Theories of Compressed Modernisation from the Japanese Perspective

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This keynote explores the intellectual traditions of modernisation theories in Japanese sociology, focusing on the Japanese reception and reinterpretation of Western frameworks, and examining the implications of “compressed modernisation”.

Early postwar sociology was strongly influenced by European classics (Tönnies, Simmel, Durkheim, Weber) and later by American sociology. In the 1950s, Japanese sociology shifted from “grand theory” to specialized subfields—family, rural, and industrial sociology—each dealing with the disintegration of traditional structures under rapid modernisation. On the theoretical side, Marxist sociology and liberal sociology functioned as the two major theoretical frameworks. As the primary example of the latter framework, I discuss Ken’ichi Tominaga’s *Theory of Modernisation*, published in 1996. While grounding his work in Parsons’ systematic theory, Tominaga constructed an integrated theory to explain social structure and its ‘change,’ thereby clarifying the nature of Japan’s modernisation within a universal theoretical framework.

However, the challenge lies in incorporating two dimensions that remain underdeveloped: reflexivity and plurality. Reflexivity, as formulated by theorists of reflexive modernisation (Beck, Giddens), emphasises how modernity confronts and transforms itself in the face of its own side effects. Plurality, by contrast, highlights the diversity of modernisation trajectories within Asia, including Japan’s “semi-compressed modernity.”

Finally, I examine Japanese food culture as a case study of compressed modernisation. As comparative studies in East Asia—Japan, Korea, Taiwan, China—demonstrate, the de-structuration of eating models serves as an indicator of compressed food modernity, revealing a distinctive dynamic of dietary change that differs from transformations in the economy or family structures. Moreover, comparative research on the ‘protein transition’—the shift from plant-based to animal-based foods—shows that the experience of compressed nutrition transition has generated a discrepancy between nutritionistic and environmentalist norms and the empirical reality of East Asia as a region that has nowadays become heavily meat-oriented.

Keywords: Compressed modernisation, social change, food studies, protein transition

Invited Speaker

Compressed Modernity and Asian Pathways: Perspectives from Southeast Asia

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This talk explores the concept of compressed modernity as developed by Chang Kyung-Sup, applying it to the study of Asian modernization in Southeast Asia. It begins by foregrounding three fields of focus - International Relations, Psychology, and the Arts and Literature - as entry points into the discussion. In an era of rapid technological shifts, intensified globalization, and deep inequalities, compressed modernity offers a lens to understand how societies undergo simultaneous, uneven, and often contradictory processes of modernization within condensed timelines.

The presentation situates compressed modernity within interdisciplinary debates, showing how International Relations, Psychology, and the Arts and Literature contribute to this discourse: from analyses of governance and regional diplomacy to studies of subjectivities under modernization stress, to creative and literary works that capture its affective dimensions.

The talk will address three areas: (1) the theoretical foundations and relevance of compressed modernity in Southeast Asia; (2) the interdisciplinary potential of linking social theory with empirical and cultural work; and (3) the role of intellectual and artistic practices in mediating lived experiences of modernization. It argues for a more nuanced, culturally grounded account of Asian modernity, one that recognizes the uneven rhythms of change while opening space for interdisciplinary collaboration and imagination.

Keywords: Compressed Modernity; Asian Modernization; Southeast Asia; Interdisciplinarity; Social Transformation

Invited Speaker

Varieties of Compressed Modernity: Food Cultures, and Health in Southeast Asia

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The framework of compressed modernity provides a powerful entry point for examining food and health transitions in Southeast Asia, where urbanisation, industrialisation, and globalisation unfold at accelerated and overlapping speeds. Unlike the gradual transitions in the West, Southeast and East Asian societies face simultaneous pressures of rising obesity and non-communicable diseases, contested food norms, and the emergence of reinvented heritage cuisines.

Drawing on the insights from the Asian Food Barometer initiatives, this presentation empirically grounds these debates and highlights three arenas where varieties of compressed modernity manifest in food systems and habits: (1) the rise of eating out as a distinctive marker of Asian modernisation; (2) the protein transition, marked by tensions between nutrition, sustainability, and food cultures; and (3) the increased attention to food heritage as cultural resources in compressed modernisation.

Rather than a single trajectory, these cases illustrate the plurality of pathways that societies in the region follow as they negotiate modernisation. They underscore that compressed modernities must be understood as multiple and context-specific, shaped by colonial legacies, demographic change, and cultural patterns. Food thus becomes a lens through which the varieties of modernisation are experienced - at once material in their health impacts and symbolic in their role in cultural identity.

This presentation situates food at the intersection of cultures and health to argue that understanding compressed modernities in Southeast Asia requires attention to diversity, plurality, and the uneven rhythms of change, rather than a search for universal models of transition.

Keywords: compressed modernity, varieties of modernisation, food transitions, health, Southeast Asia

Compressed Modernity in Southeast Asian Cities: Implications for the Built Environment

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Compressed modernity describes the rapid and simultaneous transformation of economic, political, social, and cultural systems within a condensed timeframe, particularly in non-Western societies. In the context of the built environment, this phenomenon manifests as a spatial and symbolic layering of different temporalities—traditional, modern, and postmodern—within urban landscapes. Cities undergoing compressed modernity often exhibit stark juxtapositions: ancient temples beside skyscrapers, colonial remnants amidst globalized architecture, and rapid redevelopment that reshapes urban memory. In Southeast Asia, this phenomenon is vividly reflected in the built environment, where colonial legacies, post-independence aspirations, and global capitalism converge.

Cities like Jakarta, Manila, and Kuala Lumpur showcase hybrid urban forms, where traditional architecture coexists with modernist and globalized structures. This spatial layering reflects the region's negotiation between heritage and progress.

The built environment becomes a material archive of contradictions—where global aspirations, local identities, and historical residues collide. However, despite its analytical power, the concept of compressed modernity remains underutilized in architectural and urban studies. Scholars call for deeper integration with spatial theory, empirical research on lived experiences, and attention to affective dimensions—how people emotionally engage with rapidly changing spaces.

