Reframing Entrepreneurial Confidence: Cognitive Bias, Calibration, and the Limits of Entrepreneurship Education

Alia Al-Shaiji | PhD Year 1 | STIP

Problem and Motivation. What if entrepreneurship education (EE) is inadvertently training entrepreneurs to fail with confidence? Confidence development has become one of the most dominant outcomes in EE research, with entrepreneurial self-efficacy (ESE) routinely used as a proxy for learning and programme effectiveness (Nabi et al., 2017). Yet this is premised on a foundational and unexamined assumption that rising confidence reflects improved judgment rather than inflated certainty. Overconfidence is defined as the systematic misalignment between subjective certainty and objective accuracy and is among the most robustly documented cognitive biases in decision science (Kahneman, 2011). It has well-established consequences for entrepreneurial judgment and decision-making (Moore & Healy, 2008). An important unresolved question concerns whether EE's reliance on action-orientation, effectual logic, and confidence-building pedagogy inadvertently cultivates a cognitive environment that amplifies, rather than regulates, this bias (Camuffo et al., 2024).
Despite longstanding evidence that entrepreneurs are disproportionately overconfident, EE scholarship has remained largely uncritical of this tendency. Central to this blind spot is the absence of calibration as an evaluative construct: the field measures whether confidence increases, not whether it is accurate. The cross-sectional, self-report designs that dominate EE research are structurally incapable of detecting miscalibration, leaving the field without a reliable mechanism for distinguishing confidence that improves entrepreneurial judgment from confidence that distorts it.

Methodology. This PhD project comprises three papers. Paper 1 employs a problematizing literature review following Alvesson and Sandberg (2011, 2020) chosen not to catalogue what is missing from the literature, but to expose what the literature has been asking the wrong questions about. The problematizing approach systematically identifies and challenges the embedded assumptions that remain unquestioned within a field. The review operates across two stages: Stage 1 maps how confidence is conceptualised, operationalised, and normatively framed within EE scholarship, Stage 2 introduces calibration and overconfidence as critical lenses drawn from behavioural decision research and cognitive psychology. Together, they establish the conceptual backbone of the PhD, generating a reframed research agenda upon which Papers 2 and 3 will build.

Future Directions and Anticipated Challenges. Papers 2 and 3 will move into quantitative empirical domain, drawing on samples of entrepreneurs undergoing EE to examine how overconfidence forms and calibrates through educational exposure though sampling strategy and design remain to be determined. Key challenges include securing institutional access and operationalising calibration in ways that are both theoretically rigorous and empirically tractable. If EE is producing miscalibrated confidence without recognising it, the consequences fall not on the field, but on the entrepreneurs it educates.

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From Labels to Configurations: Clarifying "Twin-ness" in Urban Digital Twin Research – Maria Bobyleva

Urban digital twins (UDTs) are increasingly presented as tools for improving urban planning, service coordination, and sustainability transitions. They are often framed as infrastructures for integrating data across domains and enabling more adaptive forms of urban governance (Wan et al., 2019; Weil et al., 2023). However, the term UDT is used inconsistently across the literature. It may refer to anything from periodically updated 3D city models to more operationally coupled environments with real-time data flows and ambitions of bidirectional interaction (Ferré-Bigorra et al., 2022; Deprêtre et al., 2022). This creates a significant analytical problem: initiatives that share the same label may differ substantially in technical configuration and governance implications, making comparison difficult.

This research addresses that problem by asking: How is "twin-ness" defined and operationalised in the UDT literature, and how can these accounts be translated into dimensions for comparative analysis? The study is motivated by a broader doctoral interest in how UDTs create and distribute value across multi-actor ecosystems. Before governance and business-model questions can be examined comparatively, it is necessary to clarify what kinds of artefacts are actually being compared under the UDT label.

The literature suggests that definitional ambiguity is not merely semantic. Existing work points to recurring tensions between stricter technical understandings of UDTs, which emphasise real-time updating, integration, and bidirectional cyber-physical coupling (Kritzinger et al., 2018; Ferré-Bigorra et al., 2022), and more socio-technical accounts, which stress governance, decision support, and institutional embedding (Batty, 2018; Nochta et al., 2019). In response, this project treats "twin-ness" as a configurational property rather than a binary category.

Methodologically, the study adopts a hybrid narrative review that combines morphological mapping of definitional dimensions with a configurational synthesis of how these dimensions are combined across the literature. A structured search in Scopus and Web of Science covers the period 2018–2025 and includes both definitional contributions and city-scale frameworks and governance-oriented accounts. The review identifies six recurring dimensions of UDT configuration: coupling direction, time coupling, agency, integration scope, interoperability, and purpose orientation. These are translated into graded descriptors that support more transparent classification and comparison.

