Lingnan University 2025/2026 SDG Report
SDG 9 – INDUSTRY, INNOVATION AND INFRASTRUCTURE



1,035
Research Outputs

2.35
Field Weighted Citation Impact

301
Research Projects and Grants

155
Undergraduate Courses

Lingnan University advances **SDG 9: Industry, Innovation and Infrastructure** through interdisciplinary research, responsible technological development and collaboration with industry and communities. Building on its strengths as a research-intensive liberal arts university in the digital era, Lingnan connects scientific and technological innovation with societal needs. Its work spans clean energy, advanced battery technologies, humanitarian design and responsible artificial intelligence, alongside research on enterprises' capabilities for sustainable development. Together, these initiatives support sustainable industrial practices, more resilient infrastructure and wider access to the benefits of innovation. The examples below illustrate how Lingnan combines research, practical solutions and partnerships to address local and global development challenges.

Synergies Among Responsible Artificial Intelligence (RAI), Environmental, Social and Governance (ESG), and Sustainable Development Goals (SDGs)

Research co-authored by Professor Xin Yao, Vice-President (Research and Innovation) at Lingnan University, and Changwu Huang explores how responsible artificial intelligence (RAI), environmental, social and governance (ESG), and the Sustainable Development Goals (SDGs) can reinforce one another. Their integration offers opportunities for organisations to enhance societal impact while increasing corporate value and fostering responsible innovation and sustainable business practices.

Through a systematic literature review, the study provides foundational knowledge of RAI, ESG and the SDGs, including their origins, core concepts and main implementation challenges. It then examines the connections and synergies among these frameworks, highlighting opportunities to align AI development, corporate responsibility and

sustainable development.

Based on this analysis, the researchers propose an integrated framework that synthesises the relationships among RAI, ESG and the SDGs. The framework demonstrates how these approaches can be mutually reinforcing when implemented cohesively, supporting organisations in incorporating sustainability and social responsibility into technological innovation and business decisions.

The paper also discusses implications for multiple stakeholders while acknowledging implementation challenges and tensions. It emphasises the importance of viewing RAI, ESG and the SDGs as interconnected frameworks rather than separate goals. Through this integrated perspective, organisations can align them collectively within strategic planning and operational practices, promoting more effective and sustainable outcomes while addressing complex societal challenges in the AI era.

The research contributes both theoretical understanding and practical guidance for holistic approaches that harness the transformative potential of AI while ensuring that its development and deployment serve broader sustainability and social responsibility objectives. It supports SDG 9 through responsible technological innovation, with additional relevance to SDG 12 through responsible corporate practices, SDG 16 through accountable governance, and SDG 17 through policy coherence and multi-stakeholder alignment.

C. Huang and X. Yao, "Synergies Among Responsible Artificial Intelligence (RAI), Environmental, Social and Governance (ESG), and Sustainable Development Goals (SDGs)," in *IEEE Computational Intelligence Magazine*, vol. 20, no. 4, pp. 20-41, Nov. 2025, doi: 10.1109/MCI.2025.3593452.

Multinationality and Strategic Dynamic Capabilities During Sustainable Development Goals Adoption: Evidence From a Natural Experiment

Led by Professor Liane W.Y. Lee, Associate Professor of Teaching in the Department of Management, this research examines how multinational enterprises (MNEs) implement initiatives to adopt the Sustainable Development Goals (SDGs). The study is relevant to SDG 9: Industry, Innovation and Infrastructure, with additional connections to SDG 8: Decent Work and Economic Growth and SDG 12: Responsible Consumption and Production, through its focus on innovation, strategic adaptability and sustainable corporate practices.

The research investigates how two types of multinationality—degree of internationalisation and international diversification—affect MNEs' application of strategic dynamic capabilities. It enhances dynamic capabilities theory by incorporating institutional change, examining the contextual impact of the global SDG initiative on corporate strategies.

Using a difference-in-differences approach, the study compares two groups across the

three years before and after the launch of the SDGs in 2015. This natural experiment provides a basis for analysing institutional changes associated with SDG implementation.

The findings reveal that MNEs' degree of internationalisation is positively associated with three key strategic capabilities: ambidexterity, innovation and reconfiguration. However, international diversification has the opposite effect, highlighting the distinct implications of these two dimensions of multinationality.

The study suggests that adopting the SDGs can benefit MNEs by enabling them to leverage non-location-bound firm-specific advantages across geographies. However, diverse local challenges in emerging markets may increase transaction costs and impede the internal integration of dynamic capabilities.

These findings contribute to SDG 9 by deepening understanding of organisational innovation and adaptability. They also offer insights relevant to SDG 8, particularly the strategic capabilities that may support innovation-driven productivity and sustainable business development. The connection to SDG 12 lies in examining how multinational enterprises respond to the SDGs and integrate sustainability priorities into corporate initiatives. Together, these perspectives strengthen understanding of how enterprises navigate institutional change while aligning business strategies with sustainable development.

