

The Malaysian Surveyor



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TRANSFORMING URBAN FUTURES:
HARNESSING SMART SURVEYING
TECHNOLOGIES FOR SUSTAINABLE
GROWTH IN MALAYSIA

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FROM ACT TO ACTION:

SURVEYING PRACTICES

IN NAVIGATING MALAYSIA'S URBAN RENEWAL LANDSCAPE



Chief Editor's NOTE

“ From Act to Action: Surveying Practices in Navigating Malaysia's Urban Renewal Landscape

Urban renewal is often discussed in terms of policies, plans, and legislation. Yet for many Malaysians, it is experienced far more personally—through ageing flats that no longer meet safety standards, neighbourhoods struggling with declining infrastructure, or city centres caught between preservation and progress. These realities remind us that urban renewal is not merely a regulatory exercise; it is a collective responsibility that shapes how people live, work, and belong in our cities. Malaysia has no shortage of Acts, policies, and development frameworks aimed at guiding urban regeneration. However, the true challenge lies in ensuring that these instruments translate into well-considered, fair, and sustainable action on the ground. This transition—from act to action—is where the surveying profession plays a critical and often underappreciated role.

Surveyors operate at the point where intention meets implementation. Urban renewal today extends well beyond physical redevelopment. It involves social considerations, environmental responsibility, economic viability, and governance integrity. While legislation sets the direction, it is surveyors who interpret requirements, assess feasibility, manage risk, and advise stakeholders on decisions that carry long-term consequences. In doing so, surveyors help ensure that renewal efforts are not only technically sound, but also socially responsible and economically realistic. Urban renewal projects in Malaysia are rarely straightforward. They involve multiple stakeholders, fragmented land ownership, legacy planning issues, financial constraints, and heightened public sensitivity. Quantity surveyors are increasingly expected to move beyond traditional cost management to consider lifecycle value, sustainability performance, and affordability. Valuers face the delicate task of balancing market value with social equity, particularly in regeneration areas where displacement and gentrification are real concerns. Building surveyors contribute by ensuring safety, compliance, and the adaptive reuse of ageing structures, while land surveyors provide the spatial accuracy and land certainty essential for redevelopment to proceed with confidence.

These evolving responsibilities reflect a broader shift in professional practice. Surveyors are no longer confined to technical roles; they are strategic advisers and trusted intermediaries. Urban renewal often requires navigating competing interests between public authorities, private developers, and local communities. In such contexts, professional judgement—guided by ethics, evidence, and experience—becomes as important as technical expertise. Governance is another defining element of successful urban renewal. While policy frameworks continue to strengthen, implementation on the ground can be hindered by institutional fragmentation, procedural delays, and coordination challenges. Surveyors, by virtue of their independent and professional standing, can contribute

to better governance by promoting transparency, supporting risk-informed decision-making, and aligning regulatory intent with practical delivery. In doing so, the profession plays a vital role in building public trust in renewal initiatives that directly affect people's homes and livelihoods.

Digitalisation is also reshaping how surveying practices support urban renewal. Tools such as Building Information Modelling (BIM), Geographic Information Systems (GIS), digital asset management, and e-procurement platforms are increasingly essential. When applied thoughtfully, these technologies enhance coordination, improve cost certainty, and support better long-term asset performance. Yet technology alone does not deliver better cities. Its value lies in how surveyors use digital tools to inform decisions, communicate clearly with stakeholders, and turn plans into timely action. Sustainability must remain central to the urban renewal agenda. Regeneration projects present opportunities to reduce carbon emissions, improve energy efficiency, and enhance climate resilience. Equally important is social sustainability—ensuring affordability, accessibility, and continuity for existing communities. With Environmental, Social, and Governance (ESG) considerations increasingly shaping investment and development decisions, surveyors are well positioned to integrate these principles into urban renewal in practical, measurable ways.

Looking ahead, the profession's readiness will determine how effectively urban renewal objectives are realised. Future surveyors must be equipped not only with strong technical skills, but also with digital competence, interdisciplinary understanding, and a strong ethical foundation. Continuous professional development and close collaboration between academia, industry, professional bodies, and government are essential in preparing surveyors to lead in an increasingly complex urban environment.

This issue of The Malaysian Surveyor invites reflection on how surveying practices are responding to Malaysia's urban renewal challenges. Moving from act to action requires more than regulatory compliance—it calls for leadership, integrity, and a willingness to engage beyond traditional boundaries. Ultimately, the success of urban renewal will be measured not by the number of policies enacted, but by the quality of professional action taken. As trusted professionals, surveyors have a responsibility—and an opportunity—to shape cities that are resilient, inclusive, and sustainable for generations to come.

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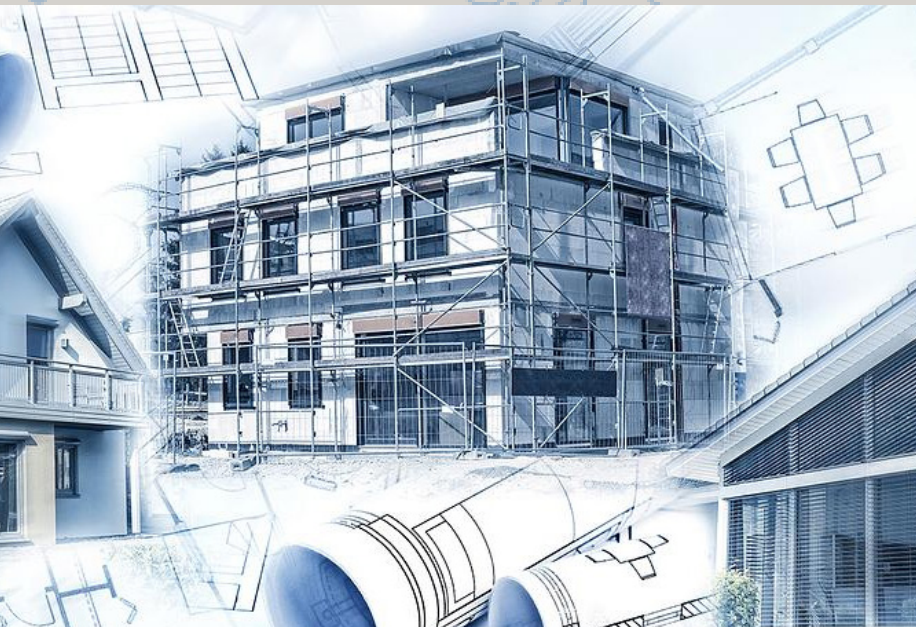
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INTERVIEW WITH THE PRESIDENT OF RISM SESSION 2025/2026

Personal & Professional Journey



Sr Wan Ainon, could you begin by sharing with us your professional background and experiences that have shaped your leadership journey to becoming the President of RISM?

I come from Gerik, a small and quiet town tucked away in Hulu Perak — the kind of place where everyone knows everyone, and dreams often feel larger than the town itself. My journey took a turn when I was offered to study at MRSM Seremban for my secondary education. It was truly an eye-opening experience as suddenly I was surrounded by students from all over Malaysia, each with different temperaments, cultural backgrounds, and family stories. That diversity shaped my perspective and taught me how to connect, adapt, and lead.

I was fortunate to continue my studies of A-Levels and then the Quantity Surveying course in the United Kingdom under MARA scholarship. Those years abroad deepened my independence and gave me a global outlook, perspectives that have stayed with me ever since. Leadership, however, was not something I deliberately sought. My first taste of it came early I was appointed Head Student in Standard 6. That role planted the seed, and over the years, it quietly grew, nurtured by the experiences and people around me. As leaders I have realised we need a tolerant of Attitude, a bit of Bravery, a lot of Courage with a touch of Diplomacy among others.

My involvement in RISM happened almost by accident. Sr Eddie Wong was looking for someone to replace Sr Dainna as Secretary of the RISM Quantity Surveying Division when she moved overseas. Somehow, I found myself stepping into the role near the end of the session. With little prior experience, I was suddenly tasked with preparing for the Annual General Meeting, learning the RISM constitution, understanding divisional functions, and compiling the QS Division Annual Report, all within a short span of time. Soon after, I represented the division at Young QS meetings at PAQS as well as attending the Board Meeting in Singapore. It felt like being thrown into the deep end but looking back, that was where the real growth began.

Through RISM, I've been constantly inspired by the people I meet, passionate, driven individuals who believe in what they do and encourage others to rise with them. I have been truly blessed to be surrounded by those who have faith in me and continue to support my journey.

Many aspire to contribute, and I believe that is what gives meaning to our work in RISM, that is to be beneficial not only to our peers but also to society and the community at large. As long as I can continue to add value and serve with purpose, I will keep doing so until the day I feel I can no longer be of benefit.

Sr WAN AINON ZURAIHA KHALID
CQS, FRISM, MRICS

Vision on Urban Renewal



In your view, what does “urban renewal” mean for Malaysia today, and how does it align with the broader national development agenda?

Urban renewal in Malaysia today extends far beyond the physical redevelopment of ageing buildings or neighbourhoods. It embodies a national agenda to rejuvenate mature urban areas, enhance liveability, and optimise land use in rapidly growing cities. In essence, it represents a strategic effort to revitalise urban environments while ensuring that growth remains inclusive, sustainable, and aligned with the nation’s long-term development goals. Globally, developed nations have long recognised the transformative power of urban renewal. Singapore’s Urban Redevelopment Authority initiated structured renewal programmes as early as 1974, while Hong Kong established its Urban Renewal Authority in 2001. Both models have since evolved into comprehensive urban regeneration frameworks that balance economic dynamism with social inclusivity and cultural preservation.

In Malaysia, the proposed Urban Renewal Act (URA) Bill, tabled in Parliament in July 2025, reflects a similar commitment. The Bill seeks to introduce a clear legal and regulatory framework to facilitate the redevelopment of ageing urban zones, dilapidated buildings, and outdated public housing schemes such as Program Perumahan Rakyat (PPR) and low-cost flats. By empowering local authorities and developers, it aims to drive redevelopment efforts that are efficient, equitable, and sustainable.

However, despite the noble intentions, the response from the public has been somewhat mixed. Many communities expressed concern about whether the Act sufficiently protects the rights and interests of affected residents and small property owners. This indicates a gap between the policy’s objectives and public understanding of its implications. People worry that redevelopment may favour certain groups, such as developers or investors while displacing vulnerable residents or erasing local heritage and community identity.

Malaysia’s urban context also differs from that of land-scarce nations such as Singapore and Hong Kong. With relatively larger land reserves, the urgency for urban densification is less pronounced nationwide. Nonetheless, in highly urbanised regions like Kuala Lumpur and Penang—where land scarcity, rising density, and an ageing population converge—urban renewal has become critical. It serves as a key instrument for achieving sustainable urban growth, supporting the 13th Malaysia Plan’s objectives of creating resilient, inclusive, and liveable cities, and aligning with the nation’s broader Madani vision for balanced and people-centred development.

From Act to Action



The theme speaks of moving “from Act to Action.” How do you see existing policies, regulations, and Acts empowering surveyors to play a more active role in Malaysia’s urban renewal efforts?

Existing policies, regulations, and Acts already provide a solid foundation for surveyors to play a more active and strategic role in Malaysia’s Urban Renewal initiatives. For instance, the National Urbanisation Policy (NUP), Town and Country Planning Act 1976 (Act 172), and the upcoming Urban Renewal Act (URA) collectively recognize the importance of integrated planning, sustainable development, and stakeholder collaboration — all of which align closely with the professional competencies of surveyors.

The proposed Urban Renewal Act in particular is a significant step forward, as it institutionalizes urban regeneration as a structured and transparent process. Within this framework, surveyors — whether land, quantity, or building surveyors — can contribute meaningfully in several areas:

1. **Technical and Financial Feasibility** – Quantity Surveyors can provide cost modelling, feasibility analysis, and value management, ensuring that redevelopment projects are both viable and equitable.
2. **Land Readjustment and Boundary Clarity** – Land Surveyors play a crucial role in resolving land ownership, delineation, and amalgamation issues that are often the biggest hurdles in renewal projects.
3. **Building Condition and Asset Evaluation** – Building Surveyors contribute by assessing existing structures, identifying safety and compliance issues, and guiding decisions on whether to rehabilitate or rebuild.
4. **Governance and Transparency** – Surveyors’ adherence to professional codes of ethics helps promote accountability, transparency, and public confidence — all vital for URA success.

At the same time, policies such as the National Land Code, Strata Titles Act, and Valuers, Appraisers, Estate Agents and Property Managers Act also indirectly empower surveyors by providing legal recognition of their professional authority and technical input.

However, to truly optimize our role, there needs to be stronger integration of surveyors in policymaking and project implementation committees, clearer interdisciplinary collaboration frameworks, and more capacity-building programs aligned with urban renewal principles. In short, while the legislative framework is already conducive, the next step is to fully leverage it, ensuring surveyors are not only technical contributors but also policy influencers and strategic partners in shaping Malaysia’s urban renewal landscape.

Existing policies, regulations, and legislative frameworks already provide a strong foundation for surveyors to assume a more active and strategic role in Malaysia’s urban renewal initiatives. Key instruments such as the National Urbanisation Policy (NUP), the Town and Country Planning Act 1976 (Act 172), and the forthcoming Urban Renewal Act (URA) collectively emphasise the importance of integrated planning, sustainable development, and stakeholder collaboration. These principles align closely with the professional competencies of surveyors, whose expertise spans technical, financial, and governance dimensions of development.

The proposed Urban Renewal Act is particularly significant as it institutionalises urban regeneration as a structured, transparent, and accountable process. Within this framework, surveyors across the land, quantity, and building disciplines are well-positioned to contribute meaningfully to Malaysia’s transformation agenda. Quantity Surveyors, for instance, can play a vital role in cost modelling, feasibility analysis, and value management to ensure that redevelopment projects are financially viable, socially equitable, and aligned with sustainability goals. Land Surveyors contribute by addressing land ownership, delineation, and amalgamation issues, which often present the most complex challenges in renewal projects. Meanwhile, Building Surveyors are central in assessing the condition of existing structures, identifying safety and compliance concerns, and advising on whether rehabilitation or reconstruction represents the most appropriate course of action.

Equally important is the role of surveyors in governance and transparency. The profession’s adherence to strict ethical codes and professional standards fosters accountability and public trust, which are essential for the success of any urban renewal initiative. Complementary legislation such as the National Land Code, the Strata Titles Act, and the Valuers, Appraisers, Estate Agents and Property Managers Act further reinforces the recognition of surveyors’ technical authority and legal standing within Malaysia’s built environment ecosystem.

However, to fully optimise the potential of these frameworks, it is imperative to strengthen the institutional integration of surveyors in policymaking and project implementation committees. There should also be more defined mechanisms for interdisciplinary collaboration and the establishment of targeted capacity-building programmes grounded in urban renewal and sustainability principles.

In essence, while Malaysia's legislative and policy environment already provides a conducive platform, the next critical step is to fully leverage it. Surveyors must be empowered to move beyond their traditional technical roles to become strategic partners and policy influencers. By doing so, the profession can play a defining part in shaping Malaysia's urban renewal and sustainable development landscape, ensuring that our cities evolve in ways that are inclusive, resilient, and future-ready.

Role of Surveying Profession



What unique roles and responsibilities do you believe surveyors whether QS, LS, BS, or PS can contribute in navigating the complexities of urban renewal projects?

I see clearly that all of us has a very big role in this urban redevelopment as we are technically trained in the related fields.

Quantity Surveyors as the main cost advisor with regards to the cost of the redevelopment. They act as the financial conscience and strategic advisor in Malaysia's urban renewal process in ensuring that redevelopment is financially viable, socially fair, and sustainably delivered.

Building Surveyors even has more roles to play. They understand buildings better. They are the building condition auditor, they work out the feasibility of adaptation and reuse, they ensure regulatory compliance, they manage assets and help with the technical due diligence.

Land Surveyors play a crucial role in ensuring effective urban renewal and redevelopment by providing accurate spatial, legal, and technical data essential for informed decision-making, efficient land management, and sustainable planning.

As for Property Surveyors, they can assess the economic viability and financial feasibility, they help in determining the fair market value, they analyse optimal land use in accordance to local development plan and market demand and conduct market studies and investment appraisal.

These are just some scopes covered by the different surveyors. Going more in detail will give more depth and breadth of the contributions that are within us.

I see clearly that each of us within the surveying profession holds a significant and distinct role in Malaysia's urban redevelopment journey. As technically trained professionals, surveyors collectively form the backbone of informed, sustainable, and equitable urban renewal.

Quantity Surveyors, as the principal cost and procurement advisors, serve as the financial conscience and strategic partners in the redevelopment process. They ensure that every project is not only financially viable but also socially fair and sustainably delivered, the balancing economic outcomes with public value.

Building Surveyors have an equally vital role. With their deep understanding of the built environment, they act as building condition auditors and technical assessors. They evaluate the feasibility of adaptation and reuse, ensure regulatory compliance, manage building assets, and conduct due diligence to safeguard safety, functionality, and long-term performance.

Land Surveyors are fundamental to effective urban renewal through their provision of accurate spatial, legal, and technical data. Their expertise enables clear land delineation, ownership verification, and efficient land readjustment which all essential for sound decision-making, proper governance, and sustainable urban planning.

Meanwhile, Property Surveyors contribute by assessing economic viability and financial feasibility, determining fair market value, analysing optimal land use in line with local development plans, and conducting market and investment appraisals. Their insights guide development decisions that align with both community needs and market realities.

These are just some of the many scopes within our profession. A deeper exploration of each discipline reveals the depth and breadth of contributions that surveyors bring to Malaysia's urban renewal agenda. Together, we possess the multidisciplinary expertise necessary to shape a more liveable, sustainable, and future-ready urban landscape.

Challenges & Opportunities



Urban renewal often faces challenges such as land acquisition, heritage preservation, financing, and stakeholder engagement. From your perspective, what are the main hurdles, and how can surveyors help turn these into opportunities?

In the context of the Urban Renewal Act, one of the pressing challenges is to rebuild public trust through greater transparency and accountability. As a professional institution, RISM has been increasingly visible in various public consultations, including the ongoing discussions surrounding the URA. Our members have actively participated in dialogues with government agencies, policymakers, and industry stakeholders at multiple levels.

However, visibility alone is not sufficient, RISM must also be heard. To ensure our perspectives are meaningfully reflected in policy formulation and implementation, there is a strong need for dedicated, full-time representation within RISM of someone who not only understands the full breadth of the surveying profession but can also articulate the institution's collective stance with clarity, confidence, and consistency.

It is very important that innovation, digitalisation, and interdisciplinary collaboration are applied throughout the process of urban renewal as it will mark and strengthen the surveying profession's contribution.

Urban renewal, while essential to Malaysia's urban transformation, often encounters complex challenges such as land acquisition, heritage preservation, financing, and stakeholder engagement. Yet, these challenges also present opportunities for surveyors to demonstrate leadership, innovation, and technical excellence.