The review also highlights several analytical challenges. The evidence base is uneven, with more conceptual and architectural papers than evaluated city-scale implementations. A further challenge is avoiding a normative reading of "more twin-ness" as inherently better, since higher levels of coupling or automation may be constrained by accountability, safety, or legitimacy considerations.

The study supports comparative case selection and analysis of how UDT configurations relate to governance and business-model logics. More broadly, it shifts the debate from whether an initiative is a "true" twin to what configuration is feasible and valuable under urban constraints.

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Organizing Distributed Search: Innovation Trajectories and Innovation Performance in Multinational Enterprises

Jiaming Chen ID: 11376839
Supervisor: Professor Mario Kafouros and Dr Dimitrija Kalanoski
Alliance Manchester Business School, The University of Manchester

Why some multinational enterprises (MNEs) consistently achieve superior innovation performance remains a central question in international business research. Prior studies have shown that firms internationalize R&D to access geographically dispersed knowledge, tap into specialized local capabilities, and benefit from cross-border knowledge spillovers. Yet firms with similarly dispersed innovation activities often generate markedly different innovation outcomes. This recurring pattern suggests that knowledge access alone cannot fully explain sustained differences in innovation performance. What matters, this research argues, is how firms search across, connect, and recombine knowledge distributed across their international innovation network.

This study examines whether differences in firms' innovation trajectories help explain persistent differences in innovation performance across MNEs. Innovation trajectories are conceptualized here as relatively persistent yet purposive patterns in the direction and scope of firms' technological search. In the evolutionary and search-based literature on innovation, trajectories are commonly treated as cumulative patterns of technological development that emerge from prior knowledge stocks, earlier investments, and path-dependent search processes. While this view is important, it tends to cast trajectories primarily as emergent patterns of technological evolution. By contrast, this study conceptualizes innovation trajectories as patterns that firms are willing to shape through the organization and direction of technological search across distributed knowledge bases. Innovation trajectories are therefore treated here not simply as inherited paths of development, but as a firm-level explanatory construct that reflects how MNEs organize and sustain technological search, and how differences in those search patterns relate to later innovation performance. This matters especially in the multinational context, where innovation is not generated within a single, homogeneous organization, but across differentiated subsidiaries embedded in the MNE's internationally distributed innovation network.

The project draws primarily on the network view of the MNE, which sees the multinational as an internally differentiated network of innovative units and as an efficient vehicle for transferring proprietary knowledge. This shifts the focus from the now-familiar argument that internationally dispersed R&D expands firms' access to geographically dispersed knowledge to a different question: how knowledge is organized within the MNE, and how that organization relates to the trajectories of search firms pursue and the innovation performance they achieve. The study therefore bridges two literatures that have largely evolved separately: international business research on internal knowledge flows and innovation research on technological search and path dependence.

Methodologically, the study employs a longitudinal MNE-year panel that uses subsidiary-level organizational and patent data to construct firm-level measures of innovation trajectories and performance. MNE headquarters and subsidiaries are identified through ORBIS, and patent data are drawn from PATSTAT and related sources. This design is well suited to tracing innovation trajectories over time and linking them to subsequent innovation performance. However, several empirical challenges remain. In particular, patents need to be assigned carefully to organizational units, and the measures must be able to reflect more durable patterns rather than short-term shifts. By tracing MNE-level innovation trajectories, the study seeks to explain how multinational enterprises turn internationally distributed knowledge into sustained innovation performance.

Keywords: Innovation trajectories; Multinational enterprises; Internal innovation networks; Technological search; Innovation performance

Examining the Diffusion of AI Innovation in Greater Manchester: The Role of SMEs and Catalytic Public Funding – Effa-Bassey Ettah

Small and Medium-sized Enterprises (SMEs) account for 99.9% of the business population and are known for driving innovation and regional economies. Since 2020, Greater Manchester has attracted substantial public investment to stimulate AI innovation through catalytic mechanisms led by academic institutions, with a focus on supporting SMEs. However, AI research, commercialisation activity, and supporting infrastructure remain spatially concentrated along the Oxford Road Corridor (ORC). There is a limited systematic understanding of how AI innovation diffuses across the other boroughs, or of the structural, institutional, and socio-economic conditions that enable or inhibit uptake beyond the core knowledge district. The problem engages central debates in innovation diffusion, regional innovation systems, and place-based R&D policy. Whilst agglomeration theory explains clustering around anchor institutions, there is insufficient empirical evidence on secondary diffusion within metropolitan sub-regions following targeted catalytic investment. This study addresses a theoretical gap by examining how public AI funding interacts with borough-level absorptive capacity, institutional density, skills composition, intermediary networks, and SME capabilities. The aim is to generate generalisable insights into how AI ecosystems expand beyond dominant urban cores. This challenge is strategic for policymakers, combined authorities, universities, and innovation intermediaries. Despite extensive literature on regional innovation systems and knowledge transfer (Fernandes et al., 2021; Sutherland et al., 2024; Petersen & Montano Ramirez, 2025), these practical questions remain:

- What structural and institutional factors enable or inhibit AI adoption and commercialisation outside the ORC?
- How does borough-level absorptive capacity mediate the impact of catalytic public funding?
- What policy and investment mechanisms could enhance equitable, city-region-wide AI ecosystem development?