Digital Innovation and Information Transparency for Sustainable Supply Chains

Led by Dr Tana Siqin, Research Assistant Professor, Office of the Faculty of Business, this research supports SDG 9: Industry, Innovation and Infrastructure by examining how digital technologies and information transparency can strengthen supply chain management. Her collaborative work connects technological innovation, digital transformation and responsible business practices, offering guidance for firms pursuing sustainable industrial development.

In a study published in *IEEE Transactions on Engineering Management*, Dr Siqin and her collaborator explore the integration of generative artificial intelligence and the Internet of Behaviors, which uses behavioural data to understand users' preferences and habits. Drawing on academic literature and business examples, the study proposes a framework for incorporating these technologies into supply chain management. It identifies opportunities to improve operational performance, examines implementation challenges and outlines priorities for future research. This work contributes to knowledge on industrial innovation and firms' technological capabilities.

A complementary study in the *Journal of Business Research* examines how information disclosure can strengthen environmental, social and governance (ESG) practices across supply chains. Through a systematic literature review, the authors develop the ETHICS framework, addressing misleading ESG claims, communication technology, visibility across supplier tiers, industry collaboration, adaptation of reporting frameworks and

integration of ESG metrics.

The framework helps managers consider what information to disclose, to whom and when. It offers a structured basis for improving supply chain transparency, ESG performance assessment and responsible supply chain governance. The study also identifies research priorities concerning the assessment and measurement of social information, disclosure timing and social responsibility within supply chain partnerships.

Together, these studies provide conceptual foundations and practical guidance for aligning digital transformation with sustainable supply chain governance. They contribute to SDG 9 by advancing research on industrial technologies and informing more sustainable ways of organising production and supply networks, with an emphasis on technology-enabled operational improvement, information transparency and sustainable industrial development.

FlexiBot: Autonomous Wireless Charging for Sustainable and Resilient EV Infrastructure

Led by Professor Tang Xiaopeng, Assistant Professor (Presidential Early Career Scholar), Division of Science, and developed with Wang Fangyu of Lingnan University, FlexiBot uses mobile robotics and wireless charging technology to address gaps in electric vehicle (EV) charging infrastructure. The project supports SDG 9: Industry, Innovation and Infrastructure through smart mobility, infrastructure innovation and resource-efficient charging.

As EVs become increasingly common, the shortage of charging facilities is becoming more pressing. In Hong Kong and many European countries, there is often fewer than one public charger for every eight EVs. In space- and resource-constrained cities, installing fixed chargers in older parking facilities requires costly excavation and cable laying. Existing chargers can also remain occupied long after vehicles are fully charged, particularly overnight. This mismatch between supply and demand creates a “last-mile” bottleneck for green transport.

FlexiBot is an autonomous wireless charging robot that navigates parking facilities, moves underneath a vehicle and automatically connects to its wireless charging module through a lifting platform. It supports compatible EVs from multiple brands. Its core innovation is to replace fixed charging arrangements with flexible, shared charging infrastructure: one robot serves multiple parking spaces, intelligently scheduling charging according to power demand and off-peak availability.

The project received the Jury Commendation Gold Medal at the Geneva International Exhibition of Inventions and a Gold Medal at the Silicon Valley International Invention Festival.

FlexiBot enables a single charging device to deliver utilisation approaching that of

three fixed chargers, substantially improving resource efficiency and reducing infrastructure costs. In older housing estates and locations where electrical capacity cannot be upgraded, its "zero-infrastructure" deployment approach minimises the need for additional fixed charging installations and transforms existing parking spaces into flexible charging areas.

Through intelligent charging schedules and off-peak energy management, the system helps reduce peak electricity demand and make better use of low-demand periods. By combining autonomous robotics with wireless charging, FlexiBot offers an innovative approach to sustainable and resilient infrastructure, supporting wider EV adoption, green transport and the transition towards low-carbon mobility.

Advisory Services for Hong Kong Power Sector's Participation in the Southern China Carbon Capture, Utilisation and Storage (CCUS) System

Undertaken by Professor LI Jia, Associate Professor at Lingnan University's Wu Jieh Yee School of Interdisciplinary Studies, this advisory project examines how Hong Kong's power sector could participate in regional carbon capture, utilisation and storage (CCUS) infrastructure in Southern China. Scheduled from August 2025 to February 2026, the project focuses on assessing potential CO_2 storage sites in Guangdong, comparing pipeline and shipping options, and developing commercial and cost models. It aims to provide a strategic participation roadmap aligned with CLP's decarbonisation strategy and regional CCUS development timelines.

SDG 7 – Affordable and Clean Energy

The project supports power sector decarbonisation by exploring how Hong Kong's electricity generation sector could access regional CO_2 transport and storage infrastructure. Its assessment of technical feasibility and costs aims to inform commercially viable approaches to reducing power-sector emissions, contributing to the transition towards lower-carbon electricity generation.