In conclusion, compressed modernity offers a compelling lens to understand the complexities of urban transformation in rapidly modernizing societies. It challenges linear development narratives and invites a more nuanced reading of how architecture and city mediates identity, memory, and power in the contemporary city of Southeast Asia.

Keywords: spatial layering, contemporary city, juxtaposition, changing space, hybrid architecture

Keynote Speaker

Application of organoid technology in the identification and characterisation of prostate luminal progenitor subsets and their ability to serve as the cell-of-origin for prostate cancer

Professor Dr Chee Wai Chua, Ph.D.

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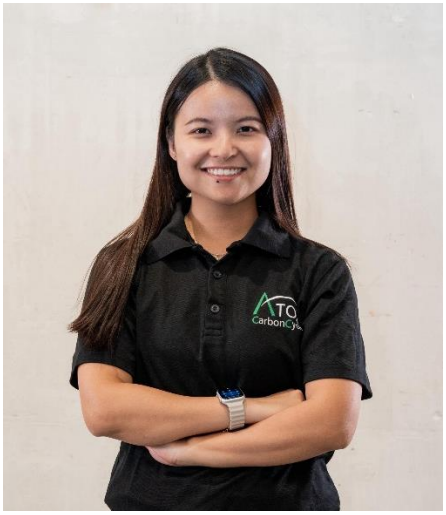
Historically, prostate luminal epithelial progenitors and cancer cells were difficult to culture, thus hampering the generation of representative models for prostate stem cell and cancer research. In the early 2010s, we have invented a prostate organoid culture methodology that favours the growth of prostate luminal epithelial cells, and can efficiently maintain prostate luminal epithelial progenitors and cancer cells as organoids. In this presentation, I will first describe the development of this prostate organoid technology, and how we have successfully used it for the identification of prostate stem cells or progenitor subsets and the generation of novel prostate tumour models for drug discovery and assessments. Moreover, I will also talk about our recent unpublished works on the elucidation of the ability of different prostate luminal progenitor subsets to serve as the cell-of-origin for immune-evading prostate cancer using integrated organoid technology, single cell transcriptomic analyses and in vivo grafting approach. Lastly, I will end my presentation by discussing the key challenges in the current state of prostate organoid technology.

Keywords: Organoid technology; Prostate luminal progenitor; Cell of origin; Prostate cancer; single cell RNA sequencing

Innovating Food, Transforming Sustainability: Microalgae & Low-Carbon Ecosystems for Healthy Living



Ms Jean Tan
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This speech explores how *microalgae innovation* and *low-carbon ecosystems* can transform the future of food and sustainability in the context of biotechnology and environmental science. In an era marked by accelerating climate change, resource scarcity, and growing consumer demand for healthier living, it is essential to rethink how we produce, consume, and regenerate food systems.

Drawing upon my experience in regenerative agriculture projects, carbon credit development, and community engagement, this address will present how microalgae—an underutilized yet powerful biological resource—can bridge health, sustainability, and economic opportunity. The session will highlight how microalgae functions as both a nutrient-rich food source and a natural carbon sink, contributing to healthier diets while mitigating greenhouse gas emissions.

The speech covers three key areas:

1. **Food Innovation** – leveraging microalgae as a superfood ingredient for healthier living.
2. **Sustainable Systems** – building low-carbon ecosystems through microalgae cultivation and circular bioeconomy models.
3. **Future Pathways** – linking biotechnology solutions with carbon markets, policy, and community adoption.

It will demonstrate how ecosystem-based approaches, combining *biotechnology* and *nature-based solutions*, can be harnessed to advance climate resilience and food security. Emphasis will be placed on interdisciplinary collaboration—spanning science, business, and social impact—aiming to inspire scholars and practitioners to co-create solutions that move beyond theory into practice.

Key takeaways include a deeper understanding of how microalgae can simultaneously improve human health, regenerate ecosystems, and unlock new economic value through carbon credits and sustainable food innovation. By connecting scientific innovation with real-

world impact, this sharing contributes to a broader vision of integrating biotechnology and sustainability into everyday living and future-ready education.

Keywords: Microalgae; Low-Carbon Ecosystems; Sustainable Food; Regenerative Agriculture; Carbon Credits

Invited Speaker

Acellular Neurotherapies: Innovative Application of Neural Stem Cell Small Extracellular Vesicles in Combating Neurodegeneration

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This speech explores *the therapeutic potential of neural stem cell-derived small extracellular vesicles (sEVs)* in the context *of stem cell-based acellular therapy for neurodegenerative diseases (NDs) such as Alzheimer's and Parkinson's diseases*. In an era marked by *rapidly ageing populations and the rising burden of NDs*, it is essential *to develop innovative and non-invasive approaches to protect vulnerable neurons and promote regeneration*. Drawing upon *advances in stem cell biology and the growing global interest in acellular (cell-free) therapy, this address will highlight the use of natural product-enriched sEVs as a novel strategy for neuroprotection and neurogenesis.*

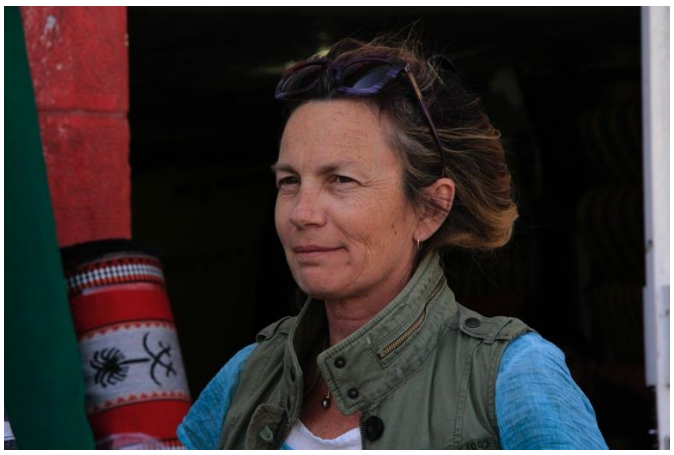
The speech covers two key areas: *(i) the application of natural herb treatment to full-term amniotic fluid stem cells (FT-AFSCs) to induce neural stem cells (NSCs) and sEV production, and (ii) the characterisation and functional evaluation of sEVs derived from induced NSCs*. It demonstrates how *natural extract-enriched NSC-derived sEVs can be leveraged to enhance neurogenesis in both homologous and heterologous stem cell systems.* Emphasis will be placed on *integrating natural compounds with stem cell platforms, showcasing a future-oriented and non-invasive approach for developing neuroregenerative therapeutics*.