The study will employ a multi-method qualitative strategy to ensure robust and systematic analysis. Thematic analysis will be used to identify recurring enabling and inhibiting factors emerging from interview data, while content analysis of policy documents, funding calls, and programme evaluations will examine governance narratives and strategic priorities shaping AI diffusion. Process tracing will help uncover how catalytic public funding translates into local innovation outcomes over time, capturing causal pathways and sequencing. In addition, comparative institutional analysis will assess variations in governance capacity, intermediary density, and absorptive capacity across Greater Manchester's boroughs. To strengthen external validity, the research will incorporate comparative case studies of Amsterdam, Dublin, Seattle, and Stockholm. These city-regions are selected for their structural similarity to Greater Manchester in terms of AI ecosystem scale, university presence, and metropolitan governance, offering more relevant insights than dominant global hubs. Secondary sources, including academic literature and policy reports, will support this analysis. Fieldwork will span core, intermediate, and peripheral boroughs to capture spatial variation in AI activity and institutional capacity, while engagement with public and private stakeholders will enhance empirical depth and policy relevance.

Several challenges are anticipated. Accessing key stakeholders and securing consistent participation across boroughs may prove difficult, potentially creating gaps in the data. There may also be variation in how AI activity is defined or measured, complicating cross-case comparison. Additionally, isolating the specific impact of catalytic public funding from broader economic influences may present analytical challenges. This research is significant because it addresses uneven intra-regional innovation dynamics and the risk of spatial concentration. By identifying how structural and institutional factors influence AI diffusion, the study can inform more equitable, place-sensitive policy and investment strategies, support inclusive economic growth and strengthen Greater Manchester's AI ecosystem.

Developing a functional framework for assessing the contribution of economic institutions.

Joel Hoskins

The role of institutions in shaping economic performance is one of the most well-established findings in development and regional economics, yet it remains among the least actionable. While decades of empirical work show that institutional quality correlates strongly with productivity, investment, and growth (Acemoglu et al., 2001; Rodríguez-Pose, 2020; Charron et al., 2014), the indicators used to demonstrate this relationship, such as corruption indices, governance perceptions, and public service efficiency scores, offer little diagnostic value. These measures often conflate the outcomes of a successful economy with the causes of institutional effectiveness, creating risks of reverse causality and obscuring the mechanisms through which institutions influence investment decision-making. A further challenge, is that institutions frequently adopt the outward appearance of high-performing organisations (Pritchett et al., 2013) without developing the underlying capacity required to support economic activity. Together, these issues mean that existing approaches can confirm that institutional weakness exists in a region without identifying why or how it constrains growth.

The purpose of this research is to address this gap by developing a functional framework that frames economic institutions as providers of targeted resolutions to market failures at distinct stages of the investment cycle. Rather than treating institutions as monolithic constraints or broad governance environments, the framework analyses them as complements to specific forms of capital - physical, human, financial, and intangible. Their performance is assessed along two dimensions: internal efficiency (the conversion of inputs into services) and external complementarity (the extent to which those services raise the productive return on the capital they support). This disaggregation into measurable inputs, outputs, and outcomes provides the theoretical precision required to apply programme evaluation methods to institutional performance.

Methodologically, the project proceeds in two stages. First, a desk-based mapping exercise will identify the types of complementary assets institutions provide and the market failures they target. Second, the framework is applied to two case studies: local planning departments and regional transport authorities. These case studies are selected as representative complements to measurable capital types - planning departments mediate physical capital, while transport authorities mediate the agglomeration benefits provided by human capital concentrations. Both operate at the subnational level where institutional variation is most variable (Charron et al., 2014), and both exhibit variation across local authority boundaries and over time, creating conditions for causal inference. This presentation focuses on the application of the framework to local planning departments as an illustrative case.

Data sources include MHCLG planning application records and Land Registry transaction data, covering institutional activity and downstream development outcomes. Key challenges include geographic inconsistency across local authority datasets, the difficulty of validating the data, and, most importantly, the construction of outcome measures that capture real institutional contribution rather than just administrative activity.

