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Developing a Transnational Postgraduate Programme in Smart and Sustainable Cities through UK-Egypt Collaboration

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Abstract **-** Since 2010, transnational education (TNE) has increasingly become a focal point for the UK higher education sector. In response to the stagnation in international student recruitment, TNE has emerged as a strategic approach for revenue diversification and the expansion of universities' global engagement. The UK currently holds a leading position in the global TNE landscape, fostering cross-border collaborations that enhance educational accessibility and institutional partnerships.
This paper presents a collaborative initiative between the University of Bradford (UK) and Tanta University (Egypt) to develop an interdisciplinary postgraduate programme in Smart and Sustainable Cities. The programme aims to address the critical shortage of professionals with expertise in sustainable urban development, particularly within Egypt and the broader Middle East. It is designed to equip graduates with an in-depth understanding of smart and sustainable urbanization while enhancing their employability through the development of practical, industry-relevant skills.
The curriculum has been developed through a structured, multi-phase process, incorporating benchmarking studies, stakeholder consultations, curriculum development workshops, academic seminars, and regulatory reviews and approvals. In addition to fulfilling educational objectives, this initiative contributes to the evolving TNE landscape by expanding access to advanced education and fostering international academic cooperation. Its broader impact extends to both Egypt and the UK, strengthening global academic ties and supporting the UN Sustainable Development Goals (SDGs).
Keywords**:** Transnational Education (TNE); Sustainable Urban Development; Smart Cities; Sustainable Development Goals (SDGs); Curriculum Development

1. Introduction

In the digital era, rapid advancements in technology necessitate equipping graduate students with the scientific and practical knowledge required to tackle the complex challenges of designing and managing smart and sustainable cities (SSCs). To leverage the research expertise of leading academics, a joint team from the University of Bradford (UK) and Tanta University (Egypt) initiated a collaboration under the 2023–2024 British Council TNE Grants scheme.

The primary objective of this collaboration is to strengthen academic ties between the two institutions by developing an advanced interdisciplinary postgraduate programme in Smart and Sustainable Cities aligned with Egypt Vision 2030 [1]. This initiative has the potential to make substantial contributions to Egypt's economic development and social wellbeing over the medium and long term. By emphasising sustainability, innovation, and technology, the programme addresses critical challenges facing modern urban environments—such as population growth, urbanisation, resource management, energy crises, and social inequality.

The programme targets graduates from diverse academic backgrounds—including engineering, computing, architecture, management, and economics—equipping them with essential knowledge and hands-on skills tailored to the smart urbanism labour market. Its multi-dimensional structure integrates cutting-edge technologies such as wireless sensor networks, the Internet of Things (IoT), waste and energy management systems, smart grids, urban planning, GIS, smart transportation, ecology, artificial intelligence, and big data analytics. Cross-disciplinary coursework ensures that students acquire both theoretical insights and applied competencies in intelligent urban planning and implementation.

Globally, the rapid expansion of smart city initiatives underscores the growing need for strategic planning and sustainable development in urban areas. In Egypt, this vision is materialising through cities such as the New Administrative

Capital, New Alamein, and New Luxor—featuring renewable energy systems, smart infrastructure, and green mobility solutions. These efforts reflect Egypt's strong commitment to sustainability and digital transformation in urban development.

Despite global progress, Egypt and the broader Middle East face a notable shortage of professionals equipped with specialised knowledge in this domain. A comprehensive survey confirmed the absence of comparable programmes in Egypt and only a limited presence in the wider region. This highlights the strategic importance and regional uniqueness of the proposed programme, which is designed to fill this educational and professional gap while fostering a new generation of leaders in smart and sustainable urban development.

2. Objectives and Importance

The overarching objective of this programme is to develop a new generation of highly skilled professionals capable of addressing the multifaceted challenges of smart and sustainable urban development. The programme directly responds to a recognised gap in the Egyptian and broader Middle Eastern labour markets, where there is a growing demand for experts who can integrate technological innovation with sustainable planning principles.

The programme's development was guided by a structured sequence of activities, including benchmarking studies, stakeholder engagement, curriculum design workshops, and academic consultations. These efforts culminated in the preparation of documentation for regulatory approval, demonstrating institutional commitment and strategic alignment with national development goals.

Smart cities are defined by their ability to harness data, digital technologies, and integrated systems to improve urban infrastructure, enhance citizen services, and foster inclusive, environmentally responsible growth. In this context, technologies such as artificial intelligence, digital twins, big data analytics, and IoT are enablers of transformation—but the success of smart cities depends equally on the coordination of governance, policy, and human capital development.