Key takeaways include *the ability of these sEVs to promote neuronal maturation and communication at the molecular and cellular levels*, contributing to a broader understanding of *cell-free interventions in neurodegeneration. This approach underscores the promise of harnessing nature-inspired, acellular therapeutics to advance strategies against NDs and ultimately improve the quality of life in ageing populations.*

Keywords: Acellular therapy; Amniotic fluid stem cells (AFSCs); small extracellular vesicles; Neural Stem Cell; Neurodegenerative Diseases.

Keynote Speaker

The ‘Logistics Revolution’: A transnational approach to an emerging storage industry.



Professor Dr Delphine MERCIER

Director of Research, CNRS – Centre National de la Recherche Scientifique, Research Fellow, Maison française d’Oxford, Visiting Fellow Kellogg College, University of Oxford
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This speech explores the logistics revolution, a transnational approach to an emerging storage industry in the context of sociology. This is based on a series of technological innovations which, since the first half of the 20th century, have enabled the deployment of fluid transport networks. These innovations have made it possible to radically decouple the major functions that organise the cycle and circulation of goods (supply chain) from their geographical location. Containerisation and the globalised organisation of maritime transport are at the technical and material heart of this transformation.

However, the driving force behind this widespread frenzy that causes pollution and damage is ‘hypercapitalism’ with its negative externalities: The more complex the system becomes, the more the malfunctions multiply and become irreparable. Each logistical optimisation adds another layer of fragility and creates a society that is in a state of permanent collapse. Today's industry produces two closely linked destructive phenomena: hyperproduction and the proliferation of technical waste, which create industrial mass graves in which the residues of the system accumulate.

Storage occupies a privileged position in deserted areas, where they form veritable enclaves outside local law. They are also places of innovation where real changes in labour relations and the organisation of labour markets are emerging. Precisely because they combine rational stock management, labour flexibility and multiscalarity of distribution channels, they are privileged spaces for understanding the changes taking place in transnational economies.

Keywords: Work ; Logistic Sector ; Transnational Economies ; Labour Markets

Invited Speaker

Designing the Future of Work: Leadership, Sustainability, and Mindful Adaptability

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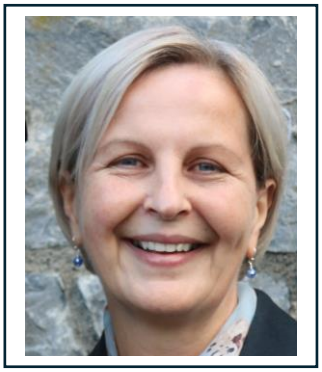
The future of work is no longer defined only by technological shifts — it is about how we design systems that bring out the best in people while responding to global challenges. As automation, artificial intelligence, and digital transformation continue to reshape industries, the deeper task is cultivating the resilience and awareness needed to thrive in uncertain times.

This keynote will explore how organizations and individuals can navigate the future of work by integrating three dimensions: human-centric leadership, sustainability, and mindful adaptability. Drawing from the Mindprint framework, the session highlights how conscious decision-making, emotional intelligence, and systems thinking can transform workplaces into environments that are both efficient and humane.

Participants will gain practical perspectives on reimagining work cultures that honor purpose, well-being, and long-term impact — moving beyond survival toward regenerative growth. The future of work is not only about preparing for change; it is about designing change with clarity, presence, and responsibility.

Keywords: Future of Work, Regenerative Growth, Human-Centric Leadership, Sustainability, Mindful Adaptability

Plastics: Design and Manufacture for Sustainability



Professor Eileen Harkin-Jones
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This keynote address explores how the design and manufacturing of plastics can be modified in the context of enhancing sustainability. In an era marked by overwhelming amounts of plastic waste and pollution, it is essential to focus on any and all means of reducing this waste. Drawing upon the author's extensive knowledge of both materials and processing research and industrial plastics processing, this address will present some solutions to reduce the amount of plastic circulating in waste streams today.

The keynote speech covers some aspects of plastic product design and manufacturing that can be altered to reduce the quantity of plastic used in the design and manufacture of those plastic products. Emphasis will be placed on well-known products, particularly in single use plastic packaging, showing how their design and manufacture could be improved in order to reduce their carbon footprint, aiming to inspire scholars and practitioners to consider these aspects in their future roles as designers and engineers.

Key takeaways include a holistic approach to design that considers both material content and actual processing technique utilised in order to reduce unnecessary material usage and to inspire a mindset of always questioning why we are making products in a particular design and how we can innovate existing processing technologies to minimise plastics waste.

Keywords: plastic waste; product design; plastics processing; sustainability

Invited Speaker

Exploring Solid Waste Solutions for Global Climate Goals

Ts Dr Vincent Woon Kok Sin
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This speech explores how improved global solid waste management can help mitigate global warming. Human activities have led to a global surface temperature rise of 1.1°C compared to preindustrial levels as of the end of 2020. As one of the greenhouse gases, methane concentrations surged to 1911.8 parts per billion in 2022, more than double the preindustrial levels. Due to its short atmospheric lifetime, methane has emerged as a key topic at COP26, highlighting its potential to rapidly mitigate global warming. The solid waste industry, a significant source of methane, could reduce its emissions through currently available technologies. This talk addresses a gap in global analysis by exploring how enhanced solid waste management can support the achievement of the Paris Agreement's 1.5° and 2°C targets, along with the commitments outlined in the Global Methane Pledge.