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Which Prior Ties Get Reactivated? Relational Resource Redeployment in Project-Based Collaboration – Qi Hu

Abstract

Although the resource redeployment literature has illuminated the factors that drive redeployment decisions, we know relatively little about which specific resources are selected for redeployment (Feldman and Sakhartov, 2022; Levinthal and Wu, 2024; Kim et al., 2024). Existing studies have examined how tax shocks, business unit decline, and variation in market thickness prompt firms to redeploy resources (Chauvin, Inoue and Poliquin, 2024; Kapacinskaite, 2026; Stagni, Santaló and Giarratana, 2020). Yet this literature focuses mainly on why redeployment occurs, leaving largely unexamined the question of which specific resources should be redeployed when a portfolio of candidates exists. I plan to address this gap in the context of inter-organizational project collaboration, where a firm's accumulated relational ties constitute a portfolio of relational resources available for redeployment. When a firm initiates a new project, which prior relational resources are selectively reactivated and why?

I will examine which prior relational resources are selectively reactivated within the set of a firm's available historical partners when assembling a new project. The Chinese movie industry offers an ideal empirical setting: project-level collaboration records, which make the composition of each project and the identities of activated and non-activated prior partners directly observable. Drawing on comprehensive project-level data from the Chinese movie industry (2012–2025), I plan to trace how project initiators progressively incorporate co-producers as a movie moves through production, distribution, and exhibition. I develop a bilateral framework of resource redeployment in inter-organizational project settings. Based on that I argue that three factors govern which relational resources are redeployed into a given project: the resource complementary of potential team members, the resource requirements specific to the focal project, and the opportunity costs facing candidate partners at the time of team assembly.

This study plans to contribute to resource redeployment theory in three ways. First, I extend the unit of analysis from intra-firm resources to inter-organizational relational ties, reconceptualizing a firm's accumulated collaborative relationships as a portfolio of relational resources available for redeployment. Second, I introduce a two-layer complementarity framework: redeployment value is refracted first through the fit between deployer and deployee resource endowments, and again through the requirements of the focal project—a structure absent from existing single-layer accounts (Levinthal and Wu, 2025). Third, I bring the deployee's opportunity cost into resource redeployment, establishing that redeployment feasibility depends not only on the deployer's calculus but on the outside options available to candidate partners (Helfat et al., 2023).

The primary methodological challenge lies in data construction. A complication arises from the structure of the industry: approximately 70% of firms in the dataset have participated in only a single movie, suggesting that many are project-specific entities established solely for one project. Accurately characterizing these firms requires tracing their ownership structure to identify affiliated parent companies—a process that demands cross-referencing equity registration records and is subject to considerable verification effort.

On the Nexus of Entrepreneurial Ethics and R&D Innovation: A Comparative Study in For-Profit Social Enterprises between the UK and China

Yimei Liang, Year 1 PhD, IMP Division

Abstract

A paradigm shift from the "age-old separation fallacy" (Dacin et al., 2022, p.863) toward recognizing the synergy between ethics and commerce (Ateeq & Milhem, 2024) has catalysed the rise of For-Profit Social Enterprises (FSEs) - sustainable organizations that integrate social, economic, and ecological objectives. Yet their hybrid nature renders them vulnerable to ethical blind spots, risking mission drift or "doing good" badly (Bacq et al., 2025). This vulnerability is particularly consequential in the context of Research and Development (R&D), the primary engine through which FSEs translate their mission into tangible outcomes (Taherdoost, 2024). Despite this, the causal pathways linking moral objectives to R&D activities remain undertheorized (Stahl et al., 2019). This conceptual gap is compounded by a practical one: existing deontological ethical frameworks are ill-suited to the dynamic, high-pressure context of entrepreneurial R&D. The resulting "ethical reflection gap" is particularly acute in FSEs, where moral and commercial imperatives must be continuously negotiated. Addressing this gap is essential, as Baumol (1996) suggests, sustaining productive and ethical entrepreneurship requires close attention to such dilemmas.

To address these gaps, the study pursues three progressive questions: (1) What are core ethical values guiding R&D decision-making in FSEs? (2) Why is integrating these ethics into R&D critically important? and (3) How do ethical decisions dynamically shape R&D processes? The research employs a qualitative, multiple-case design, comparing approximately 10 FSEs with an estimated 60 to 80 participants across China and the United Kingdom. This comparative design contrasts a liberal market economy (UK) with a state-influenced economy (China) to analytically distinguish universal entrepreneurial ethics from those shaped by specific institutional contexts. Data are collected through semi-structured interviews, focus groups, and reflexivity methods, and analysed using systematic grounded theory. The analytical framework encompasses three levels: within-case analysis, cross-case-within-nation analysis, and cross-case-cross-nation analysis.

