chancellor (Research and Innovation) or known as TNCPI (Timbalan Naib Canselor (Penyelidikan dan Inovasi)) serves as a Pusat Tanggungjawab (PTJ) navigate the research and innovation of university in achieving UiTM agenda. TNCPI office strives to mobilize faculty, and campuses to move together and cooperation of researchers to become a leading global university of science, technology, and innovation by 2025.

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### FOREWORD



#### Bismillahirahmanirrahim.

Alhamdulillah, all praises to Allah SWT and a heartfelt congratulations to the Office of Deputy Vice-Chancellor (Research and Innovation) on the publication of RISE Magazine (October Issue, No. 2) in promoting visibility for UiTM's research and its researchers.

I am thrilled to have witnessed a growing number of article publications and research innovations endeavoured by our fellow researchers. Thank you for all the effort, time, and energy that you have selflessly spent for the university.

The sustainability theme chosen for this edition is wise, apt, and timely. While striving to become a Globally Renowned University (GRU) and attaining Sustainable Development Goals (SDGs), we must ensure that our research activities are in line with the 17 goals set by the United Nations (UN) as well as the university's strategic plan.

UiTM is proud with the progressive development of renewable energy and currently 7 campuses are equipped with solar photovoltaic rooftops. This supports Malaysia's noble cause of becoming a carbon-neutral nation by 2050. Green Retrofit Framework for Sustainable Residential Refurbishment Project was also initiated with

plausible effectiveness to increase the number of green buildings and eventually will help reduce the emission of Green House Gases (GHG).

Our researchers have also begun to use Green Polysaccharides material for wound healing which is greener and environmentally benign. Other noteworthy projects are the use of Resistograph to assess the accuracy of Wood Density (WD) prediction, the application of 3D printing technology in simulating real experiences of halal animal slaughtering, as well as lipid reduction via systematic screening to make our planet more sustainable.

I am delighted with the research ambience that has now become an acceptable culture in UiTM. GRU2025 is definitely achievable with continuous effort and dedication made by members of UiTM as we work towards helping the nation and the world to achieving SDGs by 2030.

Thank you.

**PROFESSOR DATUK TS. DR HAJAH ROZIAH MOHD JANOR** Vice-Chancellor Universiti Teknologi MARA

### FOREWORD



Congratulations to the editorial team on the publication of RISE magazine Issue 2, 2022, serving as a platform to showcase our pride in UiTM research and innovations.

We chose *Sustainability* as the theme for this edition. Despite its definition that may be contextual and vary across the field, we can't deny its essence and impacts on our daily life, and that every one of us should gracefully embrace.

Under this umbrella, we have witnessed an array of projects carried out by UiTM researches in various genres of research, driven to help the community in the short and long run. Flipping each page of this magazine and seeing how far we have become as a university sends unflagging goosebumps- signaling how proud I am to be part of this huge family.

Research has no longer been alien to us. We could see that the propagated activities in the quest of finding answers to problems have mushroomed over the years. It has become somewhat the bread and butter of academics other than teaching and learning. Its role has been significantly proven to elevate teaching community to a better level.

TNCPI Office seeks continuous support from every researcher, academician, and administrator to keep your momentum in doing research and innovations. Perhaps, through a stronger research ecosystem, this well help us to become a Globally Renowned University by 2025. We will keep providing supports, rewards and facilities needed in boosting the morale of our researchers.

Lastly, I hope RISE can be the front page of UiTM exhibiting the business that we are doing. Every time you go for a conference or any meeting with potential collaborators, please share RISE with them. We never know how much opportunities that will come knocking our doors just from that gesture.

Thank You.

PROFESSOR TS. DR NORAZAH ABD RAHMAN

Deputy Vice-Chancellor (Research & Innovation) Universiti Teknologi MARA

## MESSAGE FROM THE CHIEF EDITOR

#### Alhamdulillah

It gives me great pleasure to see RISE issue # II published. We have received a huge number of impactful submissions to be featured as our #KeluargaUiTM's research stories. Despite the difficult circumstances of post-covid19, UiTM researchers are proactive in carrying out research activities and events within their respective capacities.

Allow me to express my heartfelt gratitude to all of the authors of the articles in this magazine. Not to forget all editorial members who worked hard to ensure its publication was on schedule. The publication of this issue would have been far more difficult to achieve without their contributions. In this edition, we feature seven researchers from both science and technology and social sciences disciplines with their views and experiences in sustainability-related research and their efforts for mobilising sustainable development. Also, RISE II presents the achievements of the multidisciplinary domains by distinguished UiTM research groups.



I believe that sustainability should be the nucleus of any research agenda. Prominent researchers around the world are focusing on the call to address global livelihood and wellbeing. Hence, we at UiTM should embed and embrace the principles of Sustainable Development Goals in our research efforts.

To all researchers out there, we hope that the amazing stories in RISE II will rekindle our enthusiasm for research. We sincerely hope to bring you more research news from the #keluargaUiTM in the coming issues. I invite you to discover RISE II and be inspired. Enjoy reading!

ASSOC. PROF. DR MOHD MUZAMIR MAHAT Head of Research Communication & Visibility Unit (UKPV) Office of Deputy Vice-Chancellor (Research & Innovation)



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Green Retrofit Framework for Sustainable Residential Refurbishment Project



**Ts Dr Julitta Yunus** Centre of Studies for Construction Faculty of Architecture, Planning and Surveying

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#### Location: Petaling Jaya, Selangor, Malaysia

Figure 1: Illustrates the timeline development of Petaling Jaya since its establishment in 1950s.

alaysia is becoming heavily dependent on energy due to rapid development and industrialization, resulting in a significant increase in GHG emissions. Rapid urbanization has remarkably turned Malaysia into one of the most urbanized nations in Asia (World Bank, 2021). Over the past years of dedication to economic development, the country has shown an increase in the number of existing buildings, with residential as a leading sector.