Land acquisition remains one of the most intricate issues due to ownership fragmentation, compensation disputes, and legal complexities. Land Surveyors are instrumental in this process — providing accurate cadastral mapping, clarifying boundaries, and facilitating fair land readjustment and amalgamation. Their technical precision and professionalism ensure transparency and public trust in redevelopment processes.

Heritage preservation presents another critical dimension. Striking a balance between redevelopment and cultural continuity is vital. Building Surveyors, with expertise in building pathology and adaptive reuse, can lead efforts to rehabilitate heritage structures while ensuring safety and compliance with modern standards. This approach preserves community identity and supports sustainability through conservation rather than demolition.

On the financial front, Quantity Surveyors act as the financial conscience of redevelopment. Through cost modelling, risk management, and value analysis, they ensure that projects are financially feasible, equitable, and deliver long-term value to both investors and communities.

Meanwhile, stakeholder engagement underpins the success of all urban renewal efforts. Surveyors, by virtue of their multidisciplinary training, are skilled in coordinating diverse interests — bridging gaps between policymakers, developers, and residents to achieve balanced and inclusive outcomes.

Ultimately, the obstacles facing urban renewal can be transformed into opportunities when guided by professional integrity and collaborative leadership. Surveyors, with their broad technical expertise and commitment to public interest, are uniquely positioned to shape urban renewal that is not only technically sound and economically viable, but also socially inclusive and culturally sustainable.

Future Direction & Advice



Looking ahead, what is your vision for RISM's role in steering Malaysia's surveying practice towards greater impact in urban renewal, and what advice would you give to young surveyors entering this evolving landscape?

The strength of RISM lies not only in its proud 65-year history but, more importantly, in its people, the experienced, the young, and those yet to join our ranks. If we can successfully blend wisdom with fresh perspectives, the surveying profession will continue to stand at the forefront of building a sustainable and inclusive Malaysia. Our true relevance does not rest on the past we preserve but on the future we aspire to define.

Given the diversity within RISM's four divisions, achieving consensus can, at times, be challenging. There have been moments when we have had to respectfully agree to disagree. This diversity, however, is also our greatest strength as it reflects the breadth and depth of the surveying profession. Should there ever be a full-time representative for RISM, that individual must embody the wisdom to balance differing viewpoints and the integrity to present a unified, well-reasoned position on behalf of the institution.

Looking ahead, I strongly encourage our younger members to step forward and assume leadership roles. The new generation brings a deep understanding of the rapidly evolving world in technological, social, and environmental dimensions. Their ideas, energy, and digital fluency are vital to ensuring the continued relevance and progress of our profession.

It is my hope that surveying will continue to inspire passion and purpose among future generations, not only as a respected profession but as a discipline that plays a pivotal role in shaping sustainable, equitable, and forward-looking urban environments for Malaysia. Together, through shared vision and collaboration, we can ensure that RISM remains a beacon of professional excellence and a catalyst for national development.



"As we celebrate more than six decades of RISM's legacy, I am reminded that our true strength lies not just in our history, but in our people – those who came before us, those leading today, and those who will define tomorrow. The surveying profession stands at the intersection of tradition and transformation. If we can unite wisdom with innovation, experience with curiosity, and purpose with passion, there is no limit to what we can achieve for Malaysia. Together, we will continue building the future with precision, purpose, and people."

Sr Wan Ainon Zuraiha, President RISM 2025/2026

TRANSFORMING URBAN FUTURES: *Harnessing Smart Surveying Technologies for Sustainable Growth in Malaysia*

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Abstract

Rapid urbanisation in Malaysia presents serious challenges to urban planning, infrastructure, and environmental sustainability. To effectively address these challenges, innovative solutions are required. Smart surveying technologies, including Geographic Information Systems (GIS), drones, and mobile detection applications, offer transformative potential for urban management. These technologies improve data accuracy, increase efficiency in urban planning, and foster stakeholder engagement. However, adoption faces barriers such as limited technical expertise, economic constraints, and privacy concerns. Malaysia can overcome these obstacles through capacity-building, supportive regulatory frameworks, innovative financing mechanisms like public-private partnerships and green bonds, and the integration of artificial intelligence (AI). Implementing these smart technologies within a holistic urban planning framework will help ensure sustainable growth, resilience, and equity in the Malaysian urban future (Sánchez-Corcuera, et al., 2019).

Introduction

Rapid urbanisation experienced in Malaysia in recent decades has exerted substantial pressures on urban infrastructure, resource management and environmental sustainability. Approximately 77% of the Malaysian population lives in urban areas, which should increase in the coming years when rural migration to urban areas continues accelerating in parallel with economic development (Statista, 2025). This demographic change requires innovative town planning approaches that can effectively meet the associated challenges, including, without limiting itself, the congestion of traffic, housing shortages and environmental degradation. Intelligent surveying technologies have become pivotal tools in this modern urban landscape, offering new data collection, analysis and visualisation methodologies to improve urban growth's sustainability considerably.

Intelligent survey technologies include various advanced tools and methodologies, including geographic information systems (GIS), drones, remote sensing and the Internet of Things (IoT). These technologies facilitate precise data collection on land use, topography, urban infrastructure and environmental resources, thus allowing urban planners and political decision-makers to make informed decisions. The relevance of these technologies in the context of the emerging urban environments of Malaysia cannot be overestimated, as they provide essential information on urban dynamics, allowing planners to solve existing problems while anticipating future challenges (Jacques, E., Neuenfeldt Júnior, A., De Paris, S., Francescatto, M., & Siluk, J., 2024).

Urban growth in Malaysia is often characterised by uncoordinated development, leading to ineffective land use and tense public services. The need for cohesive urban planning strategies has never been so urgent. In this context, intelligent surveying

technologies can play a transformative role by providing complete and real-time data that can guide sustainable decision-making processes. For example, thanks to integrating IoT sensors, town planners can monitor traffic models, waste management systems and real-time air quality, leading to faster and more efficient corrective actions. In addition, GIS technology allows a sophisticated spatial analysis, allowing planners to view urban growth models and identify areas needing intervention.

However, although the potential advantages of intelligent surveying technologies are essential, their implementation in Malaysia is not without challenges. Digital fracture remains a critical problem, as disparities in technology access can limit these innovations' efficiency. In addition, a lack of expertise in exploiting advanced appeal tools and interpreting complex data sets represents an obstacle to generalised adoption. In addition, the regulatory framework governing urban planning may not yet be equipped to incorporate the dynamism caused by technological progress, potentially hampering intelligent solutions' integration into established practices.

A multiple facets strategy is essential to exploit the full potential of intelligent survey technologies to improve sustainable urban growth in Malaysia. This strategy should include investments in capacity-building programs to enhance the skills of urban planners and stakeholders in the effective use of these technologies. In addition, the establishment of public-private partnerships can promote innovation and promote the sharing of resources and expertise. In addition, decision-makers must prioritise the development of adaptive regulatory frameworks that can adapt to the rapid landscape of intelligent technologies, ensuring that they can be integrated transparently into existing urban planning paradigms



Future of Urban Planning

While urbanisation pressures intensify in Malaysia, exploring and implementing intelligent statement technologies is imperative to facilitate sustainable urban development. Thanks to informed decision-making reinforced by real-time and data-based information, these technologies can help shape resilient urban environments capable of meeting the challenges of an increasingly urbanised population. The future of town planning in Malaysia depends on the strategic adoption and integration of these advanced technological solutions, paving the way for a sustainable and fair urban future. Urban growth in Malaysia has been marked by rapid acceleration in recent decades, promoted by economic, social and technological factors. From 2023, Malaysia is experiencing significant urbanisation, with more than 77% of its population residing in urban areas, which reflects a change from a predominantly rural demography to an increasingly urbanised society. The Kuala Lumpur metropolitan area is the primary focal point of this growth, emerging as a vibrant economic centre that attracts national and foreign investments. Although this urban expansion contributes to economic growth, it brings to light substantial challenges that require innovative urban planning and management solutions.

One of the surprising trends in the urbanisation of Malaysia is the demographic change characterised by the increase in migration from rural areas to urban ones. This demographic transition indicates the search for improved means of living and employment opportunities and is also emblematic of broader social changes. Young graduates, professionals and qualified workers are increasingly attracted to cities, thus creating a flourishing urban workforce. At the same time, this influx contributes to a greater demand for housing, public services and infrastructure, which imposes significant stress on existing urban frameworks.



The challenges associated with urban growth are multifaceted. One of the predominant problems is resource management, particularly concerning water, energy and waste. Fast urbanisation has led to unsustainable patterns, challenging the effectiveness of existing resources and exerting pressure on the environment. For example, urban areas are now responsible for approximately 70% of global energy consumption, a percentage that continues to increase in Malaysia. The urban environment often fights with the dichotomy of energy demand versus the need for sustainability, improving the imperative of intelligent solutions to address these concerns.

Infrastructure development also presents substantial challenges within the urbanised regions of Malaysia. The insufficient infrastructure, evidenced by congested transport networks, inadequate public transport systems and poorly maintained public services, has hindered the general quality of urban life. Urban infrastructure should not only address current problems but also must anticipate future growth. Urban expansion planning, while guaranteeing environmental sustainability, requires a delicate balance, highlighting the need for innovative planning strategies prioritising resilience and adaptability.

In addition, urban areas in Malaysia are susceptible to environmental risks, including floods, lands of land and the impacts of climate change, which further complicates the effective management of resources. Floods, in particular, have emerged as a significant concern, with systemic urban flooding events becoming increasingly frequent due to climatic variability and inappropriate drainage systems. These realities accentuate the need for proactive and future test strategies within urban planning frameworks.

In addition, socio-economic disparities have become more pronounced in urban premises, and marginalised communities often receive inappropriate attention in development plans. Problems such as inadequate housing, limited access to education and medical care, and social exclusion contribute to urban inequalities. Addressing these vulnerabilities requires an inclusive approach to urban planning that incorporates the population's diverse needs.

Emergence of Smart Surveying Technologies

Integrating intelligent topography technologies is a viable strategy to facilitate sustainable urban growth in light of these urbanisation trends, challenges, and demographic changes. Using data-based methodologies, urban planners can improve resource allocation, infrastructure efficiency, and the promotion of resilient urban environments. However, the successful implementation of such technologies depends on addressing existing socio-economic and infrastructural challenges, demanding a holistic approach to urban planning that guarantees equitable development and sustainability in the urban landscape of Malaysia. Intelligent detection technologies include tools and methodologies that exploit advanced data collection and analytical skills to support planning and urban development. In the context of sustainable urban growth in Malaysia, these technologies play a fundamental role in improving decision-making processes, optimising the allocation of resources, and facilitating the commitment of interested parties. Among the most remarkable intelligent detection technologies are geographical information systems (GIS), drone technology, and mobile detection applications, which contribute distinctly to data analysis and urban development strategies.

GIS: A Key Tool for Sustainable Planning

Geographic Information Systems (GIS) are critical to intelligent detection technology. GIS integrates space data with attribute information to analyse geographical models and relationships. In the context of urban planning, the GIS can be used to view soil use models, evaluate environmental impacts and model urban growth scenarios. With the advent of GIS open source platforms, Malaysian urbanists can access data sensitive to time, such as population density, transport networks and ecological resources, allowing informed decision-making processes. In addition, the ability to superimpose various levels of data will enable planners to identify the areas of the urban heat islands, the regions subject to floods and the biodiversity hotspots: essential elements to promote sustainable urban environments.



Drone Technology: Transforming Urban Data Collection

The advent of drone technology has further revolutionised the practices of urban detection and planning. The drones, equipped with high-resolution Lidar cameras and sensors, facilitate the rapid acquisition of data on large areas previously arranged over time that intend to work. This technology allows the collection of three-dimensional topographic maps, which can be crucial for planning infrastructure projects and evaluating the soil's suitability for various developments. In Malaysia, where urban expansion is often in conflict with environmental conservation, drones can provide multi-temporal data that inform interested parties of the changes in coverage and the use of soil. In addition, accurate -time aerial images can improve public participation, allowing communities to view the proposed developments and engage in significant dialogues on urban growth strategies.



Mobile Applications: Enhancing Real-Time Urban Management

Mobile detection applications represent another aspect of intelligent detection technologies that improve urban planning efforts. These applications allow city planners and workers on the field to collect and check space data on the move using smartphones and tablets equipped with GPS capabilities. By integrating mobile technology with cloud computing, planners can guarantee that the data are continuously updated and accessible in real-time, promoting collaboration between the various parties involved in urban development. In Malaysia, where the rapid rhythm of urbanisation has unique challenges, these mobile solutions can help monitor the conditions of infrastructure, the supply of public services and the implementation of sustainability initiatives, ultimately contributing to adaptive urban management practices.

Despite the numerous advantages these intelligent detection technologies offer, different challenges persist in their adoption and effectiveness. The availability and quality of the data remain relevant problems since incoherent set sets can lead to inhabitants and bad decisions being made. In addition, technological disparities between urban and rural areas can exacerbate inequalities in the planning process, limiting access to advanced tools and methodologies for specific populations. In addition, integrating these technologies in existing urban paintings often meets resistance from interested parties who may not be familiar with digital platforms or host concerns about data privacy.

Politicians should prioritise constructing technical skills between planning and interested parties through training and education initiatives to deal with these challenges and urban planning with future proof in Malaysia. In addition, promoting partnerships between government agencies, academic institutions, and private sector entities can facilitate data sharing and improve the statistical bases of GIS, drones, and mobile detection applications. Public investments in technological infrastructure are fundamental to guarantee equity in the accessibility of data and the distribution of resources, thus allowing complete and inclusive participation in sustainable urban growth strategies. Integrating intelligent topography technologies in urban development presents significant benefits that contribute to greater data precision, better efficiency in the planning processes and the strengthened participation of interested parties. These advantages are crucial to fostering sustainable urban growth in Malaysia, where the current urbanisation requires innovative solutions to meet the complexities of modern urban environments.



Benefits of Smart Surveying Technologies

One of the main benefits of intelligent topography technologies is improving data accuracy. Traditional topography methods often find limitations related to human error, obsolete data sets and inefficiencies in data collection processes. In contrast, advanced technologies such as Geographic Information Systems (GIS), Global Navigation Satellite Systems (GNSS) and Earth Laser Scan facilitate the collection of precise spatial data with higher resolution and reliability. For example, follow allows the integration of several data sources, which helps urban planners to analyse geographical limits, land use patterns and demographic distributions more exhaustively. The ability to capture real-time data is particularly valuable to address dynamic urban challenges, such as population growth and changing economic activities. The improved accuracy of the data reports better decision-making and encourages more effective resource allocation and management within urban environments.

In addition, innovative survey technologies significantly reinforce the efficiency of planning processes. These technologies speed up the workflows, automating the collection and analysis of data, thus reducing the time required for traditional survey methods. For example, drones with high-resolution cameras can quickly collect aerial data in extensive urban areas, minimising labour costs and accelerating project deadlines. As a result, urban planners can react more rapidly to the evolutionary urban panorama, adapting their strategies to address emerging problems such as infrastructure maintenance or environmental concerns. Improved efficiency in planning also allows iterative development processes where feedback can be incorporated more fluidly, which leads to more informed and receptive urban planning.



In addition, incorporating intelligent topography technologies improves the commitment of interested parties, which is vital to promoting collaborative urban development. Involving interested parties, including government agencies, community organisations and the private sector, requires accessible and understandable information about urban planning initiatives. Intelligent topography technologies provide the means to visualise complex data through interactive maps and 3D modelling, which helps non-specialists understand planning proposals and their possible impacts. This transparency promotes public trust and encourages active participation in decision-making processes. For example, participatory planning methods can be improved using intelligent topography applications that allow community members to contribute their ideas and preferences directly through mobile platforms. Therefore, the increase in the participation of those interested not only leads to more democratic urban planning practices but also cultivates a sense of property and responsibility among residents, which is critical to implementing sustainable urban policies.

The integration of intelligent topography technologies in urban development processes in Malaysia produces multifaceted benefits that contribute directly to sustainable urban growth. These technologies improve data accuracy, improve the efficiency of planning processes and encourage the solid participation of interested parties, all of which are essential to address the pressing challenges of rapid urbanisation. As Malaysia seeks proof of its future planning and urban development approaches, intelligent topography technologies will be crucial to achieving sustainable development goals. The continuous integration of intelligent topography technologies into urban development projects in Malaysia exemplifies its ability to promote sustainable growth in various urban environments. This section delineates specific case studies that underline the successful application of these technologies, elucidating their role in improving urban planning and promoting sustainability.

Case Studies in Malaysia

A remarkable instance is the development of the Iskandar Malaysia region, an emblematic economic zone in Johor that has effectively used a variety of intelligent topography technologies to inform urban planning and infrastructure development. A fundamental aspect of the Iskandar Malaysia approach has been deploying geographic information systems (GIS) and high-resolution satellite images. These tools have allowed planners to perform detailed land use analyses and monitor soil coverage changes. For example, GIS was used to optimise the placement of new transit centres and residential areas with existing infrastructure, which mitigated urban expansion and reduced dependence on private vehicles. This data-based strategic planning has improved accessibility and reduced carbon emissions, reinforcing the objectives of sustainable urbanisation (Sánchez-Corcuera, R., Nuñez-Marcos, A., Sesma-Solance, J., Bilbao-Jayo, A., Mulero, R., Zulaika, U., Azkune, Gorka, & Almeida, A., 2019).



Another convincing case is the Smart Selangor initiative, which integrates geographical and intelligent topography technologies to promote integral urban management. A remarkable project within this initiative is the Urban Selangor Observatory, where innovative topography technologies collect real-time data on environmental conditions, traffic patterns and public services through various aerial sensors and drones. This project has trained local authorities to make informed decisions about allocating urban resources and interventions, such as implementing green spaces and noise reduction strategies. By continuously monitoring urban conditions, Smart Selangor effectively addresses the challenges related to urbanisation, such as air pollution and air conditioning use, which contributes to creating a healthier urban atmosphere conducive to sustainable life.





In Kuala Lumpur, the City of Kuala Lumpur initiative, which implies using Lidar technology (light and rank detection), has significantly affected urban planning and resistance against climate change. Integrating the Lidar data allows for precise topographic mapping, allowing urban planners to more precisely identify areas prone to floods. This technology was fundamental in developing the Kuala Lumpur River project, which aims to revitalise the city's rivers while mitigating flooding risks. Using intelligent topography techniques, planners could integrate natural characteristics with urban spaces, improving aesthetic value and environmental quality.

In Penang, the innovative application of information modelling technologies (BIM) in urban projects has shown potential in promoting sustainable development practices. The George Town Heritage City project took advantage of BIM to

evaluate the environmental impact of construction activities and guarantee compliance with heritage conservation standards. This methodology allows the simulation of construction performance in terms of energy efficiency and sustainability, facilitating better decision-making during the design and planning phases. The positive results of such approaches exemplify the integration of intelligent topography technologies in preserving cultural heritage while urban sustainability progresses.