The speech presents a forecast of greenhouse gas emissions from the global municipal solid waste system under a business-as-usual scenario, utilizing Bayesian-optimized artificial neural networks. Emphasis will be placed on evidence-based mitigation solutions in global solid waste management, aiming to inspire scholars, practitioners, and society to collectively change their consumption and disposal patterns in favor of sustainability.

Key takeaways include abrupt technical and behavioral changes could lead to a net-zero warming solid waste system. However, these changes necessitate rapid adoption to align with the Paris Agreement and Global Methane Pledge.

Keywords: Solid Waste; Global Warming; Paris Agreement; Global Methane Pledge.

Invited Speaker

Sustainability for Inclusive and Resilient Societies

Professor Haywantee Ramkissoon
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Professor, UniSA Business, University of South Australia, Adelaide, Australia[2]
Professor, Faculty of Business & Law, School of Management, Adelaide University, Australia[3]
Distinguished Visiting Professor, College of Business & Economics, University of Johannesburg, Gauteng, South Africa[4]
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This speech explores sustainability in the context of inclusive and resilient societies. In an era marked by natural disasters, wars, global health crises with a remarkable decline in people's emotional and mental wellbeing, it is essential to determine and understand how to further integrate management principles and practices to promote resilience across impacted communities. Drawing upon various calls from the 2030 United Nations Agenda for Sustainable Development, scholarly research and published reports, this address will present the key arguments and recommendations aimed at contributing to more inclusive, resilient and sustainable communities.

The speech covers the vital role of attachment to place and pro-sociality and demonstrate how place attachment theory and pro-social behaviors can be harnessed to develop and enhance coping skills to promote resilience and enhance community wellbeing and quality-of-life goals in communities that have been impacted by loss and separation from loved ones. Emphasis will be placed on how to foster pro-social bonds to drive more inclusion efforts across communities. The speech further elaborates on interventions designed to develop coping strategies to promote resilience aiming to inspire scholars and practitioners to join efforts and work collectively towards enhancing people's wellbeing and quality of life.

Key takeaways include place attachment, pro-sociality and inclusion contributing to a broader understanding of community wellbeing and quality-of-life across communities impacted by loss and separation.

Keywords: Inclusive societies; Place attachment; Resilience; Community well-being; Quality-of-Life

Developing Sustainable Urban Heritage Indicators

Principal Investigator
Associate Professor Dr Camelia Kusumo, School of Architecture, Building and Design, Taylor's University

Co-Investigators
Professor Dr Seyyed Mostafa Rasoolimanesh, Edith Cowan University
Associate Professor Dr Keith Tan Kay Hin, Taylor's University
TPr Ts Norliza Hashim, Urbanice Malaysia
Dr Ceelia Leong, Think City Sdn. Bhd.

Funding Agency: Ministry of Higher Education (FRGS)
Project Duration: November 2020 to July 2023
Grant Amount: RM98,700

A strong and clear indicator to measure the sustainability of urban heritage is required to balance economic, environmental, social, and governance dimensions. Recognizing the increasing pressures on heritage areas—such as gentrification, demographic shifts, and commercial exploitation—the research addresses the absence of a unified framework to guide sustainable heritage management and developed the Sustainable Urban Heritage Indicators (SUHI), a comprehensive tool designed to assess and monitor the sustainability of urban heritage sites in Malaysia. SUHI integrates four key sustainability dimensions: economic, environmental, social, and governance, and aligns with conservation principles to ensure contextual relevance and practical applicability.

Using a qualitative methodology, the study focuses on two contrasting heritage cities—Kuala Lumpur and George Town—and employs the Delphi Method and Analytic Hierarchy Process (AHP) to gather consensus from stakeholders including government officials, experts, and community members. The result is a validated set of objective and subjective indicators, structured around five conservation themes: compatible use, stakeholder engagement, authenticity and integrity, cultural association, and heritage significance.

Key contributions of this research include the creation of a contextualized and measurable framework for urban heritage sustainability, the promotion of stakeholder participation in heritage planning, and the alignment of SUHI with national and international agendas such as Malaysia's Shared Prosperity Vision 2030 and the UN Sustainable Development Goals (SDG 11.4). SUHI not only supports long-term planning for sustainable tourism and urban development but also enhances Malaysia's global standing in heritage conservation.

Keywords: Urban Heritage; Sustainability; Contextualised Indicators; Cultural Heritage

From Medicalisation to Social Inclusion:

The Role of Social Scientists in Prader-Willi Syndrome in Malaysia

Principal Investigator

Associate Professor Dr Wan Puspa Melati Wan Abdul Halim, Taylor's University

Co-Investigators

1. *Professor D Thong Meow Keong, University Malaya*
2. *Associate Professor Dr Elise Line Mognard, Taylor's University Malaysia*
3. *Dr Lee Soon Li, Monash University Malaysia*
4. *Ms Rajalakshmi Ganesan, Taylor's University Malaysia*
5. *Emeritus Professor Dr Mohd. Ismail Noor, Malaysian Association for Study of Obesity*
6. *Ms Affezah Ali, Taylor's University Malaysia*
7. *Associate Professor Dr Anasuya Jegathevi Jegathesan, University of Cyberjaya*
8. *Professor Dr Jean-Pierre Poulain, France, University of Toulouse 2*
9. *Dr Amandine Rochedy, France, University of Toulouse 2*
10. *Associate Professor Dr Cyrille Laporte, France, University of Toulouse 2*
11. *Professor Dr Maite Tauber, France, University of Toulouse*
12. *Dr Marion Valette, France, University of Toulouse*
13. *Dr G. Diene, France, University of Toulouse*