The contributions are threefold: (1) theoretically, it develops a mid-range theory bridging business ethics, social entrepreneurship, and innovation management; (2) empirically, it uncovers micro-foundations of ethical decision-making in R&D; and (3) practically, it offers a diagnostic framework with actionable tools to navigate the ethical reflection gap and foster value-aligned innovation.

Keywords: Entrepreneurial ethics, R&D innovation, For-Profit Social Enterprises

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Beyond the Buzzword: A Three-Pillar Model for Operationalizing Inclusive Innovation

Michi Ochiai

PhD Science Technology and Innovation Policy, Year 1

While innovation is a primary driver of growth, it frequently exacerbates socio-economic inequalities and excludes marginalised populations from its benefits. Recently, the "normative turn" in Science, Technology, and Innovation (STI) policy has introduced "inclusive innovation" - innovation that is powered by and/or benefits the disadvantaged - as a goal for both public and business policy. However, "inclusive innovation" as both a policy and academic concept remains "fuzzy" (Lee, 2025), with varying and fragmented definitions and frameworks to measure them. Through a narrative synthesis of existing literature, this paper seeks to organise the implementation of the concept by varying scholars and policymakers, and provide a simple and pragmatic framework for future analysis of the initiatives under inclusive innovation.

The study first reviews the concept of inclusive innovation, specifically how it is positioned under the innovation ecosystem in spatial context. Then, by acknowledging the criticisms shown towards existing inclusive innovation policies such as gentrification, decoupling, solutionism and policy-washing, it further integrates the Quadruple/Quintuple Helix models of innovation to redefine the academic institution's role as an inclusive intermediary that bridges the gap between formal institutions and grassroots civil society. Finally, by utilising the "Ladder of Inclusive Innovation" (Heeks et al., 2013) to conceptualise levels of inclusion ranging from passive consumption (Level 2) to structural co-creation (Level 5), this research proposes to bring together the proposed frameworks from existing literature into a more intuitive and visually accessible "Three-Pillar Model" framework that identifies how the ecosystem can be evaluated based on intent, process, and actors, designed to help institutions and policymakers at across different timeframes and stages of inclusive innovation initiatives, with focus given on higher education institutions including universities.

The proposed model evaluates innovation ecosystems across three dimensions: *For Whom (Intent/Outcomes)* - Shifting success metrics from pure economic growth to the expansion of "capabilities" for marginalised groups as both consumers and producers; *How (Process/Governance)* - Utilising dual-perspective evaluation to ensure target communities are active co-creators who share in decision-making and risk distribution; and *By Whom (Actors/Ecosystem)* - Explicitly measuring the integration of civil society and inclusive intermediaries that validate grassroots knowledge.

The study concludes that inclusive innovation must be a "sustained commitment" rather than a short-term project. Through "participatory foresight" and "dialogue pacts" (Aguirre-Bastos et al., 2025), institutions can establish shared visions before technological lock-ins occur. By applying models – whichever the one may choose – consistently from strategic foresight to impact assessment, administrators can ensure that inclusive innovation functions as a sustained, evolving commitment to structural change rather than a short-term, disconnected project.

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Creativity and affect: a qualitative study of individual experiences with Generative AI – Felipe Saez Noriega

Within the field of management, there is a longstanding interest in fostering creativity to generate and implement the best possible ideas. Since the emergence of Generative Artificial Intelligence (GenAI) –a system that can produce new content in different forms in response to users' prompts (Benbya, Strich and Tamm, 2024)—the field has experienced growing interest in understanding how GenAI can be introduced to foster creativity in the workplace. However, current research at the intersection of creativity and GenAI has placed much emphasis on the quality and quantity of ideas from a cognitive perspective, while overlooking how affective states influence the creative process. The present research intends to contribute towards this area.

Overall, creativity can be best understood as the generation of ideas that are both novel and useful, and the process starts with the generation of possible ideas or solutions until one is selected and validated (Anderson, Potočnik and Zhou, 2014). While creativity has often been studied in the field of psychology, it often overlooks its affective component (Rösemeier, Hu and Nijstad, 2025). With the introduction of GenAI, recent studies in creativity have emphasised experimentation with mixed results while paying little attention to the affective states and broader context that shape ideas (Holzner, Maier and Feuerriegel, 2025). The present research focuses on generating and validating ideas within the innovation context, where ideas are a critical asset for companies before further development and production (Girotra, Terwiesch and Ulrich, 2010).

The research question proposed is as follows: How does the introduction of GenAI affect individuals' affective experiences within the creative process? The research design will follow a multi-step qualitative approach, comprising on-site interviews, observational data, and diary studies (Symon and Cassell, 2012). To analyse the information, Cognitive Task Analysis will be applied to the interviews to understand the structure of the creative process, and thematic analysis will be applied to the diary and observational data to capture individual affective states.