These case studies collectively highlight the transformative impact of intelligent topography technologies within the cities of Malaysia. They demonstrate that when effectively used, such technologies address immediate urban challenges and facilitate change towards long-term sustainable urban growth. Each project illustrates specific methodologies that can be scaled and adapted through various urban contexts in Malaysia to carry out urban planning and development to the proof of the future. Adopting intelligent detection technologies in Malaysia has significant opportunities to promote sustainable urban growth; However, it is not without challenges. These challenges include different barriers, including a lack of technical skills, high implementation costs and growing concerns relating to data privacy.



Challenges in Adopting Smart Surveying Technologies

One of the main challenges in integrating intelligent detection technologies is the lack of technical skills among urban planning and detection professionals (Syed, A. S., Sierra-Sosa, D., Kumar, A., & Elmaghraby, A., 2021). The Malaysian labour market must face a gap in critical skills, particularly in specialised sectors such as geographical information systems (GIS), remoteness and data analysis. The graduates of relevant disciplines often lack adequate exposure to cutting-edge tools and methodologies during their education, thus inhibiting the ability to effectively implement intelligent technologies in the scenarios of the real world. In addition, existing professionals can request a vast redevelopment to adapt to rapidly evolving detection technologies. This lack of qualified professionals hinders proactive adoption and innovative application, ultimately hindering efforts to improve sustainable urban growth through effective planning and management.

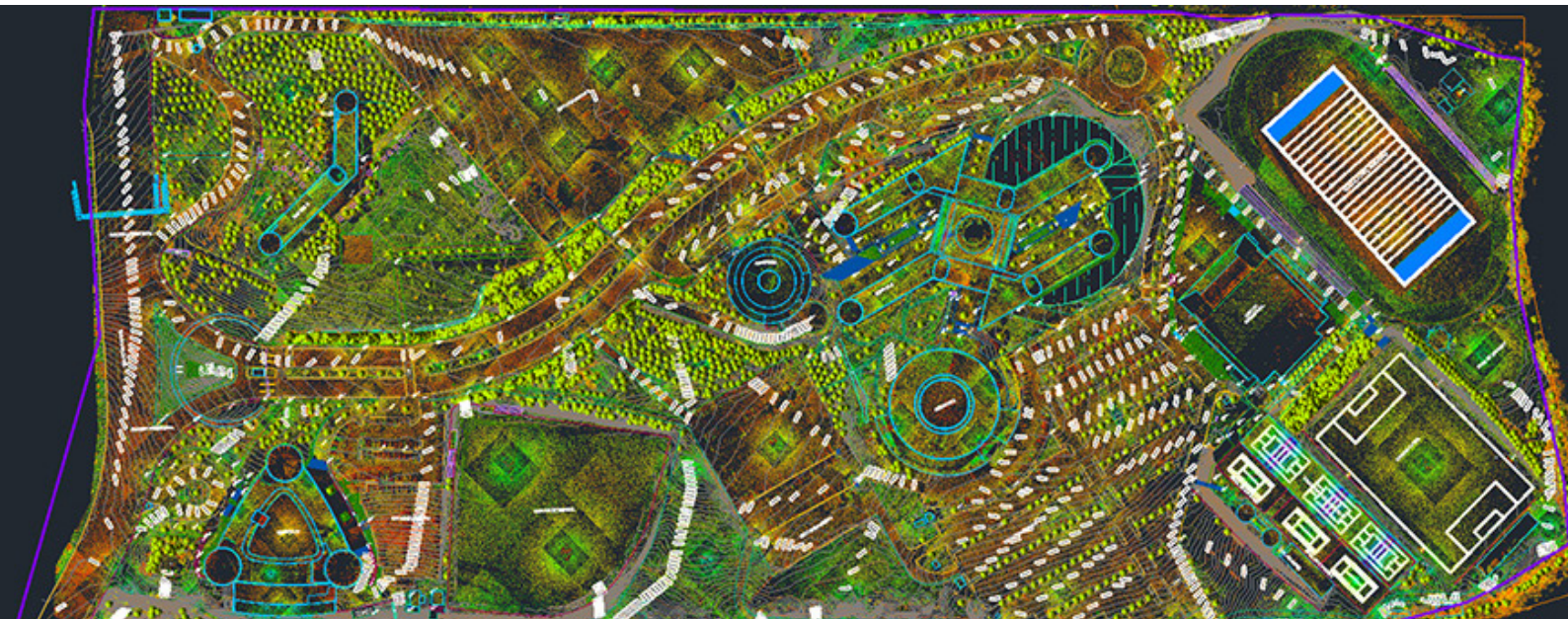


In addition to the workforce's skills, the economic considerations of adopting intelligent detection technologies present another remarkable barrier. The costs associated with the supply and maintenance of advanced technologies can be prohibitive for local governments and urban planners operating within limited budgets. The initial investments for sophisticated equipment and software can be substantial, with high-performance drones, advanced software subscriptions and training programs contributing to a high financial burden. In addition, the potential for operating costs in progress and the need for regular updates create further challenges for municipalities striving to achieve long-term sustainability objectives. These financial obstacles can dissuade the parties affected by adopting intelligent detection solutions, perpetuating dependence on traditional detection methods that may not adequately support the complexities of modern urban environments.



Finally, the concerns relating to privacy and security permeate the speech surrounding intelligent survey technologies. The dependence on large data sets, which often contain sensitive information on public and private properties, raises important ethical issues relating to consent, ownership of data and potential improper use. Since urban planners depend increasingly on collecting data that acquire detailed spatial and demographic information, apprehension regarding how this information is managed and protected becomes fundamental. The lack of precise regulatory paintings on data governance generates ambiguity and scepticism within the public sphere. Ultimately, it can hinder the widespread acceptance of intelligent detection applications. This reluctance to embrace emerging technologies in urban planning can suffocate progress, as it limits the collection of essential data necessary for the informed decision-making processes and the identification of sustainable development models.

Overall, these obstacles to adopting intelligent detection technologies are significant challenges to sustainable urban growth in Malaysia. Tackling these challenges requires a global approach that emphasises the development of skills and economic feasibility and prioritises the establishment of solid data governance protocols. Without concerted efforts to overcome these obstacles, the full potential of intelligent detection technologies in promoting resilient and sustainable urban environments can remain unrealised. The successful implementation of intelligent topography technologies in urban planning requires a robust government framework that encourages the adoption of these advanced tools and integrates them into regulatory and planning processes. Several existing policies and regulations in Malaysia reflect an increasing recognition of the imperative for sustainable urban growth. However, substantial gaps hinder the generalised integration of intelligent topography technologies.



Policy and Regulatory Framework

One of the main relevant government initiatives for this discourse is the National Urbanization Policy (NUP), whose objective is to facilitate organised urban growth and mitigate the challenges of rapid urbanisation. Although the NUP underlines the importance of sustainable development, it lacks specific measures requiring intelligent topography technologies in urban planning practices. This omission presents an opportunity for legislative modification, by which the NUP could be updated to explicitly define the role of intelligent technologies to improve data accuracy, the capacity for response and inclusion in urban planning processes.



In addition, the 1976 city planning law serves as a fundamental framework for urban development in Malaysia. The act predominantly emphasises physical planning but does not adequately address technological innovations such as geographical information systems (GIS) and remote sensing in planning practices. Modifying this legislative framework to include guidelines to integrate intelligent topography technologies can allow urban planners to produce more precise plans and evidence based on sustainable urban ecosystems.

In addition, government emphasis within the framework of the smart city reflects recognition of the potential of technology to transform urban premises into more sustainable environments. However, there is still a disconnection between the objectives of the frame and the actual deployment of innovative survey solutions at the municipal level. Policy formulators must establish lighter routes for local governments to adopt these technologies, encouraging their use through subsidies and capacity construction programs. This action would facilitate knowledge acquisition and ensure that the municipalities are equipped with technology and have the skills to use it effectively.

The challenges in adopting intelligent topography technologies are multifaceted, covering problems related to financing, technical experience and collaboration between agencies. Government policies must comprehensively address these challenges. For example, establishing a federal initiative assigning funds for developing and training personnel in intelligent topography techniques can relieve financial barriers for local governments. In addition, promoting associations between public institutions, academia and private sector players can catalyse innovation and improve the general effectiveness of intelligent technologies in urban contexts.



In addition to these recommendations, the government must consider the legal implications of data privacy and security associated with deploying intelligent technologies. You may have to review the 2010 Personal Data Protection Law to ensure that you maintain the rhythm of advances in topography technologies. Legislators must formulate policies that protect citizens' data while ensuring that urban planners can access the necessary information to make informed decisions about land use and infrastructure development.

Integrating intelligent topography technologies within the urban planning framework of Malaysia demands an adaptive legislative approach. When reviewing existing policies and investing in technological infrastructure and human capital, the government can pave the way for a more sustainable urban future. The legislative adaptation and alignment of several policy instruments with technological advances are crucial to addressing existing gaps and ensuring that urban development is intelligent and sustainable. Adopting intelligent topography technologies in urban planning and development requires a comprehensive approach to overcome existing technological barriers and improve skills development among urban planners and topographers in Malaysia. Identifying and addressing these barriers is essential to ensure that integrating advanced topography techniques contributes effectively to sustainable urban growth.

Overcoming Technological Barriers

One of the most critical barriers is a skills gap between current professionals in urban planning and surveys. As technologies such as Geographic Information Systems (GIS), Drones and 3D modelling become increasingly comprehensive in modern topography practices, training programs must be established to improve the competencies of urban planners and topography. Institutions can play a fundamental role in developing the curriculum that integrates these technologies into their training. For example, universities and vocational training centres could implement specialised courses focusing on practical applications of innovative topography tools and theoretical frameworks in urban planning and sustainability. These courses should cover the technical skills necessary to operate intelligent topography equipment and the required interpretive skills to make decisions based on data aligned with sustainable urban development objectives.

The collaboration between educational institutions and interested parties in the industry is vital to guarantee the relevance and adaptation of training programs. Academic institutions must actively commit to government agencies, urban development authorities and private sector companies to close the feedback cycle on training needs. Associations can be established to facilitate internships, cooperative programs and joint research initiatives. These collaborations provide students with practical experience and ensure that urban planners and topographers remain aware of the latest advances and technological methodologies implemented in the field. These associations can also lead to co-creating personalised training modules that address specific challenges facing Malaysia's urban context, such as rapid urbanisation, environmental sustainability and infrastructure maintenance.

Public-private associations (PPP) emerge as another strategic route to close the technological division and improve professional development. By taking advantage of private sector entities' resources and technological abilities, government institutions can promote initiatives to improve skills among urban professionals. For example, technology

companies specialising in topography technologies can provide workshops, seminars and tutoring programs that equip urban planners and topographers with practical skills. In addition, the app can help acquire advanced topography technologies, ensuring that urban authorities have access to the latest tools necessary for effective and sustainable urban management.

In addition, it is crucial to establish continuous professional development frameworks (CPD) that encourage urban planners and topographers to follow permanent learning. These CPD programs can include online courses, certification programs, and industry conferences that focus on the latest advances in intelligent topography technologies. In particular, such initiatives should prioritise accessibility to facilitate the participation of a wide range of urban professionals, including those in remote areas where technological knowledge can be scarce.

When addressing the challenges of integrating intelligent topography technologies into urban planning in Malaysia, the strategies mentioned earlier improve skills development and preparation among urban planners and topographers. By promoting anchored training programs in collaboration with educational institutions and through public-private associations, Malaysia can build a competent workforce equipped to address the complexities of sustainable urban growth. Integrating intelligent detection technologies in urban planning paintings can significantly improve sustainable urban development in Malaysia. However, the successful implementation of these technologies depends on solid public awareness and the active involvement of the interested parties. This exercise requires understanding the role that the participation of the community and transparency play in urban planning processes, particularly in the context of the various socio-cultural panoramas of Malaysia.

Enhancing Stakeholder Participation and Public Awareness

The public's awareness can be a critical facilitator for implementing intelligent detection technologies. Local populations must include not only the benefits but also the operational mechanisms of these technologies. For example, familiarity with geographical information systems (GIS) and remote control can allow communities to appreciate how data collection can inform urban decision-making processes. In Malaysia, where rapid urbanisation is prevalent, promoting informed citizenship can mitigate the resistance to adopting advanced technologies, thus improving their effectiveness in promoting sustainable development objectives. Educational initiatives and awareness programs targeted at various population segments are essential to fill the gaps in knowledge and promote an ethos of collaboration between the public and urban planners (Jacques, E., Neuenfeldt Júnior, A., De Paris, S., Francescatto, M., & Siluk, J. (2024).

The involvement of the interested parties further emphasises the multifaceted nature of urban planning in Malaysia. Urban environments are modelled by myriad interests, including those of government entities, private developers, environmental groups, and the general population. Each group of stakeholders contributes unique perspectives and skills that enrich the planning process and promote innovations in intelligent detection practices. The involvement of the parties concerned through participatory paintings allows decision-makers to incorporate different points of view, leading to more inclusive urban policies that align with everyday needs and aspirations. This approach improves the relevance of urban plans. It increases their legitimacy and support among the various actors involved in the urban ecosystem (Jacques, E. d. A., Júnior, A. N., de Paris, S., Francescatto, M. B., & Nunes, R. F. B., 2024).

Transparency in urban planning is essential to generate trust and responsibility between the interested parties. When the methodologies and objectives associated with intelligent detection technologies are communicated, it mitigates suspicion and promotes a cooperative atmosphere. For example, making data from intelligent detection initiatives accessible to the public encourages informed speech and guarantees that the community's concerns are adequately addressed. Transparency can be operational through public forums and digital platforms, showing survey data's implications for urban planning. As Malaysian cities evolve, establishing dedicated channels for feedback can ensure that the community's insights are prioritised in the planning and implementation phases, thus improving the overall quality of urban governance.

The challenges related to integrating intelligent detection technologies in Malaysia must be recognised. Predominant issues such as digital division, various levels of technological competence and cultural barriers can prevent the participation

of the interested parties and the public commitment. The strategies to combat these challenges include promoting digital literacy campaigns aimed at disadvantaged groups and promoting partnerships with local organisations that have established trust within the communities. In addition, exploiting existing networks, including local governance structures and community-based organisations, can facilitate awareness-raising efforts and guarantee a broader representation of the items in the discussions on urban planning.

The future-proof urban planning in Malaysia requires not only the adoption of innovative technologies but also the cultivation of a participatory culture that enhances the transparency and commitment of the interested parties. By underlining the public's awareness and involving a wide range of stakeholders, urban planners can navigate the complexity of contemporary urban growth while ensuring that sustainability principles remain at the forefront of urban development strategies. Integrating intelligent survey technologies into town planning requires innovative financing mechanisms that can support substantial capital investments necessary for their implementation. Traditional funding sources often do not respond to emerging requests for sustainable urban infrastructure in Malaysia. Consequently, exploring alternative financing flows, such as public-private partnerships (PPP) and green obligations, presents a viable strategy for urban development to test the future in the context of rapid urbanisation and environmental degradation.



Public-private partnerships are particularly effective in taking advantage of the forces of the two sectors. By initiating private entities, municipalities can operate not only additional funding but also expertise and operational efficiency inherent in the private sector. For example, collaboration could facilitate the integration of intelligent technologies - such as geographic information systems (GIS) and the Internet of Things (IoT) into urban infrastructure projects,

allowing an improved collection and analysis of data for town planning. These conditions promote innovation as private partners are encouraged to contribute creative solutions that align with public policy objectives. In Malaysia, successful PPP executives have been observed in sectors such as transport and housing, suggesting potential replicability in the initiatives of intelligent surveys targeting sustainable urban growth.

On the other hand, green obligations represent a booming financial instrument explicitly dedicated to financing projects with positive environmental impacts. The issue of these obligations can provide municipalities with the capital necessary to invest in intelligent survey technologies that align with sustainability objectives. For example, green obligations could finance deploying advanced surveillance systems for urban ecosystems, ensuring that urban growth is aligned with environmental transport capacities. In addition, as the global green bond market develops, Malaysia's commitment to this financing mechanism could position the country as a leader in sustainable finance in the ASEAN region, attracting international investors seeking to support ecological sustainability in urban projects.

However, the realisation of these financing options is not without challenges. Legislative obstacles, credit rating limitations and perceived risks associated with investment in innovative urban technologies can dissuade potential investors. To effectively mobilise resources, it is crucial to establish a regulatory framework that promotes transparency, reduces the risks of investment, and articulates a precise performance of investments for public and private stakeholders. In addition, capacity building within local governments to understand and navigate these complex financing structures is essential. Training programs and workshops adapted to urban planners and regional managers can improve the ability of these entities to engage in PPPs and successfully manage green bond offers.

In addition, creating an ecosystem of dialogue between government agencies, private sector players and financial institutions will cultivate confidence and facilitate knowledge sharing, ultimately leading to refined funding strategies. Establishing collaboration platforms, such as urban growth forums or technological exhibitions, can stimulate interest and allow stakeholders to present innovative financing models that reflect current trends in intelligent technology.

Adopting alternative financing mechanisms, such as public-private partnerships and green obligations, can considerably support integrating intelligent appeal technologies in the context of town planning in Malaysia. By approaching potential obstacles and promoting collaborative ecosystems, these innovative financing strategies promote sustainability and guarantee that urban development lies in future challenges, thus laying the basics of a more sustainable urban landscape in Malaysia. Integrating data analysis and artificial intelligence (AI) in intelligent surveys is decisive in improving sustainable urban growth in Malaysia. Using advanced data processing techniques, urban planners and decision-makers can derive usable information that considerably influences urban management and sustainable decision-making processes. This progression is particularly relevant in an urban context like Malaysia, where the effective use of resources and environmental considerations are becoming increasingly essential.

Intelligent survey technologies such as geographic information systems (GIS), drones and laser scanning generate large amounts of data concerning land use, topography and infrastructure. The subsequent application of data analysis allows the synthesis and interpretation of these complex data sets to reveal trends and models (Son, T. H., Weedon, Z., Yigitcanlar, T., Sanchez, T., Corchado, J. M., & Mehmood, R., 2023). For example, thanks to spatial analysis, town planners can view land use models, demographic distributions and environmental conditions, leading to more informed decisions concerning zoning regulations and the allocation of resources. This holistic perspective contributes directly to sustainable urban growth by making it possible to identify optimal locations for new developments and the preservation of vital green spaces.



AI also improves data analysis capacities during the intelligent survey by facilitating predictive modelling and simulation. Automatic learning algorithms can process historical data to predict future urban growth models, service demand, and potential environmental impacts. These predictive capacities are crucial in Malaysia, where urban sprawl can lead to significant social and ecological challenges. For example, AI-centred models can predict traffic congestion, allowing planners to proactively design alternative transport routes and infrastructure improvements, thus reducing carbon footprints and improving accessibility.

In addition, AI can help monitor urban environments, using real-time data to generate information that supports immediate management responses. Using IoT devices, cities can collect information on air quality, energy consumption and waste management. The analysis of these data not only allows reactive urban management but promotes responsibility and transparency in governance because citizens can access information and participate in decision-making processes. This data focused on data promotes a collaborative approach to urban development, ensuring that various community needs are processed, thus improving social sustainability.