Funding Agency: Ministry of Higher Education (MOHE), Ministry of Europe and Foreign Affairs (MEAE) and Ministry of National Education, Higher Education and Research (MESRI), France
Project Duration: 1 May 2020 – 30 Jun 2023
Grant Amount: RM66,000

This project aimed to address the limited integration of social science perspectives in understanding and supporting Prader-Willi Syndrome (PWS) in Malaysia, which is critical to advancing rare disease studies, disability policy, and family well-being. While PWS research in Malaysia has predominantly focused on medical aspects, little attention has been given to social, cultural, and relational dimensions that affect the quality of life for individuals and their families. Over the course of 1 May 2020 – 30 June 2023, the research successfully achieved its objectives, which were to:

1. Examine how PWS has been constructed and defined in Malaysia, drawing from both medical and societal standpoints.
2. Identify and analyze challenges faced by the PWS community, particularly in relation to medicalisation, familialisation, food management, behavioural and psychiatric difficulties, and adulthood social relationships.
3. Highlight the potential and future role of social scientists in designing interventions, promoting social inclusion, and strengthening advocacy for PWS in Malaysia.

The project employed a qualitative and reflexive methodology, including expert interviews, family observations, and reflexive interviews with caregivers and stakeholders. These were

complemented by systematic literature review and collaboration with the Persatuan Prader-Willi Syndrome Malaysia.

Key findings revealed that while PWS management has been primarily defined by medical expertise, families continue to encounter structural and social challenges that extend beyond healthcare. Food management difficulties, behavioural issues, and limited social integration persist, pointing to the urgent need for interdisciplinary collaboration. The study highlights that social scientists can design interventions, promote community integration, and strengthen advocacy alongside medical teams.

Overall, the project advanced knowledge in rare disease sociology and applied social science, demonstrating how cross-disciplinary collaboration can enrich rare disease care and policy. Findings were disseminated through academic presentations, community engagements, and policy dialogues, and are expected to inform future inclusive strategies for PWS support in Malaysia.

Keywords: Prader-Willi Syndrome; challenges; social scientists; rare diseases; Malaysia

Socio-Cultural and Economic Research in Protein Transition in Southeast Asia: Focus on Malaysia and Indonesia (SCRiPT)

Principal Investigator

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Co-Investigators

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Funding Agency: Ajinomoto; CNRS; CNIEL
Project Duration: 12 March 2020 – 22 May 2025

For many years, based on food availability data, the protein transition was considered to be a matter of economic determinism that unilaterally guided societies toward a greater share of animal products in their diets, as economic development progressed. Socio-anthropological theoretical frameworks have modified this interpretation by highlighting the fact that cultures and religions impose prescriptions and prohibitions primarily on animal products and thus considerably modify the protein consumption profile between countries and population groups. For several decades, a "new" protein transition, reducing the consumption of animal protein in favour of plant proteins, has been underway, particularly among certain segments of the population in the most developed countries. The protein transition therefore appears to be a reversible phenomenon. The challenge for public health policies is therefore to combine the two ongoing transitions, which are both contradictory and simultaneous.

Keywords: protein transition; animal protein; plant protein; socio-cultural influences; protein profilage

Identification And Evaluation of Diagnostic Tumour-Homing Peptides Specifically Targeting Breast Cancer Cells

Principal Investigator
Dr Tang Yin Quan, School of Biosciences, Faculty of Health and Medical Sciences, Taylor's University

Co-Investigators
Professor Dr Serena Zacchigna, International Centre for Genetic Engineering and Biotechnology, Italy

Associate Professor Dr Adeline Chia Yoke Yin, School of Biosciences, Faculty of Health and Medical Sciences, Taylor's University

Associate Professor Dr Yap Wei Hsum, School of Biosciences, Faculty of Health and Medical Sciences, Taylor's University

Funding Agency: Ministry of Higher Education (FRGS)
Project Duration: 1/11/2020 - 30/04/2024
Grant Amount: RM184,500

This project aimed to address the lack of effective active-targeted diagnostic approaches for multiple breast cancer subtypes, a major challenge in cancer research where small-molecule inhibitors often show limited selectivity and high toxicity. Bioinformatics analyses were applied to identify and design tumour-homing peptides (THPs) with strong binding affinity toward highly expressed receptors in breast cancer cells (MDA-MB-231, MDA-MB-453, T47D). These peptides were synthesized and evaluated through *in vitro*, *ex vivo*, and safety assays.

The research successfully achieved its objectives:

1. Designing improved THPs with targeted residues, favourable physicochemical properties, and receptor docking ability.
2. Assessing THPs specific to breast cancer cells through bioinformatics and *in vitro* binding assays.
3. Evaluating the safety and efficacy of FITC-labelled THPs as peptide-based imaging tools, ensuring non-toxicity to healthy cells and absence of hemolysis.

The study employed a bioinformatics-guided design and experimental validation approach. Data were collected from breast cancer cell lines, normal breast cells, breast cancer tissue microarrays, and PBMCs. Analyses included bioinformatics screening, MTT cytotoxicity assays, hemolysis tests, IFN-γ ELISPOT for inflammatory response, fluorescence imaging, and flow cytometry.

Key findings include:

1. THPs showed selective uptake in breast cancer cells and tissues but not in normal cells/tissues.
2. THPs were confirmed as non-toxic, non-hemolytic, and non-inflammatory at 12.5–25 µg/mL.

3. MBC-P2 emerged as the most promising candidate, with the highest binding affinity across multiple breast cancer subtypes.

These results contribute to the development of safer, more selective diagnostic tools for metastatic breast cancer. Significant outcomes include the design of novel THP candidates, a validated bioinformatics–wet lab workflow, and generation of preclinical data supporting translational research.

Overall, the project advances knowledge in bioinformatics-driven peptide diagnostics and highlights the potential of THPs as innovative, low-toxicity agents for detecting multiple breast cancer subtypes.