Urbanisation presents numerous challenges: congestion, pollution, inequality, resource depletion, and environmental degradation. Meeting these challenges requires a multidisciplinary approach that bridges technical innovation with policy, social equity, and ecological awareness. This programme is therefore aligned with the UN SDGs, particularly those related to sustainable cities, clean energy, water, environment, innovation, and quality education.

As cities worldwide increasingly embrace smart technologies and sustainable practices, professionals trained in this program will be equipped with the knowledge and skills needed to contribute to strategic urban development, allowing them to play a pivotal role in shaping urban landscapes. With a focus on sustainable development and renewable energy, the program emphasizes environmentally conscious practices, promoting eco-friendly solutions and contributing to the creation of resilient and sustainable urban environments. The interdisciplinary nature of the program ensures that participants gain a holistic understanding of the complex challenges associated with smart and sustainable urban development, enabling them to collaborate effectively across various domains, fostering comprehensive solutions. It also fulfils the educational needs of individuals interested in pursuing a career in smart and sustainable urban development, providing them with the necessary expertise and skills.

3. Methodology and Approach for Programme Development

The development of the Smart and Sustainable Cities programme followed a rigorous, multi-stage methodology grounded in evidence-based practices and stakeholder input. An initial scoping phase was conducted to benchmark existing programmes globally. This revealed a limited number of comparable offerings in Europe and only a single relevant programme within the Middle East, hosted by a Saudi university. These findings confirmed both the necessity and uniqueness of the proposed initiative in the regional context.

To ensure relevance and applicability, the curriculum design process incorporated a series of interactive workshops and consultations with subject matter experts, academics, and industry practitioners. These sessions explored key thematic areas of smart sustainability, including transportation, agriculture, energy systems, and infrastructure, ensuring that the programme reflects real-world needs and multidisciplinary integration.

A systematic review of recent scientific literature [2–4] was also undertaken to identify emerging trends, technological applications, and pedagogical models in smart urbanism. Insights gained from this review informed the content and structure of the curriculum, helping define the programme's core competencies and learning outcomes.

Based on this groundwork, eligibility criteria were established to attract candidates with suitable academic and professional backgrounds. The programme primarily targets graduates with bachelor's degrees in urban planning, architecture, architectural engineering, or civil engineering. However, applicants from adjacent fields—such as systems engineering, computer science, management information systems, economics, and geography—are also considered, provided they demonstrate relevant experience and motivation through their professional record and statement of purpose.

To harmonise the diverse academic preparation of incoming students, a suite of foundational modules was developed. These include topics such as software tools, artificial intelligence, and systems thinking. Following this preparatory stage, students select one of six specialised tracks, each offering a tailored blend of core and optional modules. Figure 1 illustrates the programme's six main tracks, while Figure 2 outlines the curriculum structure within each track.

The programme's bylaw has been completed and are currently undergoing final review by the Sector Committee of the Supreme Council of Egyptian Universities. Once approved, the programme will be officially launched, marking a significant milestone in advancing transnational education and sustainable urban development in the region.

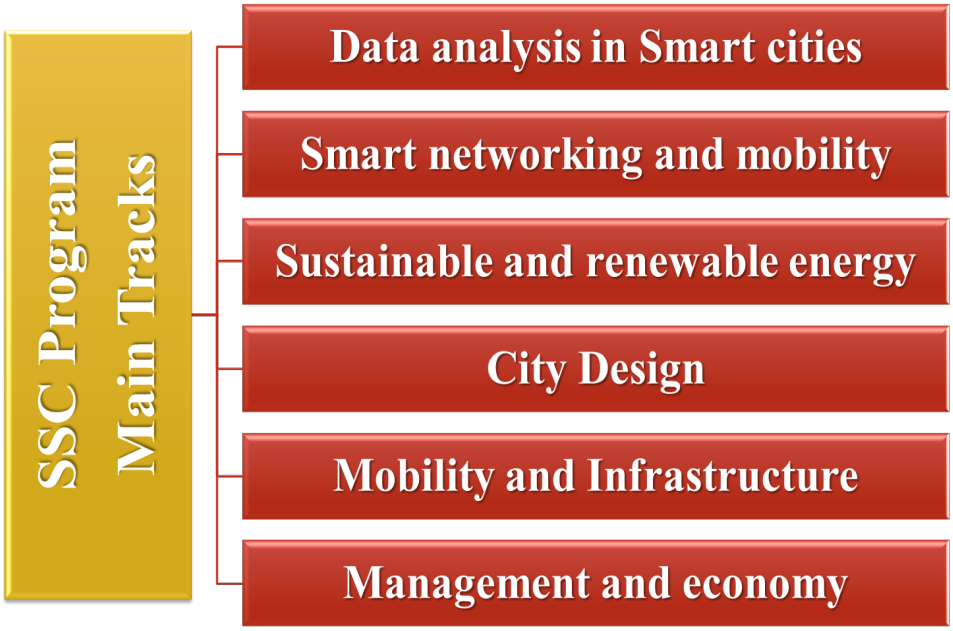

Figure 1: Smart and sustainable cities (SSC) Program Main Tracks

4. Summary and Conclusion

This initiative represents a strategic collaboration between Tanta University and the University of Bradford to deliver a forward-looking postgraduate programme tailored to the pressing demands of smart and sustainable urban development. Developed through a multi-phase process rooted in benchmarking, expert input, and stakeholder engagement, the programme reflects both academic rigor and practical relevance.