Investigating these processes could raise issues related to trust and discretionary use in unregulated environments. For example, the use of GenAI often precipitates scepticism about output quality, algorithmic bias, and emerging agency conflicts. Beyond those challenges, the present research seeks to bridge two currently theoretical perspectives: human-computer interaction literature, which focuses on the comparison of creativity between humans and models without further theory, and organisational research, whose reliance on experimental designs often lacks ecological validity (Holzner, Maier and Feuerriegel, 2025). By integrating psychological and affective aspects within the creative process, responding to recent scholarly calls in the literature (Rösemeier, Hu and Nijstad, 2025).

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Student Name: Luyao Wang University ID: 14327494

A bibliometric analysis of the literature on trade and innovation

In the context of globalization and anti-globalization, trade policies, especially tariff and non-tariff measures (NTMs), play an increasingly important role in shaping innovation, industrial restructuring, and economic growth. Existing research shows that trade and its policy arrangements influence enterprises' innovative behaviour and technological upgrading (Geng & Kali, 2021). With the restructuring of global value chains, intensifying trade frictions and the rapid development of high-tech industries, the relationship between trade and innovation has become an important research topic in academic research. Although the research is increasing, the literature is highly diversified and dispersed across research perspective, theoretical basis and methodology. Most of the existing reviews adopt narrative methods or are limited to a single research perspective (Geng and Kali, 2021; Akcigit and Melitz, 2022). Systematic account on the knowledge base, research cluster and its development path in the literatures is still insufficient.

Based on this, this study adopts a bibliometric method to analyse the interrelated literatures on trade, tariff, NTMs and innovation, capturing time period, geographical scope and conceptual framework. The dataset includes 1,299 publications drawn from the Web of Science and Scopus databases. Using the keyword co-occurrence analysis, factor analysis and co-citation network analysis, this paper identifies key publications, research themes and international cooperation networks in order to understand the current analytical and methodological framing of these issues. As such, this study aims to present the evolving knowledge structure and their interrelationships among major research streams over time through visualisation. This paper also discusses some of the key challenges faced when analysing these issues, particularly the sensitivity of results to search strategies and dataset selection.

The main contributions of this paper are as follows: First, we show that the existing reviews on trade and innovation mainly rely on narrative approaches and lack any systematic analysis of how the evolution of ideas has shaped the development of our current understanding of the research theme. Using bibliometrics, this study therefore helps to understand the overall knowledge structure in this field as it currently stands. Preliminary results show that the literatures are highly modularized, which is mainly divided into four themes: economic results, economic structure, political economy, and sustainability and value. Second, this study further identifies the knowledge base and core research clusters through co-citation analysis, revealing where the current evolution of the literature is taking us. We find that the literature splits into two main streams: one on trade's economic effects, and the other on its political economy and sustainability. Finally, through the analysis of highly cited literature and recent research, we find that the focus of research is gradually shifting from traditional trade efficiency and productivity issues to the discussion and analysis of the distributional effects, environmental consequences and structural adjustment caused by trade shocks. This study provides guidance for future research directions, thereby establishing a clearer cognitive framework for subsequent research.

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Green AI Typology

Yuhan Wang (First-year PhD in STIP;))
Supervisors: Elvira Uyarra, Shukhrat Nasirov, Xin Deng

As Green AI may represent a new technological direction that bridges digital and sustainable transition, it has become an influential term in debates on the environmental sustainability of artificial intelligence, yet it remains conceptually inconsistent and empirically difficult to operationalize. Existing research tends to equate Green AI with either reducing AI's own computational burden or applying AI for green purpose, leaving conceptual and methodological framework underdeveloped. This paper addresses that gap by developing a typology of Green AI from a technological trajectory perspective and translating it into an empirical framework for patent-based analysis. Instead of treating "green" as a general characteristic, the paper conceptualizes Green AI as a directional reorientation of AI toward environmental sustainability along two analytically distinct dimensions, namely "design" and "use". The design dimension captures how AI is constructed, whereas the use dimension measures the intended problem and application space of AI. Combining these dimensions yields a 2×2 typology consisting of Green-in AI, Green-by AI, Dual-Green AI, and Conventional/Red AI.