Keywords: Tumour-homing peptides (THPs); Breast cancer subtypes; Bioinformatics analysis; Targeted diagnostics; Peptide–cell binding efficacy

Formulation of New Non-Newtonian Blood-Mimicking Fluid for Angiography Imaging in a 3D-Printed Medical Simulator

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Funding Agency: Ministry of Higher Education (FRGS)
Project Duration: 1 Nov 2020 – 31 Oct 2024
Grant Amount: RM144,986.00

This project aimed to address the limitation of current blood mimicking fluids (BMFs), which fail to capture the non-Newtonian, shear-thinning properties and tactile realism of human blood. This is critical to the development of high-fidelity 3D-printed medical simulators for angiography training, where realistic flow behaviour and haptic feedback are essential for effective surgical rehearsal and patient safety.

Over the course of the project (2020–2024), the research successfully achieved its objectives, which were to:

1. *Develop a single-phase BMF that matches the viscosity and density of human blood.*
2. *Formulate a dual-phase BMF incorporating microparticles to simulate cellular components.*
3. *Assess the imaging quality and tactile accuracy of the 3D-printed simulator under angiographic conditions.*

The project employed a systematic experimental design using polysaccharide-based rheology modifiers (xanthan gum, starch) and polymeric microparticles suspended in a glycerol–water base fluid. Data were collected through rheological characterisation across shear rates (0.1–1000 s^{-1}), density measurements, and angiography flow tests in patient-specific silicone vascular models.

Key findings include: (i) the optimized formulations demonstrated pronounced shear-thinning behaviour with viscosity values closely aligned to human blood; (ii) the integration of microparticles enhanced tactile feedback and improved flow dynamics; and (iii) the formulated fluids maintained stability when combined with contrast agents. These results contribute to the advancement of surgical simulation by bridging the gap between conventional simulants and physiological blood behaviour.

Among the significant outcomes are the improved realism of angiography imaging in simulators, one registered copyright on the formulation procedure, one indexed-journal publication, three Scopus-indexed conference proceedings, five international oral presentations, and the successful sponsorship of one PhD student whom currently preparing for thesis completion seminar.

Overall, the project has advanced knowledge in biomedical engineering by demonstrating a practical, stable, and physiologically relevant blood mimicking fluid. The findings support innovations in medical simulation and are expected to inform future research, product development, and clinical training practices.

Keywords: Blood Mimicking Fluid (BMF); Non-Newtonian Fluids; 3D-Pinted Medical Simulator; Angiography Imaging; Surgical Training

Effect of high-dose-vitamin-B multivitamin supplement on neural connectivity and oxidative metabolism in healthy adults: A randomised, double-blind, placebo-controlled, phase II clinical trial

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Funding Agency: Blackmores Institute, Australia
Project Duration: 01/01/2019 to 31/12/2025
Grant Amount: RM535,603.94

This randomized, double-blind, placebo-controlled clinical trial investigated the effects of high-dose vitamin B multivitamin supplementation (Executive B Stress Formula), with and without *Passiflora incarnata* extract, on brain connectivity and oxidative metabolism in healthy adults. Conducted between March 2021 and December 2022, the study enrolled 108 participants aged 30–55, divided equally into three groups: two active interventions and one placebo. Each participant underwent four visits over 24 weeks, including fasting blood tests and MRI scans.

The primary outcomes included brain metabolite levels, neural connectivity indices, and plasma biomarkers (vitamin B12, folate, homocysteine). Safety was assessed via vital signs and clinical lab parameters. Results showed significant increases in vitamin B12 and folate in both intervention groups, with Group A showing a statistically significant reduction in homocysteine levels at Weeks 6 and 24. No significant changes were observed in brain metabolite markers across groups.

Advanced imaging analyses revealed that both formulations improved white matter integrity in the angular gyrus, a region linked to cognitive functions such as language and memory. Passiflora incarnata specifically enhanced white matter integrity in the medial prefrontal cortex, associated with emotion regulation and decision-making. Resting-state fMRI showed improved connectivity between the posterior cingulate cortex and corona radiata in the combined intervention groups, suggesting enhanced motor, sensory, and cognitive integration.

The study confirmed the safety and tolerability of the supplements and highlighted their potential to influence neurocognitive functions. While metabolic changes were evident, functional brain connectivity effects were more nuanced. These findings contribute valuable insights into the neurocognitive impact of high-dose vitamin B supplementation and *Passiflora incarnata*, and underscore the need for further research into their long-term and broader neurobiological effects.

Keywords: B vitamin, Passiflora incarnata, brain metabolites, neural connectivity, rs-fMRI

(Word count: 272 words)

Strategic Planning for Inclusive Circular Economy (SPICE)

Principal Investigator

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Co-Investigators

Lim Chean Shen, Independent Researcher

Funding Agency: Institute for Development Studies (Sabah)
Project Duration: Feb 2023 – Nov 2023

This project aimed to address critical vulnerabilities in food security, energy access, and supply chains exposed by recent global crises, which are critical to Sabah's sustainable economic development and its transition to a Net-Zero future. The research successfully achieved its objectives, which were to:

1. *Develop the Strategic Planning for Inclusive Circular Economy (SPICE) framework to guide sustainability intensification.*
2. *Outline pathways to enhance living standards, build resilient infrastructure for food and energy security, and mitigate global warming.*
3. *Recommend strategic approach to position Sabah as a regional Circular Economy hub and carbon marketplace to attract global ESG-focused investment.*

The project employed a qualitative methodology. Interview questions were developed based on a review of Malaysian and Sabahan macroeconomic policies and an analysis of the state's unique environmental assets. These questions guided semi-structured interviews with 20 key stakeholders from Sabah's public and corporate sectors. The collected interview data were transcribed and then thematically analysed using NVIVO to synthesise the SPICE framework.