By addressing a recognised gap in regional educational offerings and aligning with Egypt Vision 2030 and the UN Sustainable Development Goals, the programme contributes to national and international efforts aimed at building resilient, inclusive, and technologically advanced urban environments. Its interdisciplinary nature, coupled with a modular and track-based curriculum, equips graduates with a comprehensive skillset that integrates engineering, data science, planning, and sustainability.

As the first of its kind in Egypt and the broader Middle East, this programme positions Tanta University as a regional leader in transnational education and urban innovation. The collaboration not only enhances institutional capacity and reputation but also fosters cross-border academic exchange and knowledge transfer.

Upon final approval from the Supreme Council of Egyptian Universities, the programme is expected to attract students from diverse backgrounds and promote impactful careers in smart city development across the region and beyond. Future evaluations will focus on student outcomes, industry partnerships, and contribution to sustainable urban transformation.

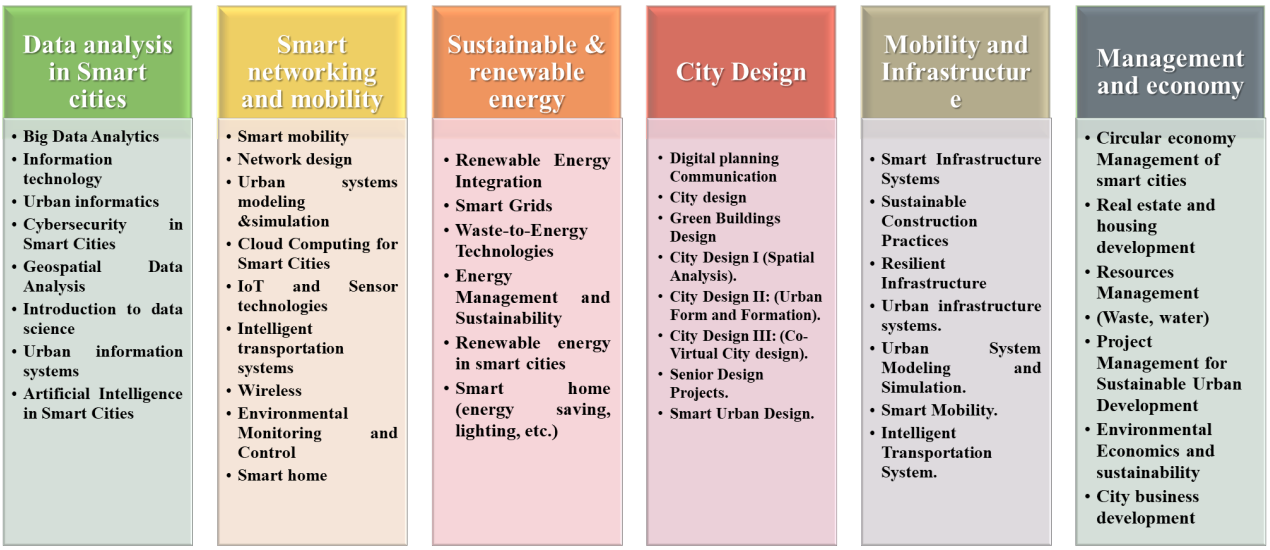

Figure 2: Main modules for each Track

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References

[1] Compton, M., & Alsford, S. (2022). Prestige, power, practice, and professional development: exploring transnational teachers' experiences of a UK-based lecturer development course. International Journal for Academic Development, 29(1), 48–61.

[2] Z. R. M. Abdullah Kaiser and Apu Deb, "Sustainable smart city and Sustainable Development Goals (SDGs): A review", Regional Sustainability Journal, Volume 6, Issue 1, 2025.

[3] Jiangjiang Shao and Byunghak Min, "Sustainable development strategies for Smart Cities: Review and development framework", Cities Journal, Volume 158, 2025.

[4] Dillip Kumar Das "Digital Technology and AI for Smart Sustainable Cities in the Global South: A Critical Review of Literature and Case Studies", Urban Science Journal, 2025.