However, implementing data analysis and AI in intelligent arpentis is challenging. Data confidentiality and security problems arise when massive data sets are collected and analysed, requiring strict measures to protect citizens. In addition, the digital fracture poses a significant barrier, especially in disadvantaged areas without necessary technological infrastructure. Ensuring equitable access to

these technologies will be essential to obtaining complete urban management solutions that benefit all population segments, including the disabled (Makkonen, T., & Inkinen, T., 2024).

Therefore, future urban planning strategies in Malaysia must promote an inclusive digital ecosystem. This exercise includes investing in technological infrastructure, improving digital literacy among local communities, and establishing governance frameworks for robust data that prioritise citizens' confidentiality and ethical data use. In addition, interdisciplinary collaborations between government agencies, universities and technology developers can facilitate knowledge exchange and innovation in innovative recourse practices.

Essentially, the role of data analysis and artificial intelligence in the practices of intelligent surveys embodies the potential to improve sustainable urban growth in Malaysia. Thanks to strategic implementation, these technologies can provide essential information for solid urban decision-making, leading to a resilient and sustainable urban future. A holistic approach to urban planning is necessary to successfully integrate intelligent topography technologies into sustainable urban growth in Malaysia. This framework should consider environmental integrity, social equity and economic viability, aligning with the principles of sustainable development. The following recommendations delineate key strategic dimensions to integrate intelligent topography technologies into urban planning processes.



Key Strategic Dimensions

First, the framework must prioritise the implementation of Geographic Information Systems (GIS) and remote detection technologies. These tools can facilitate comprehensive data collection on land use, environmental conditions and demographic distributions. Establishing a centralised data repository will allow real-time updates and analysis, improving decision-making for urban planners. Urban planners in Malaysia must adopt a participatory approach, recruiting the community's interested parties to collect and interpret data. This inclusion encourages transparency and social equity, ensuring various community voices report development plans.

Second, urban planners must integrate intelligent topography technologies in the context of the local environment. Characterised by its unique ecological diversity, Malaysia requires urban growth strategies to incorporate environmental evaluations that use these technologies. Incorporating environmental impact evaluations (EIA), which are increased by smart surveys, can allow planners to predict and mitigate possible ecological interruptions related to urban expansion. A conscious framework of the environment would also promote the use of green infrastructure, encouraging the integration of parks, green corridors and sustainable drainage systems in urban designs, thus improving biodiversity and human well-being.

Third, economic viability must be aligned with social and environmental considerations to maintain urban growth. Intelligent topography technologies can generate cost savings by better managing simplified resources and operations. For example, integrating building information modelling (BIM) can optimise construction processes, reducing operational waste and inefficiencies. Urban planners in Malaysia should advocate for public-private associations that take advantage of these technologies to allow investment in sustainable infrastructure. By promoting innovation through collaborative relationships, cities can improve their economic resilience while ensuring equitable growth based on the community's needs.

In addition, the frame must integrate an approach to innovative mobility solutions. Intelligent topography technologies can improve urban transport planning and identify optimal routes, sustainability thresholds, and congestion points. In concert with GIS data, establishing intelligent transport systems (STIs) can facilitate the design of efficient mass transport systems that reduce dependence on private vehicles, thus reducing carbon emissions and promoting accessible and equitable urban mobility.

Finally, continuous monitoring and evaluation mechanisms must be established as part of this holistic framework. Using innovative topography technologies allows the collection of longitudinal data to evaluate the impact of urban planning initiatives over time. Implementing a feedback cycle will assist planners in adapting strategies to changing demographic trends, technological advances and environmental challenges. This adaptability is critical for future urban development against socio-economic uncertainties and environmental fluctuations.



Conclusion

An integral framework to integrate intelligent topography technologies into urban planning in Malaysia must comprehensively cover environmental administration, social equity and economic sustainability. By taking advantage of these technologies within a collaborative framework, urban planners have the potential to navigate the complexities of urban growth, ensuring that the cities of Malaysia arise as sustainable and resistant environments for future generations. Addressing these multifaceted dimensions will be fundamental to facilitating sustainable urban development that meets a diverse population's aspirations while preserving Malaysia's rich ecological heritage. The analysis outlined in this document accentuates the imperative role of intelligent detection technologies in promoting sustainable urban growth within Malaysia. As urbanisation accelerates throughout the nation, characterised by a growing population and transient lifestyles, traditional planning and detection methods are becoming increasingly inadequate. This shift of the paradigm requires the integration of innovative detection technologies, such as geographical information systems (GIS), drones and the construction of information models (BIM), which have shown the potential to improve spatial analysis, the commitment of the interested parties and the decision-based data based on data. One of the fundamental results of this research is that the implementation of intelligent detection technologies allows the collection and analysis of complete data sets that facilitate informed urban planning. This ability helps identify development hotspots and manage soil resources more effectively and increases the overall resilience of urban infrastructures against environmental challenges, such as floods and other climate anomalies. In Malaysia, where natural catastrophes represent significant risks for urban environments, these technologies can substantially improve the preparation and response to catastrophes, ultimately contributing to the sustainability of metropolitan areas.

In addition, the results reveal that embracing intelligent detection technologies can promote community involvement and participatory planning processes. Local communities can better express their concerns and preferences regarding urban development projects by allowing citizens to access data in real-time and interactive platforms. This inclusion promotes a sense of ownership and responsibility between residents, thus aligning urban growth with the social and environmental needs of the community. Consequently, harmonious urban development emerges, reflecting the values and aspirations of different parties involved in urbanisation.





However, successfully integrating these technologies into urban planning practices is challenging. The identified key barriers include the need for substantial financial investments, a lack of qualified personnel and a potential resistance to change within consolidated urban planning paintings. These challenges underline the need for targeted policies to develop the infrastructure, training and knowledge necessary to advance intelligent detection applications. Tackling these obstacles will require a concerted effort by the government, private sectors, and academic institutions to strengthen technical skills and promote innovative solutions.

For future-proof urban planning in Malaysia, a strategic framework must promote collaboration between urban planners, technology, politicians and community developers. Creating partnerships can facilitate the sharing of knowledge, crowd solutions to urban challenges and mobilise resources for technological adoption. In addition, promoting a culture of innovation and continuous adaptation will be crucial to keep up with the emerging challenges posed by urbanisation and climate change.

This research confirms that intelligent detection technologies are indispensable in modelling the urban landscape of Malaysia towards sustainability. Their ability to improve the data-based decision-making process, promote the community's commitment and improve the infrastructure's resilience indicates their transformative potential in urban planning practices. Therefore, a forward-looking approach that emphasises innovation and collaboration will not only face existing challenges but will also establish a solid base for sustainable urban growth in Malaysia, ensuring that cities evolve responsibly and responsibly in the following decades.

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The Surveyor's Role in Urban Regeneration:

Bridging Policy, Property, and Practice

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Abstract:

Urban regeneration has emerged as a crucial agenda in achieving sustainable, resilient, and inclusive cities. In Malaysia, various legislative frameworks and national policies have been introduced to facilitate the transformation of declining urban areas. However, the persistent challenge lies in translating these Acts and policy frameworks into effective action on the ground. This paper argues that property surveyors and quantity surveyors hold pivotal roles in bridging the policy–practice gap. Property surveyors contribute to feasibility studies, valuation, land assembly, and the financial appraisal of regeneration schemes, while quantity surveyors ensure cost efficiency, lifecycle analysis, and financial sustainability of projects. By examining the Malaysian context alongside global perspectives, this paper highlights how surveyors support urban regeneration processes by aligning regulatory frameworks with market realities and project delivery. It also proposes a conceptual framework—‘From Act to Action’—that positions surveyors as catalysts in driving effective regeneration outcomes. This framework underlines the integration of policy, property, and practice as essential dimensions in shaping livable, economically viable, and socially inclusive urban spaces.

Key words: Urban regeneration, property surveying, quantity surveying, Malaysia, policy, Act to Action

1. Introduction

Urban regeneration is increasingly recognised as a critical strategy to revitalise declining urban areas, improve quality of life, and stimulate economic growth. Across the globe, governments are grappling with challenges of ageing infrastructure, deteriorating housing stock, socio-economic inequalities, and environmental degradation within city cores. In Malaysia, rapid urbanisation has intensified pressures on urban centres, with older neighbourhoods facing abandonment, underutilisation, and loss of cultural identity (Economic Planning Unit, 2021).

In response, the Malaysian government has enacted a series of legislative frameworks and policies—such as the Town and Country Planning Act 1976 (Act 172), the National Urbanisation Policy (2006–2020), and more recently, urban renewal initiatives under the Twelfth Malaysia Plan (12MP). Despite these efforts, a persistent gap remains between policy aspirations (Acts) and implementation (Action). Urban regeneration projects often stall due to fragmented governance, lack of financing, and limited integration between regulatory structures and market mechanisms

(Yap, 2019).

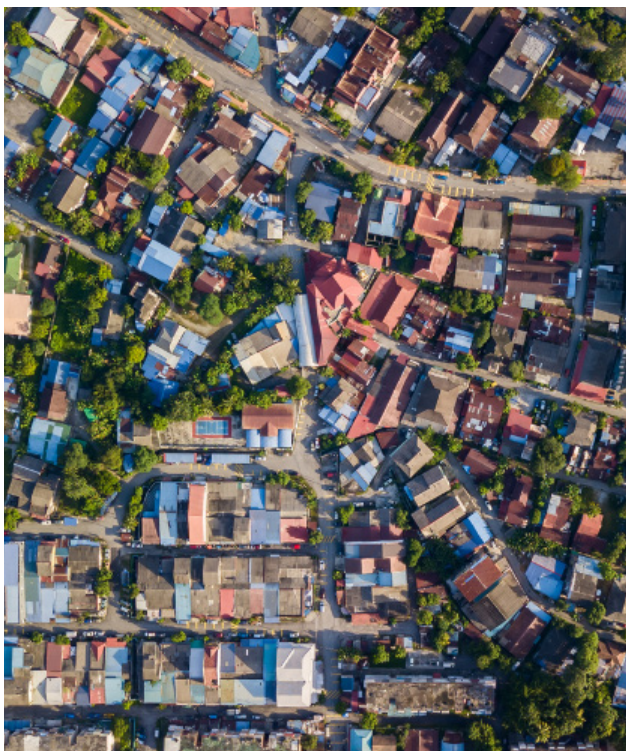
This manuscript positions surveyors—particularly property surveyors and quantity surveyors—as vital actors in bridging this policy–practice divide. Property surveyors play a key role in determining land and property values, conducting feasibility studies, and structuring investment models for regeneration. Quantity surveyors, meanwhile, ensure cost certainty, manage lifecycle expenditures, and support sustainable project delivery. Together, they bring financial, technical, and managerial expertise that translates legislative intent into implementable action. The paper proceeds by reviewing the concept of urban regeneration and its policy underpinnings, examining the contributions of property and quantity surveyors, and discussing case insights. It concludes with the development of a conceptual ‘From Act to Action’ framework, proposing how surveyors can catalyse effective regeneration outcomes in Malaysia.

2. Urban Regeneration in the Malaysian Context versus Policy–Practice Gap: From Act to Action

Urban regeneration refers to the comprehensive process of revitalising declining urban areas to improve their economic, social, and environmental conditions (Roberts, Sykes, & Granger, 2017). It is more than physical redevelopment; it involves holistic interventions addressing housing, infrastructure, employment, and community well-being (Turok, 2019). Globally, urban regeneration has evolved from state-led redevelopment programmes in the 1960s towards integrated approaches emphasising sustainability, inclusivity, and heritage conservation (Couch, Sykes, & Börstinghaus, 2011).

Malaysia's urbanisation rate increased from 34% in 1980 to over 77% in 2020 (Department of Statistics Malaysia, 2021). This rapid growth has led to deteriorating urban neighbourhoods, abandoned housing projects, and socio-spatial inequalities. In response, the government has enacted several policies and legislative frameworks:

- Town and Country Planning Act 1976 (Act 172): Provides statutory basis for urban planning and renewal.
- National Urbanisation Policy (2006–2020): Emphasises balanced urban growth, sustainable land use, and regeneration of urban cores.
- Twelfth Malaysia Plan (12MP), 2021–2025: Prioritises urban renewal programmes, affordable housing, and smart city initiatives (Economic Planning Unit, 2021).



Despite these efforts, urban regeneration remains underdeveloped compared to developed nations. Challenges include fragmented implementation across agencies, inadequate financing models, and limited private sector involvement (Yap, 2019). Furthermore, regeneration initiatives often neglect socio-cultural dimensions, such as community engagement and heritage preservation (Mohd et al., 2020).

While Acts and policies provide frameworks for urban regeneration, their translation into practice is inconsistent. Globally, scholars note a recurring “policy–practice gap” where legislation sets ambitious objectives but fails in execution due to governance complexity, financial constraints, and weak inter-professional collaboration (Healey, 2010). In Malaysia, regeneration projects are frequently delayed by ownership disputes, financing barriers, and limited coordination between local authorities and private developers (Shuid, 2016). Bridging this gap requires professionals who can interpret policy into actionable, financially viable, and socially acceptable projects.

1. The Surveyor's Role in Urban Regeneration: Bridging Policy, Property and Practice



Policy Frameworks Supporting Urban Regeneration

- **Town and Country Planning Act 1976 (Act 172)**
Statutory foundation for urban planning and renewal.
- **National Urbanisation Policy (2006–2020)**
Focuses on balanced growth, sustainable land use, and revitalizing urban cores.
- **Twelfth Malaysia Plan (12MP), 2021–2025**
Emphasises urban renewal, affordable housing, and smart city initiatives. (Source: Economic Planning Unit)

POLICY → PROPERTY



Surveyors' Key Contributions

Addressing Challenges

- Feasibility studies & cost benefit analyses
- Property & land valuation for fair compensation
- Budgeting & lifecycle cost management



Mitigating Risks

- Transparent procurement systems
- Stakeholder negotiation (land & property rights)
- Financial & contractual risk assessments



Reflections & Future Directions

1. **Institutional Recognition** Elevate surveyors' roles policymaking.
2. **Interdisciplinary Collaboration.** Foster teamwork with planners, architects, and policymakers.
3. **Digital Integration** Use tools like BIM, GIS, and ESG cost modelling for better decisions.
4. **Community Engagement** Empower surveyors as mediators between developers and communities.
5. **Sustainability In Valuation** Integrate resilience indicators into

2. The Role of Surveyors in Urban Regeneration

Surveyors, encompassing both property and quantity surveyors, serve as pivotal actors in the urban regeneration process. Their professional expertise lies in the intersection of policy interpretation, economic evaluation, and project delivery, making them indispensable in bridging the gap between legislation ("Acts") and practical implementation ("Action"). The following dimensions highlight their collective role:

Surveyors play a key role in translating policy and legislative frameworks into implementable strategies. They ensure that statutory requirements—such as those stipulated in the Town and Country Planning Act 1976 (Act 172), the Strata Titles Act 1985, and urban renewal directives under the Twelfth Malaysia Plan (12MP)—are understood in financial, technical, and operational terms. By doing so, they act as advisors to government, developers, and communities, helping align policy objectives with feasible project outcomes.

Urban regeneration projects often struggle due to financial uncertainty and fragmented land ownership. Surveyors address these challenges by:

- Conducting feasibility studies and cost-benefit analyses.
- Valuing properties and land to ensure fair compensation and viable investment returns.
- Managing budgets and lifecycle costs to guarantee financial sustainability.

Through these tasks, surveyors safeguard both public and private sector interests, ensuring regeneration initiatives are economically sound.

Surveyors increasingly contribute to sustainability and resilience goals in urban regeneration. They incorporate environmental, social, and governance (ESG) principles into valuation, cost planning, and procurement processes. For example, surveyors apply lifecycle costing to evaluate long-term environmental and social impacts, ensuring regeneration projects deliver value beyond short-term profits. In doing so, they align Malaysia's urban regeneration agenda with the Sustainable Development Goals (SDGs) and smart city initiatives.

Urban regeneration often involves complex risks, such as ownership disputes, market volatility, and stakeholder conflicts. Surveyors mitigate these risks by:

- Structuring fair and transparent procurement systems.
- Negotiating with stakeholders on land assembly and property rights.
- Providing expert assessments on financial and contractual risks.

By reducing uncertainty, surveyors create confidence for investors, developers, and local authorities to proceed with regeneration projects.

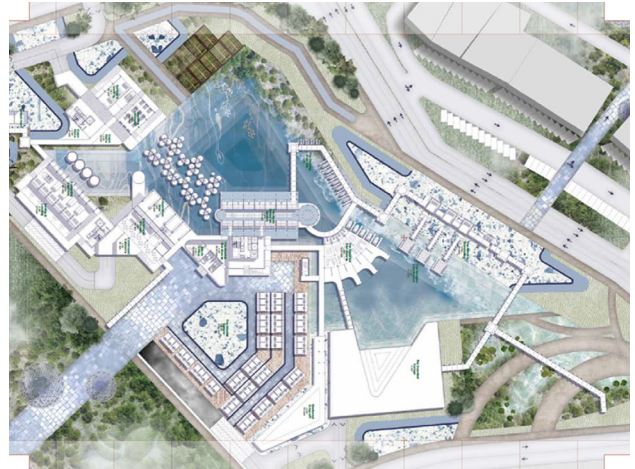
Beyond technical expertise, surveyors serve as mediators between policymakers, developers, and affected communities. They ensure that regeneration projects consider social inclusivity, affordability, and cultural preservation—dimensions often overlooked in top-down planning approaches. This role supports Malaysia's commitment to "leaving no one behind" in line with the 12th Malaysia Plan (Economic Planning Unit, 2021).



4.0 From Act to Action Framework

The preceding review highlights a persistent policy–practice gap in urban regeneration. While Malaysia has enacted numerous policies and Acts, implementation is frequently delayed by fragmented governance, financial barriers, and limited stakeholder integration. This paper proposes the “From Act to Action” Framework, positioning surveyors as the mediating force that operationalises policy into practice through three interconnected dimensions: Policy, Property, and Practice.

Surveyors interpret legislative frameworks, such as Act 172 and urban renewal directives, into workable strategies. Their advisory role ensures that legal intentions—such as land reassembly, affordable housing provision, and heritage conservation—are translated into financially and technically viable development schemes.



The property dimension centres on surveyors’ capacity to evaluate, appraise, and manage land and property assets. By balancing government objectives (e.g., affordability, inclusivity) with market realities (e.g., investment return, valuation accuracy), surveyors create a bridge between policy goals and investor confidence. Property-based insights ensure regeneration projects remain attractive to both public and private stakeholders.

Surveyors ensure policy and property considerations materialise into deliverable projects. Through lifecycle costing, procurement advice, and financial risk management, they provide technical certainty and sustainability. The use of digital technologies—such as Building Information Modelling (BIM), Geographic Information Systems (GIS), and digital valuation tools—further strengthens their ability to bring regeneration from concept to completion.