Key findings highlight the pivotal role of the Agriculture, Forestry and Other Land Use (AFOLU) sector in achieving Net-Zero and the necessity of a unified CE design to attract climate investment. These results contribute to a strategic model for regional sustainable development. A significant outcome is the SPICE framework itself, which will serve as a guiding reference for the Institute for Development Studies (IDS) to propose new economic roadmaps and policy recommendations to the Sabah government.

Overall, the project has successfully advanced knowledge in applying integrated CE and ESG principles to regional policy and demonstrated an innovative pathway for decoupling economic growth from resource consumption. The findings have been disseminated through this whitepaper and are expected to inform Sabah's economic development roadmaps and attract global investment moving forward.

Keywords: Circular Economy; Strategic Planning; Framework; Net Zero; ESG

From HR Practices to Employee Well-being: Multilevel Effects of Hybrid HRM under Authoritarian Leadership

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Funding Agency: MINISTRY OF EDUCATION MALAYSIA (MOE)
Project Duration: Oct 23 – Sept 25

This project addressed the limited understanding of how hybrid human resource management (HRM) systems affect employee well-being and performance at multiple levels, which is critical to strategic HRM, organizational sustainability, and supporting Malaysia's Shared Prosperity Vision 2030, a national initiative aimed at enhancing well-being, productivity, and a decent standard of living for all Malaysians. While Western literature has examined mechanisms to achieve well-being and performance simultaneously, contextual factors such as leadership styles and relational well-being remain underexamined in Malaysia, and prior research often relies on cross-sectional, self-reported data.

Over the course of June to October 2024, the research achieved its objectives:

1. Examining the multilevel influence of hybrid HRM on employee well-being and job performance,

2. Assessing its impact on relationship (interpersonal connectedness) and health-related (emotional exhaustion) dimensions of well-being, and

3. Investigating the mediating role of well-being and moderating role of authoritarian leadership in hybrid HRM outcomes.

The study employed a three-wave multilevel survey design, collecting data from 360 employees nested within 47 teams and their managers. Analyses were conducted using SPSS and Stata for multilevel, mediation, and moderation tests.

Key findings revealed that hybrid HRM enhances job performance while increasing emotional exhaustion, with relational well-being unaffected. Interpersonal connectedness mediated the HRM–performance link, reflecting a "mutual gains" effect, and authoritarian leadership moderated outcomes, weakening positive effects and amplifying strain.

These results provide a multilevel, integrative framework for understanding the complex effects of hybrid HRM on employee outcomes and highlight the contextual role of leadership. By generating theory-driven, context-specific insights for managers and policymakers, this project contributes to strategies that can enhance employee well-being and productivity, supporting the broader goal of Malaysia's Shared Prosperity Vision 2030.

Keywords: Hybrid HRM; Employee Well-being; Job Performance; Authoritarian Leadership; Multilevel Analysis

Unlocking Startup Valuation: A VRIO Framework Analysis Guided by the Resource-Based View

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Funding Agency: Ministry of Higher Education (FRGS)
Project Duration: Oct 23 – Sept 25
Grant Amount: RM 113800

This project addresses the limited understanding of how startup resources—particularly those that are valuable, rare, inimitable, and organizationally embedded (VRIO)—influence early-stage investment decisions. This understanding is essential for improving startup valuation practices and guiding entrepreneurial finance policy in Malaysia. Conducted over two years (October 2023 – September 2025), the study aimed to: (1) examine the relationship between VRIO resources and startup valuation; (2) identify how investors and entrepreneurs perceive and apply VRIO in valuation practices; and (3) develop practical guidelines to enhance valuation accuracy and objectivity.

Using a mixed-method design, the research integrated qualitative and quantitative approaches. The qualitative phase involved semi-structured interviews with eleven active investors, representing angel, venture capital, and private equity sectors. Interview transcripts were analyzed using Python-based computational thematic analysis with Term Frequency–Inverse Document Frequency (TF-IDF) vectorization and K-means clustering, identifying five thematic clusters that captured how investors interpret and apply VRIO resource attributes in valuation decisions.

The quantitative phase surveyed 171 startup founders and key decision-makers across diverse industries. Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) in SmartPLS 4.0 to assess direct and mediated relationships between VRIO dimensions, strategic planning, and startup valuation.

Findings show that valuable ($\beta = 0.204$, $p = 0.012$) and organized ($\beta = 0.199$, $p = 0.013$) resources significantly and directly affect valuation, while rare and inimitable resources do not. Organizational capability had the strongest effect on strategic planning ($\beta = 0.401$, $p < 0.001$) and was the only VRIO dimension with a significant indirect effect on valuation via strategic planning ($\beta = 0.068$, $p = 0.041$).

The study concludes that valuation is not solely a matter of resource possession but of strategic deployment. It provides actionable guidance for founders, investors, and policymakers to strengthen organizational readiness and planning capability, ultimately enhancing startup investability and ecosystem growth.

Keywords: Startup valuation; VRIO framework; Resource-Based View; Entrepreneurial finance; Strategic planning; Investor decision-making

Investigation of water-electrolysis generated ozone on aromatic ring-based pesticide degradation and heavy metals elimination in producing high quality attributes local grown chilies (Capsicum annuum L.): A new approach of postharvest greener technology

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Funding Agency: Ministry of Higher Education (FRGS)
Project Duration: 1/9/2022 – 28/2/2025
Grant Amount: RM101,500

This project aimed to address the persistent issue of pesticide and heavy metal residues in postharvest red chilies (*Capsicum annuum* L.), which is critical to food safety and public health, particularly in regions with intensive agricultural inputs. Over the course of 2.5 years, the research successfully achieved its objectives, which were to:

1. Establish an effective water-electrolysis-generated ozone treatment to degrade pesticide and heavy metal residues in chilies.
2. Investigate the mechanism of action responsible for degrading aromatic ring-based pesticides during ozone treatment.
3. Examine the impact of water-electrolysis ozone on the physicochemical properties of chilies during cold storage.
4. Evaluate the effect of ozone treatment on microbial activity in chilies during refrigerated storage.