Building on this conceptualization, the paper proposes a hybrid empirical framework to identify and classify AI patents. AI patents are first identified by the WIPO PATENTSCOPE Artificial Intelligence Index. Green-by AI is then operationalized by intersecting AI patents with environmentally relevant technological domains captured by a union CPC code set comprising the OECD ENV-TECH CPC codes, Y02, and Y04S. By contrast, Green-in AI cannot be reliably inferred from these more structured and standardized patent indicators and therefore requires rule-based textual interpretation of patent titles, abstracts, and claims. To guide this process, the paper develops three fundamental conditions and seven concrete classification criteria covering algorithm refinement, reductions in energy and resource consumption, emission reduction, compatibility with resource-constrained hardware environments, architecture and practice refinement, footprint reporting and transparency improvement, and life-cycle refinement. On this basis and to further elaborate this typology and the operationalizable empirical framework, this paper proceeds by drawing a sample from the AI patent dataset, manually classifying patents according to the typology, and illustrating each category through representative patent cases.

The paper makes three contributions. First, it reconstructs Green AI into a more coherent framework suited to innovation studies, management research, and broader social science. Second, it moves beyond the simple concept of "Green AI", which is widely yet ambiguously discussed in computer science and social science. It introduces the technological trajectory perspective to the debate, extending the problem space of Green AI. Third, it offers an operationalizable patent-based framework that combines structured classification codes with systematic textual analysis, thereby opening a route for future large-scale empirical analysis on the direction, composition, and governance of Green AI.

Keywords: Green AI; Green-in AI; Green-by AI; Innovation Typology; Technological Trajectory; AI patents

Abstract - 2026 AMBS Doctoral Conference – Tianqi Yang

Firms have long explored ways to build collaborative relationships with stakeholders in order to achieve mutually beneficial exchanges (Bosse & Coughlan, 2016; Freeman et al., 2010; Klein et al., 2019). Stakeholder theory broadly defines stakeholders as actors who can affect or are affected by the firm (Freeman, 1984), and a central question concerns the types of relationships firms seek and need to develop with them (Bosse & Coughlan, 2016; Freeman et al., 2004)This question also raises the issue of whom firms manage for and how they do so. Accordingly, management scholars have sought to explore organizational boundaries in relation to stakeholder enfranchisement, examining who qualifies as a stakeholder, what forms of relationships firms establish with them, and how firms address competing demands arising from collective action problems (Bacq & Aguilera, 2022; Bridoux & Stoelhorst, 2022; Klein et al., 2012, 2019; McGahan, 2020). The cause and effect of the activities and decisions made when managing stakeholders to reach the collaborative relationship has been tested but not explored in depth (Freeman et al., 2010; Friedman & Miles, 2002; Laplume et al., 2008).

When addressing these questions, stakeholder research has primarily focused on actors who make relationship-specific investments in the value creation process, such as employees, customers, and suppliers (Barney, 2018; McGahan, 2021). Because these stakeholders contribute critical resources, exclusion from value appropriation may prompt them to withdraw participation or support (Dorobantu & Odziemkowska, 2017). However, stakeholders who do not directly invest in production may nonetheless possess significant influence over firm activities. Managing such stakeholders therefore requires distinct governance structures and strategic responses. This challenge becomes salient when these stakeholders are granted formal rights to influence decision-making, enabling them to exercise hold-up power over firms (Henisz et al., 2014; Odziemkowska & Dorobantu, 2021).

This dynamic reflects situations in which stakeholders are granted control rights over resource use, raising the question of how firms manage stakeholder relationships to achieve mutually beneficial outcomes. Stakeholder governance research has utilised property rights theory aiming to further the argument around the canonical question in stakeholder research - who is in, who is out, and who gets what. From this perspective, stakeholder governance concerns the establishment of the “rules of the game” that structure interactions between firms and stakeholders, enabling behavior that supports mutuality. Governance arrangements infuse order into conflict resolution by defining procedures, roles, and decision rights that mitigate disputes and facilitate cooperation. In doing so, governance enables the realization of mutual gains from exchange, a foundational premise of economic organization. Because conflict resolution may request court is costly, stakeholder governance enables firms and their stakeholders to incur efforts to develop supportive governance arrangements that sustain relationships and reduce reliance on external adjudication (Klein et al., 2019; Williamson, 2002). In this way, firms enact adaptive responses through processes of negotiation and renegotiation that shape expectations regarding value distribution. Existing research on stakeholder governance and adaptation often assumes that firms are able to align stakeholder interests. However, when non-contributing stakeholders are involved, such alignment may be difficult to achieve, as interactions frequently involve both private and public interests that are inherently challenging to reconcile (Henisz et al., 2014; Mahoney et al., 2009).