By operating across these three dimensions, surveyors act as integrators of governance, finance, and delivery. Their capacity to bridge diverse stakeholders—government, developers, financiers, and communities—ensures that Acts do not remain abstract documents but are converted into tangible regeneration outcomes.



5.0 Closing Reflections

Urban regeneration is a multifaceted process that demands alignment between legislation, financial viability, and practical implementation. In Malaysia, various Acts and policies—such as the Town and Country Planning Act 1976 (Act 172) and the Twelfth Malaysia Plan (12MP)—have set the stage for urban renewal. Yet, the persistent challenge lies in translating these frameworks into tangible outcomes on the ground.

This paper has highlighted the crucial role of surveyors in bridging this policy–practice gap. By serving as policy interpreters, financial guardians, sustainability custodians, risk managers, and stakeholder connectors, surveyors ensure that regeneration initiatives are not only legally sound but also financially viable, socially inclusive, and environmentally sustainable. Property surveyors provide critical valuation, feasibility, and land management expertise, while quantity surveyors bring cost certainty, lifecycle analysis, and financial risk management. Together, they enable the operationalisation of Acts into action.

The proposed “From Act to Action” Framework underscores surveyors’ integrative role across three dimensions: policy, property, and practice. By situating surveyors at the centre of these dimensions, the framework illustrates how their expertise translates legislation into actionable regeneration strategies, while fostering collaboration among stakeholders.

Reflections emerging from this study include:

1. Strengthening the institutional recognition of surveyors’ roles in urban regeneration policymaking.
2. Enhancing interdisciplinary collaboration between surveyors, planners, architects, and policymakers.
3. Expanding the use of digital tools (e.g., BIM, GIS, ESG cost modelling) to improve decision-making and delivery in regeneration projects.
3. Increasing community engagement by empowering surveyors to act as mediators between developers and local communities.
4. Integrating sustainability indicators into valuation and cost planning frameworks to ensure long-term resilience of regeneration projects.

By positioning surveyors as central agents in Malaysia’s urban regeneration journey, this paper affirms their capacity to transform Acts into action—bridging policy intent with practical delivery, and contributing to sustainable, inclusive, and prosperous cities.



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Geomatics Engineering Future-Ready Surveyors For Urban Renewal Challenges In Malaysia

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Abstract

Malaysia's efforts to revitalize its aging urban infrastructure, exemplified by proposed legislation such as the Urban Renewal Bill 2025 and policy frameworks like Economic MADANI and 10-10 MySTIE, are transforming the competency requirements for professional surveyors. Geomatics engineers are required to navigate various legal and regulatory frameworks, manage multi-sensor geospatial workflows (including UAV, LiDAR, GNSS, and mobile mapping), develop 3D city models and digital twins, integrate BIM and GIS, oversee data governance, and conduct socio-environmental impact assessments. This article analyzes the changing urban-renewal landscape in Malaysia and discusses the experience of Universiti Teknologi Malaysia (UTM) in training future-ready surveyors. This document outlines the mapping of curriculum to competencies, presents living-lab case studies such as the UTM 3D campus, details assessment instruments aligned with Program Learning Outcomes (PLO), and provides a roadmap for 2025–2030 that highlights legal literacy, AI-augmented geospatial analytics, and community-centric ethics. This study concludes with implementation metrics and a replicable model for Geomatics programs in Malaysia and the surrounding region.



1 Introduction

Urban Malaysia is confronted with a significant accumulation of aging, unsafe, or under-utilized buildings, along with fragmented parcels that hinder transit-oriented development, climate resilience, and overall liveability. The Urban Renewal Bill 2025, introduced in Parliament in August 2025, aims to establish a systematic national framework for regeneration, ensuring a balance between property owners' rights and the public interest. The discussion has focused on consent thresholds for strata redevelopment, compensation, governance, and protections against displacement (Mohamad Ezri, 2025).

Simultaneously, Malaysia's macro-policy agenda Ekonomi MADANI (2023) and 10-10 MySTIE focuses on high-productivity sectors, technology diffusion, inclusive growth, and the creation of socio-economic value through scientific advancement. These frameworks implicitly enhance surveying and geospatial capabilities as essential public infrastructure for decision-making (Ministry of Economy, 2023). In this context, geomatics engineers play a crucial role: they determine boundaries, manage multi-sensor spatial data, mitigate redevelopment risks through accurate measurement and monitoring, facilitate planning submissions, and provide evidence-based geospatial intelligence for compensation, valuation, and stakeholder engagement. This study analyzes the alignment of curricula, research, and outreach at UTM to prepare surveyors for urban renewal effectively.

2. Malaysia's Urban-Renewal & Regulatory Landscape

Historically, the redevelopment of stratified properties in Malaysia has faced challenges due to the unanimous consent requirements stipulated in the Strata Titles Act 1985 (Act 318), particularly for collective termination, resulting in infrequent for the whole processes. The Urban Renewal Bill seeks to establish clearer procedures and entities (federal/state committees) and, through iterative drafts, standardize consent thresholds (commonly discussed at $\geq 80\%$) (Theedgemalaysia, 2024). As urban cities such as Kuala Lumpur, Johor Bahru, and Penang confront the simultaneous issues of deteriorating infrastructure and increasing population density, the government has acknowledged the pressing necessity for a cohesive legislative and planning framework. This setting establishes a foundation for a significant change in the manner in which surveyors interact with policy, legislation, and governance. To fulfill these national objectives, surveyors must not only excel in the technical aspects of measurement and mapping but also possess a comprehensive awareness of the regulatory framework that influences urban regeneration initiatives.



2.1 A Comprehensive Urban Renewal Framework

Historically, Malaysia's rebuilding efforts were impeded by disjointed legislation and institutional redundancy. The Strata Titles Act 1985 (Act 318), which regulates high-rise and stratified properties, mandated unanimous consent from all unit owners prior to any collective renovation. This rigorous condition ultimately incapacitated most en-bloc initiatives, as achieving unanimous consent in densely populated urban blocks was virtually unattainable. As a result, urban deterioration escalated, leading to several strata buildings particularly those erected in the 1970s and 1980s becoming structurally compromised and financially impractical for upkeep (Theedgemalaysia, 2024).

In acknowledgment of these obstacles, the Malaysian government enacted the Urban Renewal Bill (2025), signifying a major policy advancement. This legislation aims to enhance and modernize redevelopment processes by creating specialized federal and state urban renewal committees, which will be authorized to coordinate planning, acquisition, and compensation methods more effectively. The proposed legislation seeks to standardize consent levels for collective redevelopment, with an 80% approval rate anticipated as the benchmark striking a balance between development practicality and owner protection.

This threshold has garnered attention from politicians and developers, yet it continues to be a subject of public discourse. Critics, comprising property owners and civil society organizations, underscore the necessity for transparent compensation formulas and equitable treatment of minority dissenting owners. Thus, the Urban Renewal Bill transcends mere legislative change; it embodies a socio-political negotiation of efficiency, rights, and equality. Surveyors, as essential intermediaries between the state and the public, must comprehend these changing legal dynamics to guarantee that urban regeneration projects are conducted ethically and transparently.

2.2 Interfacing Legislation and Agencies

Despite the existence of a specialized Urban Renewal statute, the regulatory framework for redevelopment in Malaysia continues to be multifaceted. Surveyors are crucial in negotiating interconnected legal and institutional systems to assure project compliance, defensibility, and adequate documentation.

1) Town and Country Planning Act 1976 (Act 172)

This legislation undergirds Malaysia's planning framework, stipulating that all redevelopment proposals must conform to structural and municipal plans. Surveyors must cooperate with municipal authorities and one-stop centres to ensure that spatial data and land boundaries align with zoning, density, and land-use restrictions. Precise spatial documentation is essential for obtaining planning permission and adhering to sustainable urban design principles (Malaysian Parliament & Agencies, 2021).

2) National Land Code 1965 (Act 56) and Land Acquisition Act 1960 (Act 486)

These statutes delineate the authority of the State over land ownership and acquisition. In numerous renewal initiatives, land assembly entails merging fragmented parcels or mandatorily acquiring deteriorated properties for reconstruction. Surveyors are required to produce accurate cadastral maps, valuation reports, and acquisition plans, guaranteeing that compensation aligns with fair market standards (Choy, 2025). Their efforts directly facilitate due diligence and mitigate the danger of legal challenges during purchase.

3) Strata Titles Act 1985 (Act 318) and Strata Management Act 2013 (Act 757)

These two statutes collectively regulate strata subdivision, management, and termination processes. Surveyors must possess expertise in strata re-parcelling, share unit computations, and boundary certification to enable collective sale or redevelopment. Under the Urban Renewal Bill, these technical responsibilities grow progressively intricate when antiquated strata plans are amalgamated or restructured into new titles (Parliament of Malaysia, 2013; Parliament of Malaysia, 2024b).

4) Licensed Land Surveyors Act 1958 (Act 458, amended 2024)

The 2024 amendment to this act redefined the professional boundaries of certified land surveyors, enhancing compliance standards and augmenting oversight by the Land Surveyors Board (LJT). It underscores accountability, data integrity, and the legal enforceability of survey records. Surveyors involved in urban redevelopment must uphold registration and compliance under this legislation to guarantee that spatial data and cadastral outputs are legally acknowledged by authorities (Parliament of Malaysia, 2024a).

Surveyors function as both technical custodians and legal facilitators through various legal channels. Their proficiency guarantees that every stage of redevelopment from boundary delineation to compensation and title transfer is conducted within Malaysia's intricate legislative framework (Parliament of Malaysia, 2024a).

2.3 Policy Influencers that Determine Competencies

In addition to legislation, many national policy frameworks influence the competencies necessary for the future-ready surveyor. These policies not only redefine Malaysia's socio-economic objectives but also establish geomatics and spatial intelligence as fundamental components of development planning.

1) Economy MADANI

This framework, introduced by the Ministry of Economy (2023), seeks to foster an inclusive, balanced, and equitable economy. Urban revitalization initiatives are anticipated to reflect MADANI principles by fostering social cohesion, enhancing safety, and ensuring affordability in revitalized regions. This necessitates that surveyor cultivate skills in community participation, impact assessment, and socially responsible value. Geospatial data generated by surveyors can assist policymakers in assessing the impact of redevelopment on affordability and accessibility, guaranteeing equitable distribution of renewal benefits among people (Ministry of Economy, 2023).

2) MySTIE Framework, 10-10

The 10-10 MySTIE framework, created by the Academy of Sciences Malaysia (ASM) and the Ministry of Science, Technology, and Innovation (MOSTI) in 2021, delineates ten science and technology enablers that bolster ten socio-economic drivers. In this framework, geospatial technologies, Building Information Modelling (BIM), and digital twins are emphasized as essential facilitators for the Smart Cities and Urban Development initiative (MOSTI & ASM, 2021). The framework promotes data-informed decision-making, highlighting interoperable technologies and real-time geographical analysis.

For surveyors, MySTIE necessitates technological proficiency comprehending the integration of geospatial data with urban information systems, environmental monitoring, and smart infrastructure management. As Malaysia adopts the Fourth Industrial Revolution (IR4.0), surveyors must transition from mere data collectors to data scientists and policy consultants, adept at analyzing spatial trends to guide evidence-based governance. These initiatives reconceptualize surveying from a limited technical field to a strategic component of national development. The integration of legal frameworks, planning systems, and science-technology policies fosters an advantageous environment for geomatics engineers to excel as interdisciplinary experts as shown in Figure 1.





Figure 1. The Regulatory Ecosystem Map for Urban Renewal in Malaysia

3. Competency Framework For Future-Ready Surveyors

In the age of swift urban transition, surveyors are essential in connecting land, law, and technology. As Malaysia approaches the implementation of the Urban Renewal Act (URA) 2025, surveyors must transform into multi-disciplinary experts proficient in measurement science, as well as knowledgeable in legislation, ethics, data analytics, and digital innovation. This competency framework delineates the fundamental domains that a future-ready geomatics engineer must understand to advance Malaysia's sustainable and equitable urban redevelopment goal.

3.1 Legal and Regulatory Proficiency

A fundamental ability for contemporary surveyors is legal and regulatory proficiency. Urban renewal is a multifaceted process regulated by a confluence of legislative frameworks, including the Town and Country Planning Act 1976 (Act 172), Strata Titles Act 1985 (Act 318), Strata Management Act 2013 (Act 757), and the forthcoming Urban Renewal Act 2025. A future-ready surveyor must adeptly interpret these statutes to guarantee conformity in land assembly, property subdivision, and redevelopment processes.

Understanding consent thresholds, the proportion of strata owners required to approve collective redevelopment impacts both project viability and societal acceptance. Surveyors engage with the Land Acquisition Act 1960 (Act 486), guaranteeing fair compensation and transparent appraisal practices (The edge malaysia, 2024). Furthermore, the capacity to oversee cadastre migrations, whereby antiquated title systems are reorganized into contemporary urban land-use frameworks, necessitates both legal acumen and technological accuracy. In the absence of such literacy, surveyors jeopardize procedural accuracy, potentially delaying or invalidating rehabilitation projects.

3.2 Mastery of Multi-Sensor Geomatics

The fundamental aspect of future-ready surveying is the expertise in multi-sensor geomatics. This includes proficiency in UAV photogrammetry, terrestrial and aerial LiDAR, GNSS/RTK positioning, mobile mapping, and hydrographic surveying. Each technique offers distinct spatial information essential for modelling dense urban environments, evaluating terrain stability, and assessing redevelopment possibilities.

UAVs have become essential instruments for mapping urban environments, generating high-resolution orthophotos and 3D point clouds. Research published in MDPI's ISPRS International Journal of Geo-Information indicates that UAV flight parameterization comprising altitude, overlap ratio, and sensor calibration substantially affects both accuracy and computing efficiency (Chaudhry et al., 2020). Likewise, LiDAR provides millimetre-level accuracy for creating digital elevation models and evaluating building deformation, whilst mobile mapping systems (MMS) integrate real-time kinematic GNSS and LiDAR to effectively collect street-level data.

The capacity to integrate data from several sensors and handle uncertainty budgets differentiates a proficient geomatics engineer from a technician. This connection facilitates data validation, enhances 3D model accuracy, and guarantees consistency between aerial and ground datasets an indispensable requirement for dependable urban-renewal decision-making.



3.3 Three-Dimensional Geographic Information Systems and Digital Twins

Urban rejuvenation necessitates a spatial comprehension of intricate vertical contexts, leading to the emergence of 3D Geographic Information Systems (3D GIS) and digital twins as revolutionary instruments. These platforms embody object-centric models of structures and infrastructure, allowing planners and engineers to replicate real-world scenarios within a digital framework. At Universiti Teknologi Malaysia (UTM), the 3D GIS Research Lab created an extensive campus-scale digital twin by combining the LiDAR scans, UAV photos, and cadastral data into a cohesive geospatial database. This program establishes a standard for urban 3D modelling in Malaysia, illustrating how academic institutions may spearhead the creation of realistic frameworks for municipal revitalization (Salleh, et.al., 2021). In terms of scope, the basic elements of the digital twin can be divided into the physical space, digital space, and linking information, as shown in Figure 2. From a processing standpoint, the core components of a digital twin consist of data, models, and knowledge. Data and knowledge serve as the connecting elements that bridge physical entities with their digital counterparts, which are represented through modeling techniques.

3D GIS applications encompass more than mere visualization. They assist with planning approvals, construction sequencing, and safety assessments, while digital twins enhance lifespan asset management by forecasting maintenance requirements and evaluating energy efficiency. The use of real-time IoT sensors significantly improves situational awareness, in accordance with Malaysia's Smart City Framework as outlined in the MyDigital Blueprint 2030.

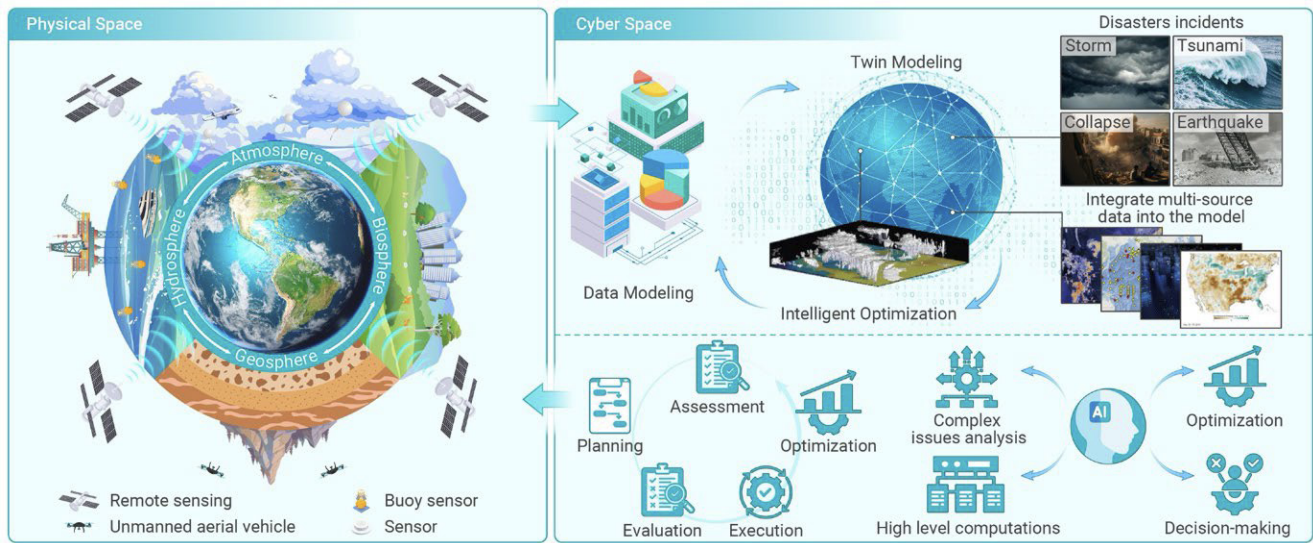


Figure 2. An Information Framework of Digital Twin to support sustainable Earth management.
(Adapted from Wang Y. et al., (2024))

3.4 Integration of BIM and GIS

A burgeoning capability is the combination of Building Information Modeling (BIM) and Geographic Information Systems (GIS). BIM emphasizes the intricate geometry and characteristics of specific structures, whereas GIS encompasses the wider spatial context. The integration of these two domains facilitates comprehensive urban assessments, enabling planners to visualize the interactions between buildings, utilities, terrain, and regulatory limitations. Advanced standards like IFC (Industry Foundation Classes), CityGML, and GeoBIM promote cross-domain interoperability. Surveyors must excel in schema translation, clash identification, and automated constraint verification, such as the automatic assessment of building height restrictions or setback requirements in accordance with planning standards. This regulatory automation expedites approval processes and minimizes human error, establishing surveyors as enablers of effective governance within the urban renewal framework.