Before the propagation of the building sustainability directive, most of the existing building stock had been constructed without consideration of environmental impacts. Thus, such buildings extend various appealing opportunities to be recovered and improved. Since its establishment in 2009 (GBI. 2020), Malaysia has authorized a total of 500 projects, in correspondence with less than 10% of the building stock by June 2019. The total number of green buildings is still not adequate to compare with the escalating number of building construction projects each year. The gap in numbers is undoubtedly huge and, for the record, as of 2020, the country has a total of 5,775,095 units of existing building supply of housing with an additional future supply of about 903,352 units (NAPIC, 2020). With the continuous supply of construction projects, it has become a challenge to stand against climate change as this situation contributes more to carbon emissions and energy use.

It is not enough to just rely on the emergence of new green building construction as the efforts are insufficient to alter the broad cycle of unsustainable existing buildings. Although providing more new green buildings means reducing the increasing amount of carbon emissions, it does little to lessen the overall impacts of the existing building stock. For that reason, dealing with the efforts of improving the existing conditions of building stocks should be one of the main concerns in the construction industry as it is not feasible and viable enough if one day, all the buildings need to be demolished to build a new green building to minimize the impact on the environment.

This project involves a task that focuses on the application of green retrofit strategies to existing residential buildings. The selected location of the case study is a residential development within Petaling Jaya (PJ), and the scope of the study is limited to intermediate units of double-storey terrace houses. Currently, the development of new residential buildings in PJ is very restricted due to the limited available land left to be developed, which encourages more refurbishment activities among existing residential buildings. The research intends to develop a strategic green retrofit framework that may elevate the current residential refurbishment system performance towards a more sustainable concern. The focus of case study is directed towards the district of Kelana Jaya and Damansara Jaya due to the concentration of terrace house development in the area during the year of 1970s and 1980s.



Figure 2: Map of Kelana Jaya

Figure 3: Illustration of different building typology in Kelana Jaya



Figure 4: Map of Damansara Jaya



Figure 5: Illustration of different building typology in Damansara Jaya.

The framework will transform the scientific and hightechnical knowledge into a basic application of green refurbishment strategies in a residential project that applies to all. It can also contribute to lessening the gap of knowledge between authorities, users, and professionals towards a more effective means of communication to achieve sustainability in residential refurbishment projects.

From the observation done during the early stage of this study, it was identified that the residentials in the country mostly consist of detached, semi-detached, terraces, townhouses, clusters, low-cost houses, lowcost flats, flats, apartments and condominiums. The residential building typology prevailing Malaysian construction industry which distinctly unveils the terrace housing as the largest typology by far in the country with more than 2 million in number. Terrace houses have a big market due to their allowable room for modifications compared to the high-rise apartment to the increased value of land in urban areas. However, the setback of the design includes the lack of social and cultural considerations taking into account the privacy matters became one of the main reasons why modifications are done. In addition to that, the renovations are being conducted as yet, to satisfy the residents' needs despite the scope for physical modification in terrace houses being rather limited.

We took the basis of The Eleventh Malaysia Plan (2016–2020), which outlined inclusiveness and sustainability as the key pillars where the pursuit of green growth for sustainability and resilience will be a game-changer, shifting from the old model of "grow first, clean up later". The current existing initiatives related to electricity generation that are crucial and to be highlighted is the Green Technology Master Plan Malaysia (GTMP) 2017-2030 under the Energy and Building Segment which has set apart green growth as one of the six game changers of the nation's growth. The National Energy Efficiency Action Plan (NEEAP) under the GTMP heeds the importance of the research which begins with the advocacy of voluntary actions for energy performance and green initiatives. It suggests a path towards improving energy efficiency by pursuing implementation measures that are considered practically doable and replicable with measured targets. This effort requires commitment from all stakeholders and key players in the industry. The action plan mostly covered the uptake of large and medium-sized commercial buildings, industries, and government facilities. Our team then realised that the uptake of green technology in residential buildings remains limited.

Therefore, policy-makers need to emphasize the need for green retrofitting to obtain sustainability in the built environment. Besides, existing buildings correlate to the amount of energy that has already been consumed in the production, procurement, and transportation of raw materials and in the construction practises themselves. The effort would certainly convey the benefit of green building to existing structures, and the effort is one of the major approaches to practically attaining sustainable energy consumption and greenhouse gas emissions. Green buildings and retrofitting existing buildings are demanded more than ever before, and to attain energy-efficient consumption in Asia's building sector, these buildings have been authorized as the most important players.

There is plenty of potential in implementing green retrofits to the existing buildings, as it can improve the overall sustainability of the buildings and their environmental performance as well. Most of the existing buildings in Malaysia were not built with the consideration of reducing their impacts in mind. Therefore, confronting and tackling the problem in regards to the building sector, other than developing more new green buildings, is to mend the existing conditions of our building stocks. If the construction of the new green buildings were to be compared with the execution of green retrofit, it would become more advantageous to retrofit since the embodied energy of the building can be preserved and waste can be prevented. As such, green retrofit can be considered a cost-effective way to consider that energy consumption and cost of operation can be reduced, thus leading to a higher investment return.



Extension of roof for parking and changes at the frontage of house



The degree of extension of a terrace house's back lane in Damansara Jaya to be compared with the left house that still maintain the original back view of the house.



Changes in façade after the renovation was conducted by the house owners.



The use of HVAC can be seen as normal occurrence surrounding Kelana Jaya area

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