SDG 9 – Industry, Innovation and Infrastructure

The project supports the planning of cross-border low-carbon infrastructure, including CO_2 pipelines, shipping routes and geological storage facilities. By evaluating infrastructure requirements, storage capacity and commercial arrangements, it aims to inform the development of regional CCUS networks and strengthen the evidence base for sustainable industrial infrastructure investment.

SDG 13 – Climate Action

The project explores potential pathways for large-scale carbon emissions reduction through Hong Kong's participation in regional CCUS hubs. Its technical, regulatory and economic assessments will inform a strategic roadmap for participation between 2025 and 2040, supporting evidence-based climate mitigation planning and alignment with

regional decarbonisation efforts.

SDG 17 – Partnerships for the Goals

The project supports cross-border collaboration among CLP Power Hong Kong Limited, Guangdong CCUS stakeholders, China Southern Power Grid, academic and geological experts, and relevant government and regulatory agencies. By examining shared infrastructure, business arrangements and regulatory requirements, it aims to facilitate coordination between Hong Kong and Guangdong in pursuit of shared climate objectives and regional low-carbon development.

Monitoring Greenhouse Gas Emission Point Sources From China Space Station

With Professor LI Jia, Associate Professor at Lingnan University's Wu Jieh Yee School of Interdisciplinary Studies, participating in the research collaboration, this project aims to develop a greenhouse gas monitoring system using observations from the China Space Station and related satellite platforms. Running from August 2025 to August 2028, it will combine space-based observations, data analytics, ground-truth verification and blockchain technology to identify and quantify emission point sources and provide secure, transparent and traceable emissions data.

SDG 7 – Affordable and Clean Energy

The project aims to provide reliable greenhouse gas emissions data that can inform clean energy transition strategies. By identifying emission sources and analysing trends, it could help policymakers and industry stakeholders assess emissions associated with energy use and prioritise opportunities for lower-carbon energy systems.

SDG 9 – Industry, Innovation and Infrastructure

The project advances space-based environmental monitoring and secure digital infrastructure by integrating satellite observations, data analytics and blockchain technology. Its planned data-processing framework and geospatial visualisation platform will support the development of innovative tools for emissions monitoring, while blockchain integration aims to strengthen data integrity, transparency and traceability.

SDG 13 – Climate Action

The project aims to strengthen the capacity to identify, quantify and track greenhouse gas emissions, supporting evidence-based climate mitigation and carbon reduction strategies. By combining space-based observations with ground-truth verification, it seeks to provide validated emissions data for regulatory monitoring and compliance assessment, with potential future applications in carbon credit verification.

SDG 17 – Partnerships for the Goals

The project brings together expertise from Lingnan University, the Hong Kong University of Science and Technology, Hong Kong Baptist University, and the Technology and Engineering Center for Space Utilization of the Chinese Academy of Sciences, with support through the Innovation and Technology Commission's Innovation and Technology Support Programme. This cross-institutional collaboration combines capabilities in space technology, environmental monitoring and digital systems to advance climate technology development and support shared sustainable development goals.

Let's Talk: Co-Designing Empathic Retrieval-Augmented Generation (RAG) Chatbots for the Media Arts Classroom

Let's Talk integrates generative AI into design-thinking teaching to accelerate empathy training and AI literacy, supporting SDG 4: Quality Education through interdisciplinary learning and innovative, human-centred pedagogy. This media arts strand sits within the wider Let's Talk Teaching Development Grant, which also includes empathy training in design thinking for global sustainable development across the Global Development and Sustainability Programme's teaching.

Across six interdisciplinary courses, students co-design chatbots that simulate conversational partners, practise perspective-taking and active listening, and learn to verify outputs through citations and "NOT IN CORPUS" rules in safe, repeatable scenarios. The sequence moves from zero-shot roleplay and "sticky questions" to attachment-only, self-check, and two-bot relay workflows, culminating in a student-built RAG chatbot with controllable sources and parameters. Baseline and follow-up surveys, artefacts and reflections capture changes in communication skills and critical, responsible use of AI, producing widely transferable resources for other disciplines and educators.

The project develops empathy, digital literacy, curatorial skills and prompt-engineering proficiency while fostering equity, diversity and inclusion (EDI), cultural sensitivity and inclusive learning environments. These dimensions are relevant to SDG 10: Reduced Inequalities. Its interdisciplinary approach connects technology and design thinking with social and sustainability challenges, while adaptable chatbots and shared teaching resources support knowledge exchange and capacity building among educators. These resource-sharing activities can also support SDG 17: Partnerships for the Goals through future educational collaboration.

Organising Units:

- Global Development and Sustainability Programme, Wu Jieh Yee School of Interdisciplinary Studies - Professor Grace Chou, Programme Director and Professor of Teaching
- Wong Bing Lai Music and Performing Arts Unit, Wu Jieh Yee School of Interdisciplinary Studies - Dr Enrico Bertelli, Associate Professor of Practice