3.5 Deformation and Risk Surveillance

Urban redevelopment frequently entails destruction, reconstruction, and the repurposing of deteriorating edifices, each of which presents structural and geotechnical hazards. Consequently, deformation and risk monitoring have emerged as essential competencies. Utilizing Robotic Total Stations (RTS), GNSS sensors, and Mobile Laser Scanning (MLS), surveyors may identify sub-centimeter displacements of the ground or structures over time. (Fong and Zainon, 2021; Othman and Mohamad, 2025).

The Faculty of Built Environment and Surveying (FABU) at UTM has innovated research in real-time deformation monitoring for slope and structural integrity. Such devices can provide early-warning indications for planning conditions or construction-site safety management. In hillside urban redevelopment initiatives, real-time GNSS networks furnish continuous data that assist authorities in mitigating landslide hazards, a function fully connected with Malaysia's Disaster Risk Reduction (DRR) obligations under the Sendai Framework 2015–2030.

3.6 Data Governance and Ethical Considerations

The increase of high-resolution spatial data has become data governance and ethics essential skills. Surveyors are guardians of sensitive information ownership borders, property assessments, and demographic data that must be managed in accordance with stringent privacy and consent rules, including the Personal Data Protection Act (PDPA) 2010 (Ahmad, 2025). Surveyors prepared for the future must get training in the ethical acquisition, storage, and dissemination of geospatial data. This encompasses acquiring informed consent for aerial imaging, anonymizing household-level data, and implementing non-displacement measures when renewal programs threaten to displace vulnerable people. The current URA 2025 debates emphasize that ethical data management is crucial for sustaining public trust and ensuring urban transformation adheres to social justice principles.

3.7 Socio-Environmental Analysis

Urban renewal should be assessed through the perspective of sustainability. Consequently, surveyors must excel in socio-environmental analytics, utilizing spatial indicators to measure public benefits and environmental compromises. Malaysia's MURNInet (Malaysian Urban-Rural National Indicators Network) and analytical methodologies such as the Analytic Hierarchy Process (AHP) provide robust instruments for assessing urban livability, resilience, and inclusivity (Azman et.al, 2014).

By integrating facts on accessibility, green space, and socio-economic vulnerability, surveyors can generate evidence-based rationales for prioritizing specific communities for revitalization. These evaluations assist planners and politicians in ensuring that redevelopment promotes economic benefit, environmental sustainability, and social equality.



3.8 Communication with Stakeholders

The human aspect of urban revitalization highlights the significance of stakeholder communication. Surveyors must possess the ability to convert intricate geospatial data into comprehensible maps, dashboards, and infographics that are accessible to the public, government authorities, and developers.

Effective communication encompasses conflict resolution, wherein surveyors assume a neutral position in negotiating boundary issues, valuation differences, or community concerns. Interactive web-based GIS dashboards can enhance participatory planning sessions, allowing citizens to visualize suggested modifications and provide feedback. Awareness of vulnerable populations, including low-income tenants and elderly people, is essential to guarantee that redevelopment choices are inclusive and equitable.



4. The Utm Experience: Program Structure And Objectives

Universiti Teknologi Malaysia (UTM) is a leading institution in geomatics teaching, research, and professional development in Malaysia and Southeast Asia. The Bachelor of Geomatics Engineering (Hons) program, one of the nation's oldest and most esteemed geomatics degrees, has significantly influenced generations of surveyors who currently hold top positions in government, industry, and academia (Faculty of Built Environment and Surveying, 2025). The curriculum excels in integrating theoretical knowledge, practical training, and applied research, equipping graduates to tackle intricate difficulties in land administration, urban development, and spatial governance.

Accredited by the Land Surveyors Board Malaysia (LJT), the program harmonizes its Program Educational Objectives (PEO) and Program Learning Outcomes (PLO) with national policy frameworks and international standards. This guarantees that UTM graduates fulfill the professional standards established by the Licensed Land Surveyors Act 1958 (Act 458) (Amended 2024) (Parliament of Malaysia, 2024a) while simultaneously advancing national initiatives like Ekonomi MADANI and 10-10 MySTIE (Ministry of Economy, 2023; MOSTI & ASM, 2021). The program's curriculum is continually updated to align with changes in technology, regulation, and industry need, especially in urban redevelopment, spatial analytics, and smart-city development.

The Faculty of Built Environment and Surveying (FABU) underpins this curriculum with a multidisciplinary framework that integrates the accuracy of geomatics with the innovation of urban design and sustainability science. The faculty's research ecosystem encompasses various fields such as aerial photogrammetry, LiDAR mapping, deformation and risk monitoring, contemporary cadastre and strata management, hydrography, and optical and Islamic astronomy each providing distinct expertise to Malaysia's spatial data infrastructure. These domains constitute the conceptual foundation of UTM's urban-renewal curriculum, wherein students acquire the ability to amalgamate technological, environmental, and human factors into spatial decision-making (Faculty of Built Environment and Surveying, 2025).



4.1 Mapping of Curriculum to Competencies

The UTM geomatics curriculum is designed to systematically enhance technical skills, analytical reasoning, and professional ethics. It utilizes a scaffolded learning framework that progresses from fundamental theory to practical problem-solving and real-world application. a) Years 1–2: Fundamental Knowledge and Technical Proficiency
The initial years of the program engage students with the principles of surveying science, geodesy, mapping, and geographic information systems (GIS). Courses in remote sensing, mathematical modeling, and programming for geographical analysis cultivate computational literacy—an indispensable skill in the digital era. Field exercises over these years foster collaboration, accuracy, and field-data management, establishing a foundation for advanced applications. b) Years 3–4: Specialization and Integration

In the advanced years, students go to specialist modules in UAV photogrammetry, LiDAR technology, hydrographic and industrial surveying, and contemporary cadastre. Land law and urban applications courses amalgamate technical and regulatory expertise, equipping students to address real-world challenges including urban land readjustment, stratum redevelopment, and spatial data governance. The curriculum concludes with a capstone project and industrial internship, during which students partner with municipal authorities, commercial enterprises, and research institutions to provide solutions that correspond with Malaysia's urban regeneration objectives.

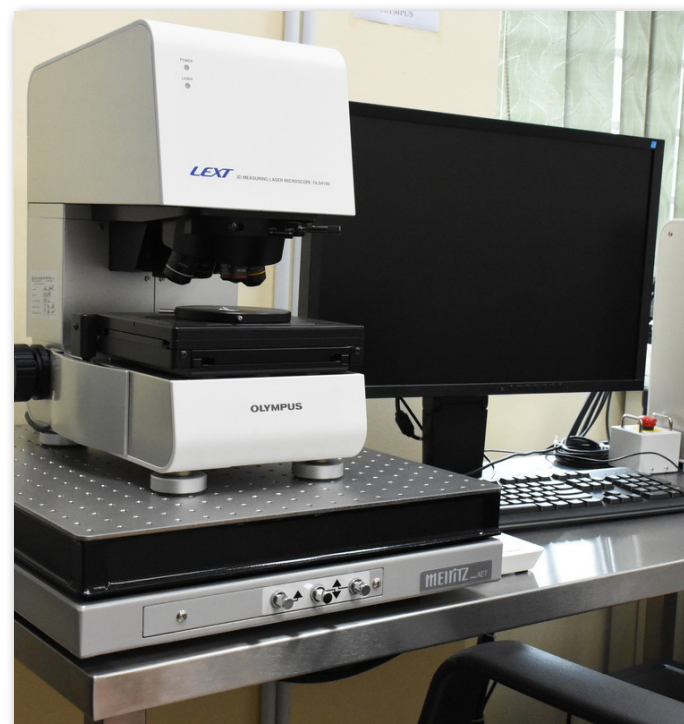
This systematic advancement guarantees that UTM geomatics graduates possess both technical proficiency and strategic acumen, enabling them to integrate policy, technology, and human requirements.

4.2 Educational Foundations

UTM's pedagogical approach prioritizes experiential and project-based learning, enabling students to convert theoretical concepts into real innovations. A variety of teaching principles characterize the UTM geomatics experience:

1. **Studio-Style Laboratories:** These laboratories replicate professional work settings in which students engage in comprehensive spatial projects that encompass data collection, analysis, and visualization.
2. **Field Campaigns:** Students engage in multi-day field trips to apply practical skills in surveying, hydrography surveying, UAV mapping, and LiDAR scanning.
3. **Experiential Learning and Service-Learning Projects:** By partnering with local councils and communities, students engage in place-based problem-solving activities, like mapping informal settlements and assessing flood-risk areas.

The UTM campus functions as a living laboratory, enabling students to execute pilot projects in urban analytics, digital twinning, and environmental monitoring. This educational framework connects theory and practice, cultivating graduates who possess both technical expertise and civic duty.



5. Case Studies Of Living Labs From UTM

UTM's Living-Lab Framework exemplifies its "learn-by-doing" philosophy. These case studies augment academic knowledge and advance urban renewal research and municipal innovation.

5.1 Campus-Scale Three-Dimensional Geographic Information System

The 3D GIS Research Lab at UTM has created a virtual 3D representation of the university campus, incorporating UAV photos, LiDAR scans, and cadastral databases. This digital twin facilitates applications including navigation, facilities management, and spatial scenario analysis. The project reflects the workflows employed in urban-scale revitalization, including the establishment of levels of detail (LOD), semantic organization, and temporal versioning (Salleh et.al, 2021).

5.2 UAV Aerial Mapping of Urban Districts

UTM's field courses in aerial photogrammetry utilize UAVs to acquire data in intricate mixed-urban settings. Students examine the impact of flight-line patterns, overlap ratios, and camera calibration on data accuracy and processing efficiency. These teachings significantly influence urban-renewal processes, wherein UAV imagery facilitates swift, economical mapping for feasibility analyses, pre-acquisition evaluations, and progress tracking. The study referenced in class modules substantiates the empirical notion that survey design directly affects computing efficiency and spatial accuracy (Chaudhry et al., 2020).



5.3 Monitoring Deformation for Structural and Slope Hazards

In accordance with FABU's research focus on geohazard monitoring, students participate in real-time deformation analysis utilizing Robotic Total Stations (RTS) and GNSS networks. These simulations replicate risk-monitoring scenarios in hillside and infrastructure rehabilitation projects. Students acquire the ability to construct monitoring networks, conduct error propagation assessments, and establish warning levels for structural movement skills essential for safeguarding public safety in redevelopment areas (Fong and Zainon, 2021; Othman and Mohamad, 2025).

5.4 Evaluation of Spatial Sustainability

Researchers at UTM have innovated multi-criteria spatial analysis for urban sustainability through the application of the Analytic Hierarchy Process (AHP). This methodology, applied to neighbourhoods in Johor Bahru, incorporates socio-economic, environmental, and accessibility metrics to assess liveability and vulnerability (Azman et.al, 2014). Students proficient in these techniques can apply them to prioritize renewal sites and conduct social-impact assessments, ensuring redevelopment is consistent with the Sustainable Development Goals (SDGs).



6. A Workbench For Urban Renewal Geomatics

UTM's "urban-renewal workbench" combines cutting-edge hardware and analytical techniques, providing students with a thorough toolkit that reflects professional practices as shown in Figure 3.

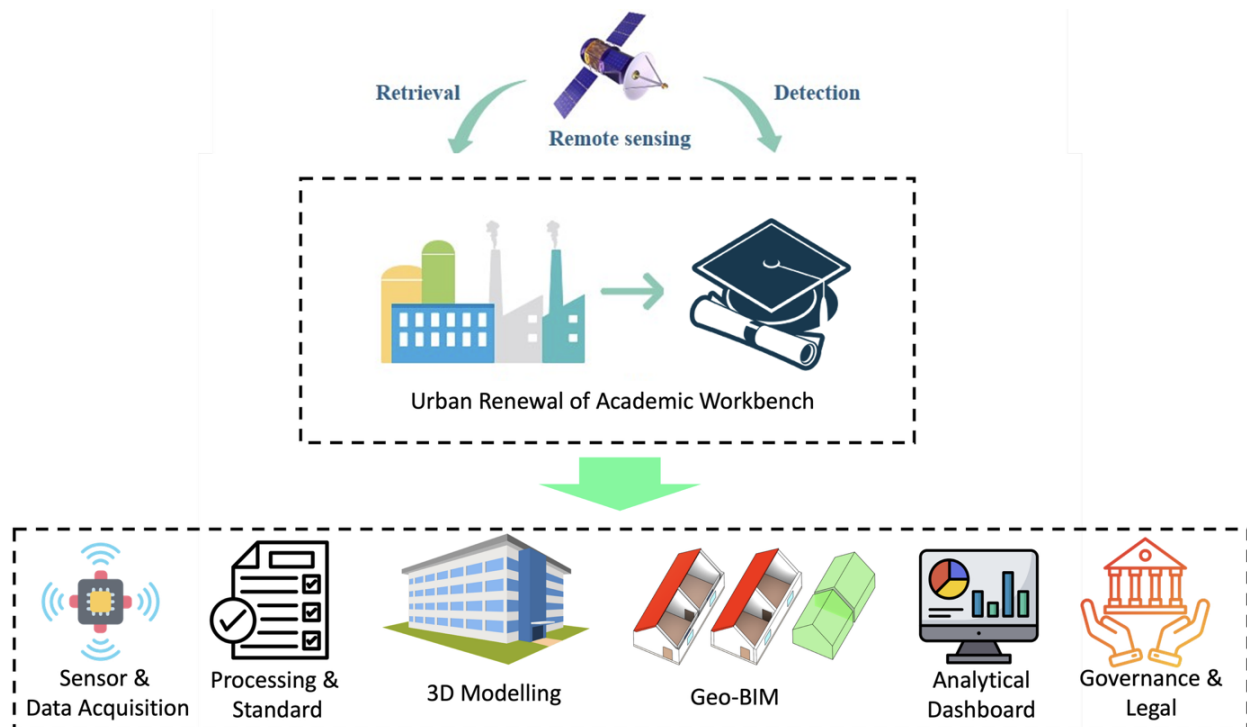


Figure 3. Urban Renewal Geomatics Workbench (Modified from Qiao, Z. et al. (2020).)

1. Sensors and Data Acquisition: RTK GNSS, total stations, robotic total stations, terrestrial and mobile laser scanners (TLS/MLS), UAVs outfitted with RGB, multispectral, and thermal sensors, as well as hydrographic instruments for coastal reconstruction.
2. Processing and Standards: Structure-from-Motion (SfM), Multi-View Stereo (MVS), and geodetic network adjustments are facilitated by ISO-compliant quality assurance and quality control procedures, together with uncertainty reporting.
3. 3D Modeling: Utilization of CityGML and CityJSON for semantic three-dimensional representation, mesh optimization, and temporal change detection in dilapidation assessments.
4. Geo-BIM Integration: Interoperability between IFC and GIS platforms for automatic compliance verification (e.g., building setbacks, daylight planes, accessibility requirements).
5. Analytical Dashboards: Interactive dashboards depict mobility access, heat islands, valuation surfaces, and participation input for inclusive planning.
6. Governance and Legal Compliance: Students are instructed to create evidence packets for submissions that adhere to Act 172 (Town Planning), STA/SMA (Strata Administration), and NLC (Land Code). This guarantees that technological outputs comply with engineering and legal norms.

This comprehensive workbench guarantees that graduates become multi-disciplinary specialists, equipped to provide complete solutions for Malaysia's urban redevelopment initiatives.

UTM's Geomatics Engineering program represents a forward-thinking academic framework, integrating comprehensive technical education with policy comprehension, ethical consciousness, and practical involvement. The living-lab ecosystem, underpinned by research in 3D GIS, UAV mapping, deformation monitoring, and spatial analytics, establishes it as a national standard for applied geomatics education. By synchronizing curriculum development with Malaysia's advancing regulatory frameworks and technological innovations, UTM guarantees that its graduates are both employment-ready and equipped to contribute to the nation's sustainable urban transformation.

7. Improvements To The Curriculum

The forthcoming decade will reshape geomatics education in alignment with Malaysia's national transformation objectives. In preparation for the URA 2025 and the overarching transition to data-driven government, UTM has developed a detailed Curriculum Enhancement Roadmap for 2025–2030 that fortifies students' professional, technical, and ethical skills.

The Urban Renewal Law and Practice module is a significant enhancement, familiarizing students with comparative consent frameworks, due diligence, land consolidation, stratum termination, and compensation modelling. Through the analysis of Acts including 172 (Town and Country Planning), 318 (Strata Titles), 757 (Strata Management), and 486 (Land Acquisition), students acquire the ability to evaluate legal frameworks via practical case simulations. These activities are supplemented by workshops with professionals from PlanMalaysia, The Edge Malaysia's property division, and the Department of the Director General of Lands and Mines (JKPTG), guaranteeing coherence between academia and practice. A crucial component is the Geo-BIM and Regulatory Automation module, which emphasizes the integration of Building Information Modeling (BIM) with Geographic Information Systems (GIS). Students acquire the skills to encode planning laws for automated compliance verification, converting planning rules into digital schemas utilizing IFC and CityGML standards. This equips students for a future in which rule-based digital planning submissions are standard practice. UTM is enhancing its curriculum in Deformation and Health Monitoring. Students will combine GNSS, LiDAR, and RTS time-series data to evaluate structural stability during demolition or construction. These competencies are essential in renewal zones where structural risk must be controlled instantaneously. Furthermore, novel modules in Artificial Intelligence and Machine Learning for Urban Geospatial Analysis instruct students in automated change detection, crack identification, and solar potential assessment utilizing deep-learning models.

The ethical and social aspects are equally reinforced. The Socio-Spatial Justice and Community Engagement module instructs students in the utilization of participatory mapping methods to evaluate inclusion and formulate grievance-redress processes. Data Governance and Professional Practice assures adherence to PDPA compliance, record keeping, and professional accountability as stipulated by the Licensed Land Surveyors Act 1958 (Amendment 2024). The curricular innovations are implemented via an immersive framework comprising living-lab studios, interdisciplinary clinics, and capstone projects. From 2025 to 2030, UTM intends to connect 80% of final-year projects to actual urban-renewal locations and produce a minimum of two living-lab publications annually from these initiatives. Collectively, these activities bolster UTM's position as a national incubator for future-ready geomatics engineers.



8. Evaluation Framework And Execution

UTM utilizes a competency-based assessment framework to guarantee significant learning outcomes by aligning assignments with Program Learning Outcomes (PLOs) and professional standards. This method assesses not just knowledge acquisition but also the ability to use, appraise, and articulate complicated geospatial information in practical scenarios.

Every course incorporates genuine assessment tools, such as project-based tasks, peer-reviewed presentations, and simulation activities. In the Urban Renewal Law and Practice module, students compile a Legal-Technical Dossier encompassing site limits, consent strategies, and legislative references (PLO 1–2–7). In applied geospatial modules, students create 3D Geo-BIM models that are subjected to rule-based compliance assessments in accordance with local planning standards (PLO 2–4).

Additional instances comprise:

1. Acquisition and Compensation Scenario Book: Students create geographic value models and conduct sensitivity studies for redevelopment sites.
2. Monitoring Plan: Students establish RTS/GNSS deformation thresholds and develop risk alert matrices (PLO 3–6).
3. Community Brief: Students create accessible dashboards elucidating consent procedures and compensation formulas, in alignment with PLO 8 about ethics and communication.