This research views collaborative outcomes between firms and non-contributing stakeholders as a function of stakeholder attributes, conditional on firms’ adaptive governance responses. When large-scale non-contributing stakeholders are granted residual control rights, managerial authority becomes shared rather than unilateral, and firms and stakeholders may hold divergent expectations regarding exchange outcomes. Under such conditions, managing stakeholder relationships becomes a central strategic challenge. We address this problem by examining goal-alignment feasibility across stakeholder engagements—captured by (a) value congruence, (b) strategic complementarity, and (c) property rights clarity—and by theorizing how firms’ adaptive governance choices condition whether stakeholders cooperate with, or contest, firm initiatives. Because collaborative outcomes depend fundamentally on relational dynamics, stakeholders vary in their propensity to engage constructively or escalate disputes. We therefore propose that agreement formation reflects the joint influence of stakeholder attributes and governance design, highlighting governance as a strategic safeguard that conditions the likelihood of cooperative resolution in the presence of stakeholder heterogeneity.

Research abstract

The political marketplace literature focuses on the rule-setting stage, where firms secure favourable regulatory outcomes by lobbying and providing financial inducements to political actors who possess legislative authority (Hillman et al., 2004). These strategies, however, presuppose legislative authority — a condition that collapses at the rule-application stage. When the relevant actors are local planning authorities — who control critical permits but possess only administrative discretion within nationally prescribed frameworks — conventional nonmarket tools are foreclosed. Less is known about how firms navigate these constrained political environments.

Facing these constraints, we argue that firms' nonmarket strategy shifts from influence to navigation — reading the local political landscape and selecting accordingly. We will examine corresponding hypotheses in the context of UK onshore wind permitting, using planning application records from the Renewable Energy Planning Database merged with local election data. A first challenge to be addressed is establishing baseline evidence that the local political landscape shapes permit outcomes. It connects firms and the local political actors in emergent strategic interactions, and exploratory data analysis is underway as data collection proceeds. In doing so, we seek to extend nonmarket strategy theory and draw out implications for national and local political actors, with broader reference to permit-dependent firms.

Julia Zdunczyk
julia.zdunczyk@postgrad.manchester.ac.uk

The University of Manchester, IMP Division
1st Year – Abstract – PhD Business and Management

"*Transforming Multinational Pharmaceutical Companies through Systemic Innovation: Integrating R&D Strategy and Digital Innovation for Sustainable Packaging Eco-design Supporting Waste Reduction*"

The twenty-first century has been characterised by pressing environmental challenges, driven by massive waste generation, with profound implications for public health, resource conservation and ecological integrity. A major contributor to pollution is packaging waste, which constitutes 36% of the 400 million tonnes of plastic waste produced annually (Lau and Wong, 2024). Although packaging waste poses a significant sustainability challenge, its detrimental environmental effects are often under-recognised by stakeholders, highlighting the urgent need for further research into eco-packaging. Even small adjustments in packaging design and material selection can significantly impact climate change. In this regard, pharmaceutical packaging has the potential to mitigate emerging environmental concerns while complying with regulatory requirements and meeting consumer expectations (Weinrich *et al.,* 2024).

My research investigates the sustainability transition by developing a decision-making tool that enhances strategy implementation and cross-stakeholder coordination, utilising digital technology. This study focuses on industries under economic and regulatory pressure to facilitate eco-packaging R&D decisions. The pharmaceutical sector is selected due to population growth, which is driving higher healthcare demand and medicine consumption, leading to improper disposal of packaging waste (Arke *et al.,* 2025). The first question is to understand challenges and untapped opportunities throughout the lifecycle while developing innovative eco-packaging strategies and identifying cross-stakeholder relationships that influence the packaging decisions. To address this question, the document analysis will focus on three multinational pharmaceutical companies and will thereby be complemented by thirty individual semi-structured interviews with sustainability experts. The primary data will also be utilised to analyse conditions affecting eco-design development strategies and the significance of digital technologies in facilitating systemic innovation in R&D decision-making. Ultimately, the combination of both methods will provide an understanding of dependencies, particularly regarding who internally controls eco-design strategies and the extent of stakeholder involvement in packaging decisions. My research is not expected to encounter any major problems; however, there are some potential minor issues that may arise during the interviews. One concern is obtaining honest answers regarding the true causes of the eco-packaging problems. To address this issue, I will conduct confidential interviews to reduce bias and ensure the anonymity of the respondents.

I anticipate that my study will have substantial theoretical and practical implications by offering a detailed understanding of current eco-packaging operations. By mapping the influence of external and internal conditions, this PhD research aims to advance the existing body of literature on theorising strategic adaptation for innovative, environmentally friendly packaging. Additionally, this study will identify best practices to incorporate digital technologies into innovative packaging R&D decision-making (Dominguez-Escrig and Mallen-Broch, 2023). From a practical standpoint, my project aims to develop a decision-support tool for R&D managers and senior sustainability executives in highly regulated sectors, enabling them to select new, innovative eco-packaging R&D options.

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