The project employed an experimental design using ozone treatments under optimized conditions (3 ppm, 3 L/min, 15 minutes). Data was collected from locally grown red chilies and analyzed using chromatographic, spectrophotometric, and microbiological techniques.

Key findings include significant reductions in pesticide residues, with cypermethrin degraded by 83.67% and tebuconazole by 34.56% ($p < 0.05$), attributed to differences in molecular structure and ozone reactivity. Heavy metal levels were also reduced most notably cadmium (49.47%) and arsenic (36.38%) through oxidative transformation into less soluble or bioavailable forms. Ozone-treated chilies stored at 4°C for 16 days exhibited reduced microbial counts and only minor changes in color and nutrient levels. Notably, antioxidant activity increased post-treatment, indicating a possible stress-response mechanism.

These results demonstrate that water-electrolysis ozone is a scalable, chemical-free approach to residue removal while maintaining produce quality. Among the significant outcomes are insights into ozone degradation pathways for aromatic pesticides, improved microbial safety, and potential industry applications. The project also involved stakeholder collaboration with Medklinn, a company specializing in ozone technology, ensuring practical relevance and

scalability. Overall, the project has successfully advanced knowledge in green sanitization technologies and postharvest quality management, and the findings have been disseminated through academic presentations, publication and stakeholder engagement, with potential to inform postharvest practices and technology adoption moving forward.

Keywords: ozone, pesticide, heavy metal, postharvest quality

Heat Source Modelling and Grain Size Algorithm for Directed Energy Deposition Additive Manufacturing on Thick Wall Structure

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Funding Agency: Ministry of Higher Education (FRGS)
Project Duration: 07/09/2021 to 07/03/2024
Grant Amount: RM 96,000

This project aimed to address the lack of accurate heat source models (HSM) and grain size prediction capabilities in the finite element modelling (FEM) of the Wire Arc Additive Manufacturing (WAAM) process, which is critical to advancing simulation reliability and process optimization in Directed Energy Deposition (DED) additive manufacturing. Over the course of the project, the research successfully achieved its objectives, which were to:

1. Investigate the effects of DED process parameters on transient heat distribution and the resulting grain size.
2. Model the transient heat distribution using an optimised HSM suitable for the DED process.
3. Predict the grain microstructure of the deposited material by incorporating HSM into FEM.

The project employed experimental fabrication of WAAM specimens using 316L stainless steel and thermocouple-based temperature acquisition, alongside finite element simulations using MSC Marc/Mentat and user-defined FORTRAN subroutines. Data were collected from temperature measurements at strategic points in the specimen and microstructural analysis of grain size at different heights and analyzed using thermal modelling techniques and ASTM grain size calculation methods.

Key findings include the superior accuracy of the Uniform HSM in predicting temperature history as compared to Goldak, modified Goldak and Parabolic HSM, and the successful grain size prediction at the top section of the specimen with errors below 10%. These results contribute to improved predictive capabilities in WAAM process simulation, enabling better control over thermal history and microstructure evolution. Among the significant outcomes are a validated FEM model for WAAM, a new grain size prediction subroutine, and experimental data supporting further research.

Overall, the project has successfully advanced knowledge in the simulation of DED additive manufacturing process and demonstrated the viability of simplified HSM and grain prediction algorithm in industrial-scale WAAM applications. The findings have been disseminated

through the publication of one indexed-conference proceeding and two indexed-journal papers and are expected to inform further research, simulation development, and innovation in additive manufacturing moving forward.

Keywords: microstructure; grain size; finite element analysis; directed energy deposition; additive manufacturing.

An integrated Strategic Sustainability - Risk Management modelling approach for Product Development of Malaysian Furniture Companies

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Funding Agency: Ministry of Higher Education
Project Duration: 1 Sep 2022 - 31 Aug 2025
Grant Amount: RM 75,660.00

This project aimed to address in understanding how eco-product and eco-process innovations influence sustainability risk management, particularly in the Malaysian furniture industry. It also tackles the lack of integrated frameworks linking sustainability and risk, and explores the under-researched moderating role of market turbulence in this relationship. Over the course of *3 years*, the research successfully achieved its objectives, which were to:

1. *To examine the key antecedents influencing eco-product and eco-process innovation in the Malaysian furniture manufacturing industry.*
2. *To assess the impact of eco-product and eco-process innovation on sustainability risk management.*
3. *To investigate the moderating effect of market turbulence on the relationship between eco-innovation and sustainability risk management.*

The project employed **a quantitative research design using a cross-sectional survey method and Partial Least Squares Structural Equation Modeling (PLS-SEM)**. Data were collected from **108 employees in Malaysian furniture manufacturing companies involved in product development activities**, and analysed using **SPSS and Smart_PLS software**.

Key findings include **(1) managerial environmental concern and customer green demand significantly influence both eco-product and eco-process innovation; (2) eco-innovation positively impacts sustainability risk management; and (3) market turbulence does not moderate the relationship between eco-innovation and sustainability risk management**. These results contribute to **advancing knowledge on how eco-innovation strategies can be leveraged to manage sustainability risks within industrial product development contexts**. Among the significant outcomes are **a validated integrated framework linking eco-innovation with sustainability risk management, empirical evidence specific to the Malaysian furniture industry, and practical insights for policymakers and industry practitioners**.

Overall, the project has successfully advanced knowledge in **sustainability-oriented innovation and risk management** and demonstrated **practical relevance for improving strategic responses to sustainability challenges in manufacturing sectors**. The findings have been disseminated through **thesis documentation, stakeholder presentations, and academic consultation** and are expected to inform **future research, sustainable business practices, and policymaking** moving forward.

Keywords: Eco-innovation; Sustainability Risk Management; Product Development; Market Turbulence; Malaysian Furniture Industry