The assessment framework highlights five dimensions: technical accuracy, adherence to regulations, analytical thoroughness, clarity of communication, and ethical judgment. UTM's internal Program-Level KPIs target $\geq 80\%$ of capstone projects with municipal collaborations, $\geq 70\%$ proficiency in legal compliance assessments, and regular publishing of student-led research in journals. This concept coincides with UTM's Outcome-Based Education philosophy and ensures that graduates can function effectively in real-world multidisciplinary teams.



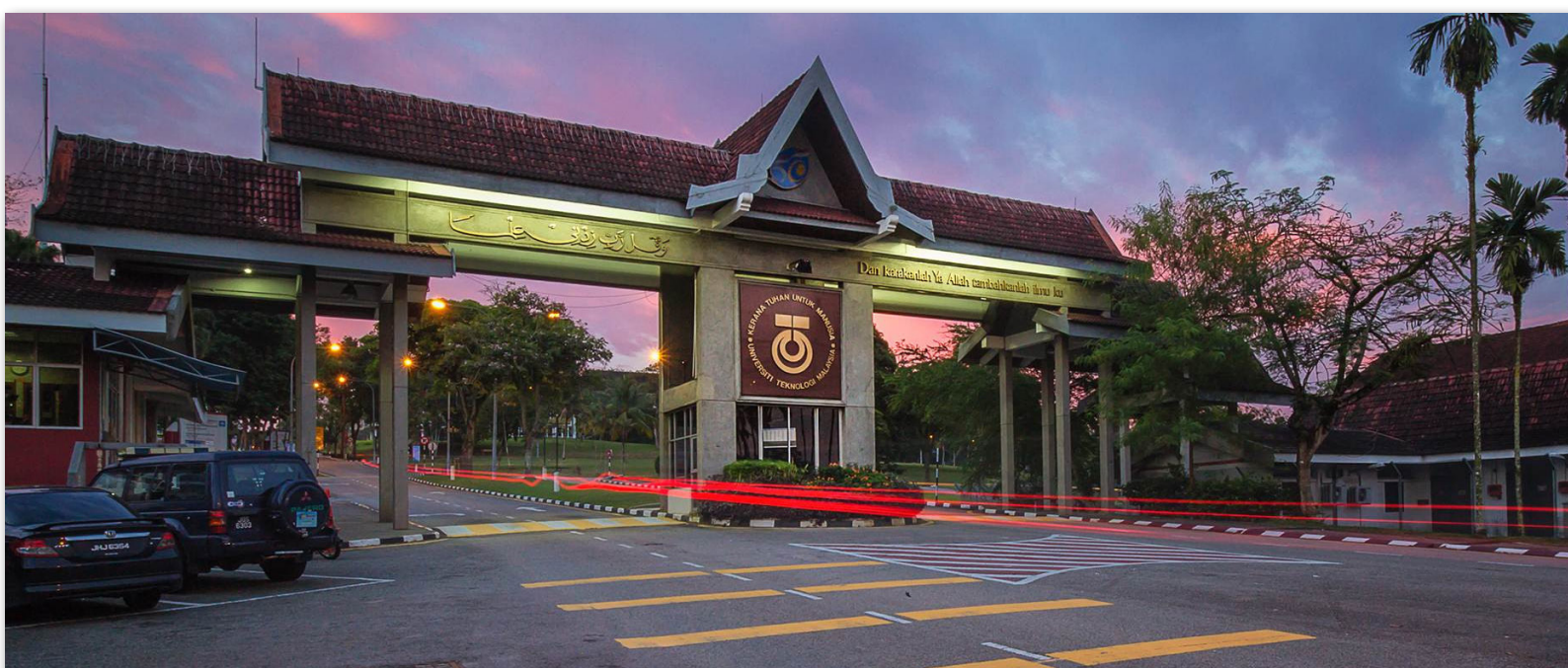
9. CONCLUSION

Malaysia's initiative for organized urban revitalization signifies a wider transformation in government, emphasizing data transparency, technology advancement, and citizen engagement. In this context, UTM's Geomatics Engineering program has established itself as a leader in thought and capacity development, preparing graduates to serve as intermediaries among law, technology, and community welfare.

Nonetheless, numerous obstacles remain. The changing URA 2025 legislation necessitates ongoing curricular adjustments to guarantee that graduates stay legally informed. Ethical hazards, including gentrification, data exploitation, and displacement, necessitate ongoing vigilance and social awareness. Simultaneously, automation via Geo-BIM and AI provides efficiency; yet, it should not supplant human discernment in intricate ethical or legal situations. UTM recognizes these issues as opportunities for continuous learning and innovation.

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Malaysian Construction Industry Outlook in 2024

The Malaysian construction industry in 2024 experienced a period of significant resurgence and transformation, becoming a vital engine for economic revitalization and long-term structural change. In the aftermath of global economic disruptions and amidst a cautiously optimistic recovery, Malaysia's construction sector capitalized on improving macroeconomic conditions, large-scale policy reforms, and strategic public-private investments. The momentum generated throughout the year was shaped by a convergence of fiscal caution, investment inflows, enhanced industrial planning, and targeted infrastructure initiatives.

The year 2024 marked a turning point for the construction sector in Malaysia, which was strategically positioned at the heart of national recovery and growth efforts. Malaysia's re-emergence as a regional investment hub, amid stabilizing global trade dynamics and post-pandemic resilience-building, brought renewed attention to sectors with high multiplier effects including construction. Notably, this resurgence was guided by the ambitions of the "Ekonomi MADANI" framework, which emphasized inclusive development, fiscal sustainability, and national competitiveness. The construction sector, encompassing infrastructure, housing, and energy projects, played a central role in operationalizing these goals and in supporting Malaysia's long-term aspiration to become one of the world's top 30 economies.



Figure.7 Seven Key Performance Indicators

In terms of economic performance, Malaysia's GDP recorded a growth of 5.1% in 2024, significantly surpassing the 3.6% recorded in 2023. This robust performance was anchored in a strong rebound in domestic consumption, expansion in the services and manufacturing sectors, and particularly buoyant growth in both private and public investments. Bank Negara Malaysia (BNM) identified the construction sector as a key beneficiary of this economic momentum, as a result of broad-based policy interventions, higher capital inflows, and the realisation of national development blueprints. The Ministry of Finance projected sustained economic expansion, with the construction industry expected to grow by 9.4% in 2025. Malaysia's policy architecture in 2024 was shaped by efforts to balance economic stimulus with long-term fiscal consolidation. Key fiscal strategies included the rationalisation of fuel subsidies, an increase in the Sales and Service Tax (SST), and improved efficiency in public spending.

Inflation was kept in check at 1.8% in 2024, thanks to a combination of direct financial aid to low-income households, effective price monitoring, and careful calibration of subsidy reforms. These reforms created fiscal room for strategic investments in national infrastructure, social protection, and energy transition programmes under the National Energy Transition Roadmap (NETR). These initiatives, in turn, provided a consistent pipeline of construction-related projects across federal, state, and municipal levels.

From an operational perspective, the cost structure within the construction industry remained generally stable, although some segments experienced localized price volatility. According to the National Construction Cost Centre (N3C) cost index, machinery rental rates displayed relative consistency, aided by improved supply chain conditions and currency stability. Nonetheless, diesel price adjustments introduced moderate increases in logistics and transportation costs. These cost pressures were effectively managed through regulatory oversight and enforcement mechanisms, including anti-profiteering measures and targeted subsidies for critical inputs.

The N3C cost index reveals that cost movement throughout the year was broadly stable across standard categories monitored in the index. Building cost index exhibited minimal fluctuation. These steady trends provided contractors with a more predictable cost environment for pricing, tendering, and financial planning throughout the year. Minor variations observed may reflect the effects of seasonal adjustments, diesel price reforms and localized supply-demand imbalances.

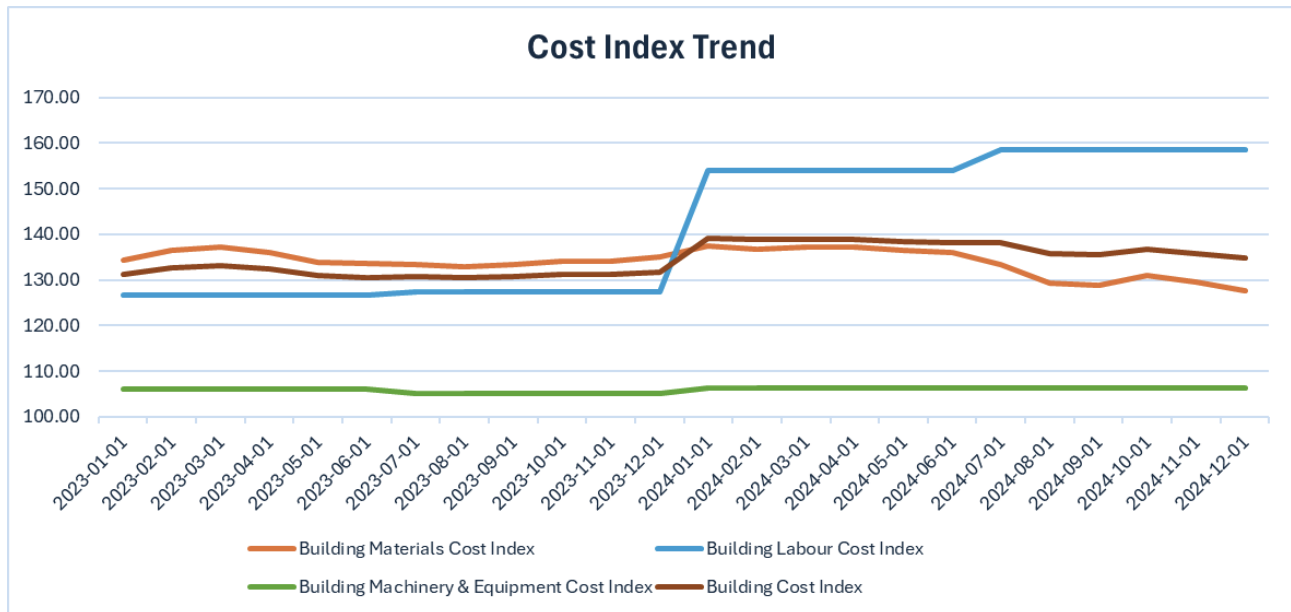


Figure 8: N9C Cost Index Trend

Rental indices for construction machinery showed similarly consistent trends across 2024. Despite expectations of a price increase following diesel subsidy reforms in mid-2024, the overall impact on machinery rental rates remained limited. This suggests that market competition, operational efficiencies, and stable equipment availability played a key role in containing cost transmission to end users.

The construction sector's total contribution to GDP reached RM158.8 billion in 2024, representing a notable 20.2% increase from the previous year. This expansion was facilitated by supportive monetary policy, particularly the maintenance of the Overnight Policy Rate (OPR) at 3.00% by Bank Negara Malaysia, which ensured sufficient liquidity in the banking system. Credit availability, especially to SMEs and major construction entities, was bolstered by strong competition among financial institutions, healthy capital buffers, and confidence in the sector's outlook.



A critical driver behind the sector's performance was the initiation of Malaysia's third investment upcycle, which began in mid-2023 and gained considerable traction in 2024. Unlike previous cycles, this phase was distinguished by a strategic emphasis on high-value, technology-intensive, and sustainable investments. The rollout of the New Industrial Master Plan 2030 (NIMP 2030), NETR, and the Twelfth Malaysia Plan introduced a wave of demand for construction services tied to smart infrastructure, industrial parks, clean energy plants, and digital connectivity projects. These frameworks not only stimulated demand but also elevated construction standards by embedding ESG compliance, productivity-linked incentives, and innovation-led procurement models.

The construction industry also witnessed increasing adoption of collaborative delivery models, particularly public-private partnerships (PPPs), which allowed for risk-sharing, financing flexibility, and more efficient execution timelines. The integration of digital tools, prefabrication technologies, and green building standards signalled a paradigm shift in project design and implementation. These trends reinforced Malaysia's competitiveness and enhanced the value proposition of its construction ecosystem to foreign investors.

Despite these advances, the sector continued to grapple with enduring challenges. Labour shortages especially skilled local workers remained a key constraint. The industry's reliance on foreign labour highlighted structural inefficiencies in the national training pipeline and the need for greater alignment between vocational education (TVET) and industry demands. Additionally, price volatility in globally traded commodities such as steel, cement, and imported equipment introduced cost unpredictability for developers. Administrative bottlenecks, including delays in planning approvals and complex land acquisition procedures, further compounded project timelines.

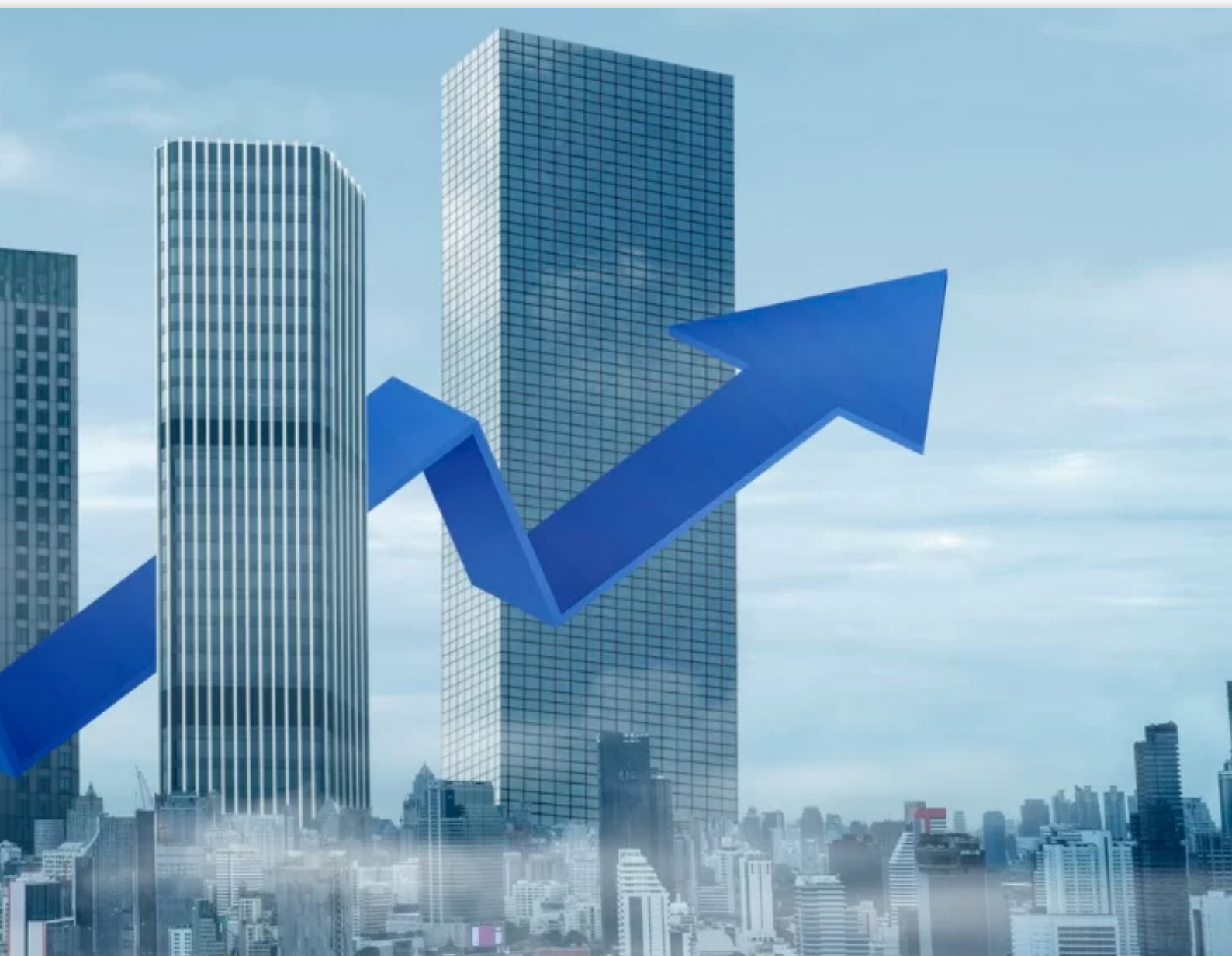


Government recognition of these structural issues was evident through its prioritization of workforce reforms, the expansion of digital permitting systems, and the rationalisation of regulatory procedures. Initiatives to improve labour market resilience such as micro-credentialing, apprenticeship incentives, and industry-academia partnerships were announced to gradually reduce skills mismatches. Moreover, the government's commitment to centralized and transparent project governance was reflected in policy guidance issued by ministries and regulatory bodies.

Looking forward, the Malaysian construction industry stands on solid ground with multiple growth enablers on the horizon. Projections for 2025 indicate continued expansion driven by a 12.1% increase in private investment, enhanced regional trade links, and robust public development expenditure. Green infrastructure, circular construction practices, and climate-resilient design will continue to gain prominence, especially under the guidance of NETR. Malaysia's ASEAN chairmanship and initiatives like the Johor-Singapore Special Economic Zone (SEZ) are expected to unlock additional cross-border infrastructure opportunities and solidify Malaysia's strategic position in regional value chains.

The Ministry of Finance anticipates national GDP to grow between 4.5% and 5.5% in 2025, supported by easing global cost pressures and ongoing domestic reforms. This projection is grounded in sound macroeconomic fundamentals, resilient financial markets, and the continuation of infrastructure-led growth. Digitalisation, sustainability integration, and regulatory modernization will likely determine the future competitiveness of the construction sector.

In conclusion, the Malaysian construction industry in 2024 emerged as a central pillar in the nation's economic transformation, embodying both the resilience and adaptability needed in a post-crisis environment. With strategic frameworks in place, broad-based investment flows, and a commitment to structural reform, the sector is poised for continued progress. As Malaysia forges ahead with its development vision, the construction industry will remain a key enabler of inclusive, sustainable, and future-ready growth.



10th INTERNATIONAL CONFERENCE ON GEOMATICS AND GEOSPATIAL TECHNOLOGY

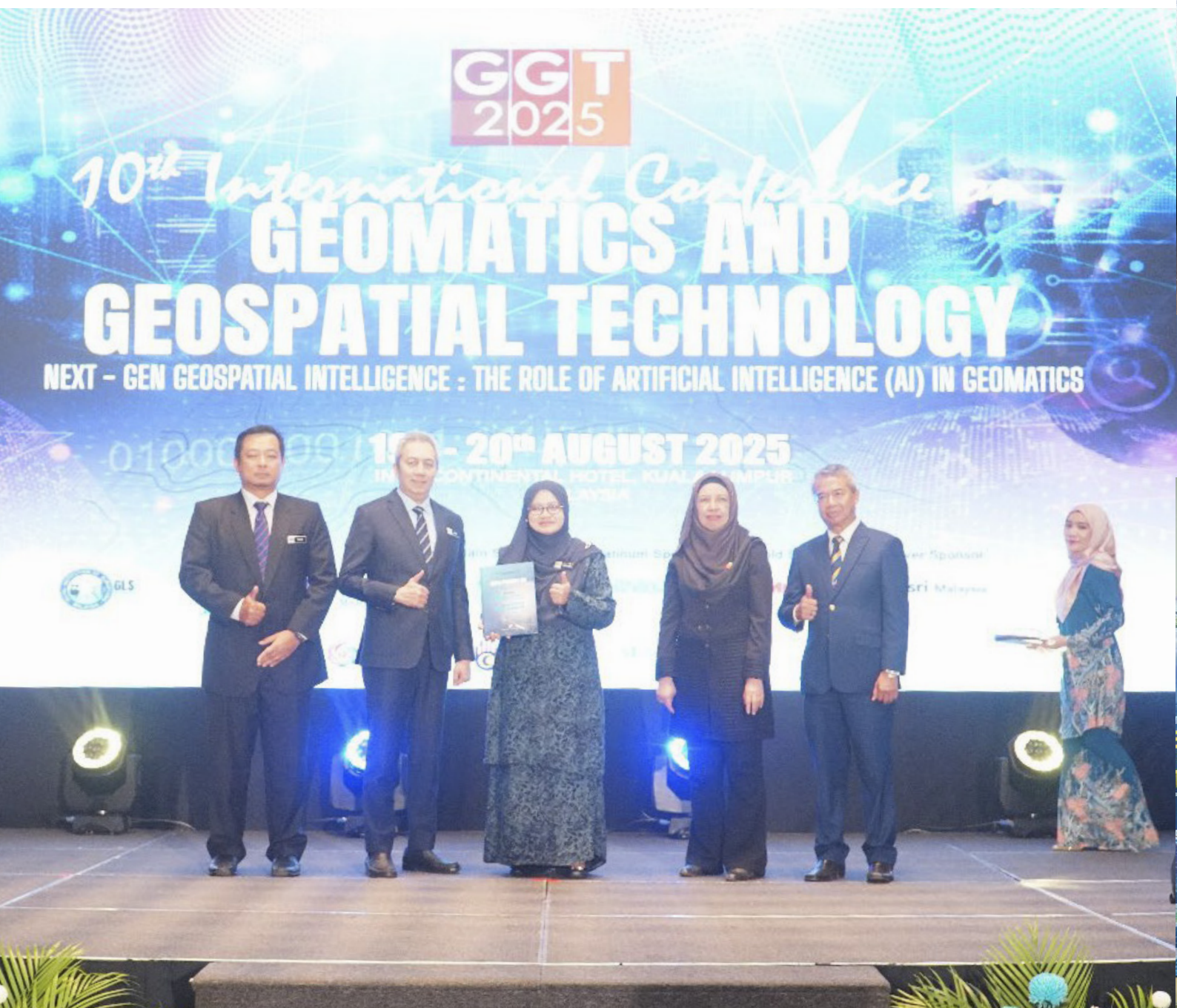
Date:

19-20 AUGUST 2025

Venue:

INTERCONTINENTAL KUALA LUMPUR HOTEL

The 10th GGT 2025 Conference, themed “Next-Gen Geospatial Intelligence: The Role of AI in Geomatics,” will be held over two days from August 19 to 20, 2025, at the Intercontinental Kuala Lumpur Hotel. The conference was officially inaugurated by Puan Norsham binti Abdul Latip, Deputy Secretary-General (Natural Resources), Ministry of Natural Resources and Environment (NRES).





Organized by the Geomatics and Land Survey Division (GLS) of the Royal Institution of Surveyors Malaysia (RISM), in collaboration with the Department of Survey and Mapping Malaysia (JUPEM) and Universiti Teknologi MARA - Official Media, the event successfully attracted 300 participants from government agencies, private sector companies, and international attendees, including representatives from Brunei. The conference featured 8 distinguished speakers from Malaysia, Singapore, Taiwan, and Indonesia. Additionally, 16 exhibition booths were set up, showcasing 31 academic paper presentations.



27th INTERNATIONAL SURVEYORS' CONGRESS (ISC) & 64th ANNIVERSARY DINNER ORGANISING COMMITTEE



The 27th International Surveyors Congress was held on 19-20 June 2025 at Sime Darby Convention Centre, Kuala Lumpur. The 27th ISC started with Welcoming Address by the Organising Chairman, Sr Wan Ainon Zuraiha Khalid and it was officiated by the Minister of Works YB Dato Sri Alexander Nanta Linggi.

The theme for this year is “Innovate to Elevate: Surveyors Reinventing the Profession and Industry. In today’s rapidly evolving world, every industry faces the challenge of adaptation and innovation. The surveying profession is no exception. With the rise of new technologies, shifting industry needs, and the increasing demand for sustainability, surveyors have been at the forefront of reinventing their roles, embracing innovation, and driving change within their industry. The theme “Innovate

to Elevate” captures the dynamic spirit of surveyors who are shaping the future of their profession.

This event will feature presentations from distinguished professionals as well as notable and respected speakers. As the industry is gearing itself towards era of circular economy and data driven insights, the 27th ISC will delve into pertinent topics such as Innovative Building Materials and Energy, Smart Energy Management Towards Sustainability, AI Driven Carbon Zero Building Design, Geomatics and Land Surveying Tomorrow: Innovating for a Sustainable Future, Surveyors Beyond Borders: Connecting Diversity in Evolving Artificial Intelligences to Fortify Innovation, Automation and Transformation : AI in Surveying.



Over the years, RISM's involvement in this conference has garnered recognition within the built environment sector. The event has assembled distinguished experts from diverse academic and professional disciplines, fostering insightful discussions and knowledge exchange through 20 technical papers addressing various aspects of adapting to the evolving construction and design industries. This includes identifying emerging trends, cutting-edge technologies, and innovative methodologies transforming the planning, design, construction, and management of buildings and infrastructure. Professionals such as land surveyors, building surveyors, quantity surveyors, property managers, and developers must stay abreast of advancements like sustainable construction practices, Building Information Modelling (BIM), smart buildings, renewable energy integration, and resilient design. By embracing these innovations, practitioners can enhance efficiency, sustainability, and resilience in the built environment, effectively meeting the dynamic needs of society and the environment.



“

The 27th ISC was a remarkable success, supported by 15 esteemed professional organizations. The event was proudly sponsored by Land Surveyors Board as the Platinum Sponsor, Aonic Sdn Bhd as the Gold Sponsor, and JS Valuers Property Consultants as the Silver Sponsor. The Moderators, Speakers, and Panelists comprised distinguished professionals from both national and international sectors. This Congress also convened over 427 participants representing the surveying, Geomatics and Land Surveying, Property Surveying, Quantity Surveying, and Building Surveying disciplines.



64th ANNIVERSARY DINNER

**IMPERIAL BALLROOM,
ONE WORLD HOTEL, PETALING JAYA**

“

The 64th Anniversary Dinner was held in the Imperial Ballroom, One World Hotel, Petaling Jaya. Altogether there were 80 tables. The 65th President, Sr Wan Aion Zuraiha Khalid was duly installed by the immediate Past President LSr Dr. Ahmad Sanusi Che Cob.

”



The prestigious ceremony saw 9 trophies handed out for 6 categories under the Excellence Awards.

- **RISM Exemplary Leadership Awards**

Recipients:

1. Juruukur Terraforma,
2. Firdaus and Associates,
3. BK Entrust,
4. Almas Building

- **RISM Young Surveyor of the Year Award**

Recipient: Sr Ts. Dr. Mohd Asrul Hassin

- **RISM Lifetime Achievement Award**

Recipients:

1. Sr Jailani bin Jasmani
2. Prof. (I) Sr Hj. Mohd Khairudin Abd Halim
3. Datuk LSr Bernard Liew Chau Min

- **RISM Outstanding Writer in Property and Construction Award**

Recipient: Sr Ts. Dr. Mohd Ashraf Mohd Fateh

- **RISM Innovation & Technology Award**

Recipient: Assoc. Prof. Sr Ts. Dr. Md Azree Othuman

- **RISM Outstanding Contribution in Sustainability Award**

Recipient: Assoc. Prof. Sr Dr. Nur Azfahani Ahmad

- **Tokoh Juruukur Malaysia Award**

Recipient: LSr Haji Mohammad Azmi Mohd Zin

Prepared by:

Siti Noor Hanie Salleh, Secretariat

Endorsed by:

LSr Dr. Sanusi bin Che Cob, Organising Chairman



COURTESY VISIT TO MINISTRY OF WORKS (KKR)

Date:
27 AUGUST 2025

Venue:
MINISTRY OF WORKS (KKR)

The Building Surveying Division of RISM had the honour of paying a courtesy visit to the Ministry of Works (KKR), received by YB Dato Sri Alexander Nanta Linggi, Minister of Works, together with YBhg. Dato' Seri Azman Ibrahim, Secretary General, YBhg. Dato' Mohd Sakeri Abdul Kader, and the top management of KKR.



The visit served as a valuable platform to present and discuss the importance of the Building Surveying profession and the proposed Act for Building Surveyors. It was indeed an engaging session, where the Minister and KKR leadership showed strong interest and posed pertinent questions on the subject matter.

Special appreciation goes to Sr Richard Ooi, Datuk Sr Firdaus, and Sr Steven Pang from the RISM Council, who accompanied the Division during this visit. Their presence and insights further strengthened our discussions with the Ministry.

RISM-AIAC ADR CONFERENCE 2025

The RISM-AIAC ADR Conference 2025, themed “Practical ADR for Surveyors: From Root Cause to Right Outcome,” was successfully held on 10 November 2025, Monday at the Asian International Arbitration Centre (AIAC), Bangunan Sulaiman, Kuala Lumpur. The conference brought together industry practitioners, academics, and professionals to discuss practical approaches to Alternative Dispute Resolution (ADR) relevant to the surveying profession.

AIAC participated as the Strategic Partner, with REHDA and IEM as Supporting Organisations. The event recorded 40 physical attendees, comprising paid participants and invited guests, and an additional 80 online participants. The conference was highly encouraging, especially with the keynote address delivered by The Honorable Justice, Dato’ Sr Lim Chong Fong, Judge of the Court of Appeal.



“

The Organising Committee extended their sincere appreciation to all individuals and organisations involved in making the conference both successful and memorable. While the secretariat finalizing the account, the Committee propose the profit generated from the event will be channelled towards future training programmes and research initiatives under the ADR Committee.



RISM HIKING 2025

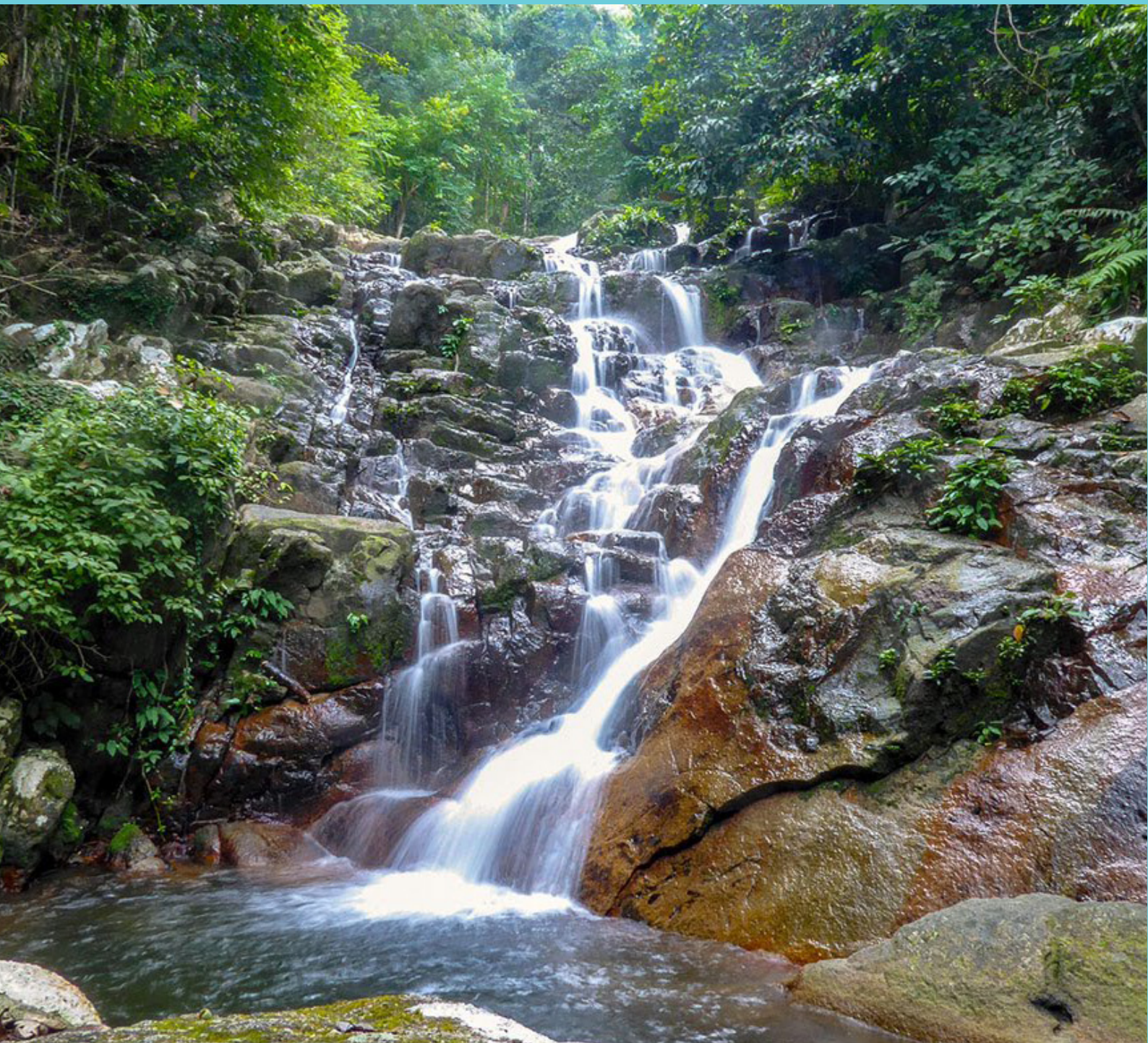
Date:

28 SEPTEMBER 2025

Venue:

BATU ASAH WATERFALL AND SOFEA JANE WATERFALL

The RISM Hiking Program was successfully held on 28 September 2025 (Sunday) with a total of 34 participants. The hiking trail covered scenic routes leading to Batu Asah Waterfall and Sofea Jane Waterfall, two of Selangor's popular eco-recreational destinations.





The event proceeded smoothly, with all participants completing the hike safely and enjoying the refreshing natural environment. The program received positive feedback, with many participants expressing appreciation for the well-organized activity and suggesting that more hiking programs be organized regularly under RISM rather than as a one-off event.



RISM PICKLEBALL TOURNAMENT 2025

“ The RISM Pickleball Tournament 2025 was successfully held on 11 October 2025 (Saturday) at Pickle Fence Subang. A total of 30 teams participated across three categories – Men’s Doubles, Mixed Doubles, and Women’s Doubles.

The event was organized by the RISM Sports & Social Committee to encourage member engagement, promote fitness, and strengthen camaraderie among RISM members. The tournament was well-received and conducted smoothly under the coordination of the organizing team.

Overall, the tournament achieved its objectives of promoting sportsmanship and unity among members, and similar activities will continue to be encouraged in future sessions.



Mixed Double

CHAMPION	: Sr Mohd Hanafi bin Moghni & Emyliza binti Abdul Halim (Hsz Asset Management)
2ND PLACE	: Sr Linges & Sheryne Wong Hui Hwa (Knight Frank)
3RD PLACE	: Yuwaraja Muniandy & Wendy Lim (CBRE WTW)

Women's Double

CHAMPION	: Sr Yong Juang Yunn, Jessyca & Sr Leong Ka Mun, Carmen (PHB Property /Structural Repairs)
2ND PLACE	: Alya Masisarah Binti Mokhtar & Aina Madiah Binti Mokhtar (MN Associates)
3RD PLACE	: Sarahdewi binti Abdul Salam & Nuraisah Binti Mat Ali (Rahim & Co International)

Men's Double

CHAMPION	: BRYAN YAPYEE SHENG & JOHN LIMWAYXIAN (RAHIM & CO INTERNATIONAL)
2ND PLACE	: SR STANLEY & SR KHAW ENG LENG (LAURELCAP/HENRY BUTCHER)
3RD PLACE	: MUHAMMAD NUR ARIFF & ABDUL MUIZZ (MN ASSOCIATES)



MALAYSIAN EXCELLENCE SHINES AT RICS SOUTHEAST ASIA AWARDS 2025

Date:

30 OCTOBER 2025

Venue:

FULLERTON HOTEL, SINGAPORE



The prestigious RICS Southeast Asia Awards 2025, held at the iconic Fullerton Hotel Singapore, celebrated outstanding achievements in the built environment across the region. The ceremony recognised individuals and organisations that exemplify the highest standards of professionalism, innovation, and impact in real estate, construction, and infrastructure.

This year, Malaysia proudly emerged as one of the top-performing countries, with several wins and commendations across major categories – demonstrating the nation's growing influence and leadership in the Southeast Asian built environment landscape.

The strong showing of Malaysian winners at the RICS Southeast Asia Awards 2025 underscores the nation's expanding leadership in the regional built environment. From innovative academic research and digital valuation tools to excellence in property, valuation, and quantity surveying services, Malaysia continues to demonstrate that its professionals are driving sustainable, data-informed, and inclusive growth across ASEAN.



Distinguished Malaysian Representation on Jury

Malaysia was also represented on the RICS Southeast Asia Awards 2025 judging panel by Sr Wan Ainon Zuraiha, President of the Royal Institution of Surveyors Malaysia (RISM) for the 2025/2026 session.



Woman of the Built Environment Award

PPRISM Sr Dr Wan Maimun Wan Abdullah

Recognised for her exemplary leadership and contribution to empowering women in the surveying and construction professions.



Emerging Achiever of the Year

Assistant Professor Ts. Sr Dr. Nadzirah Hj. Zainordin, MRICS

Honoured for her outstanding achievements in research, sustainability advocacy, and leadership within the quantity surveying profession, representing Malaysia's new generation of transformative built environment leaders.



Research Team of the Year

Construction Economics, Law & Policy (CELP) Research Group,

Faculty of Built Environment & Surveying, Universiti Teknologi Malaysia (UTM)

Project: A cost model analysis-driven rating tool for smart housing valuation in Malaysia

Acknowledged for pioneering an innovative, data-driven approach to housing valuation that supports smart and sustainable development goals.



Property Management Team of the Year

Knight Frank Property Management Sdn Bhd
Menara Binjai



Quantity Surveying Team of the Year

PKT Quantity Surveying Consultant SDN BHD
Data Center Project



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