

Research Showcase

Science, Technology, and
Innovation Policy

Environmental Policy and
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Social and Urban Policy



Science, Technology, and Innovation Policy

Veale, M., **Matus, K.**, & Gorwa, R. (2023). AI and Global Governance: Modalities, Rationales, Tensions. *Annual Review of Law and Social Science*, 19.

In this review, the authors study what exactly the salient but polarizing issue of Artificial Intelligence (AI) is being governed, how, by who, and why by considering the literature on AI, the governance of computing, and regulation and governance. The authors took critical stock of the different modalities of the global governance of AI that have emerged, such as ethical councils, industry governance, contracts and licensing, standards, international agreements, and domestic legislation with extraterritorial impact, and examine selected rationales and tensions that underpin them, drawing attention to the interests and ideas driving these different modalities. As these governance regimes built around AI become clearer and more stable, the authors urge those engaging with or studying the global governance of AI to constantly ask the all-important question of “Who benefits?”

Yarime, M. "Facilitating Data-Driven Innovation for Sustainability: Data Governance and Its Impacts in Smart Cities in China." *2023 AAS Annual Conference. ASIANSTUDIES*, 2023.

Few empirical studies were conducted to examine how data are managed and provided in smart cities and how they affect companies' innovative activities, despite their crucial role in addressing a variety of sustainability issues. This conference paper examines the data available and used in smart cities and how the government and enterprises collaborate on data to facilitate innovation. Focusing on China, particular attention is paid to different types of public-private collaboration for smart cities, including equipment supply, platform building, and data analysis. Interviews were conducted to examine how key stakeholders in the public and private sectors collaborate on data, and the impact on the outcomes of innovative activities was examined by analysing the government procurement data.

Stephenson, M., Lejarraga, I., **Matus, K.**, Mulugetta, Y., Yarime, M., & Zhan, J. (2023). AI as a SusTech Solution: Enabling AI and Other 4IR Technologies to Drive Sustainable Development through Value Chains. In *The Ethics of Artificial Intelligence for the Sustainable Development Goals* (pp. 183-201). Cham: Springer International Publishing.

Artificial intelligence (AI) and other new technologies of the Fourth Industrial Revolution (4IR) can help drive sustainable development through what can be called 'SusTech' solutions. To address the questions on how can these SusTech solutions be supported by governments, adopted by firms (especially in managing value chains), and encouraged by users, this book chapter proposes a three-part solution: (1) creating a Sustainable Technology Board by the G20 (modeled after the Financial Stability Board) as a mechanism for coordination, cooperation, and scaling of SusTech solutions; (2) adopting policy and regulatory measures to help firms integrate SusTech solutions into value chains, including drawing from 11 concrete, actionable options; and (3) illustrating opportunity and inspiring replication by examples of firms already adopted SusTech solutions.



Environmental Policy and Sustainability

Wang, R., Hertwich, E. G., Fishman, T., Deetman, S., Behrens, P., Chen, W. Q., de Koning, A., Xu, M., **Matus, K.** Ward, H., & Zimmerman, J. B. (2023). The Legacy Environmental Footprints of Manufactured Capital. *PNAS*, 120(24), e2218828120.

This paper integrates 50 years of economic and environmental data to provide the global legacy environmental footprint (LEF) and unveil the historical material extractions, greenhouse gas emissions, and health impacts accrued in today's manufactured capital. It is shown that between 1995 and 2019, global LEF growth outpaced GDP and population growth, and the current high level of national capital stocks has been heavily relying on global supply chains in metals. The LEF shows a larger or growing gap between developed economies (DEs) and less-developed economies (LDEs) while economic returns from global asset supply chains disproportionately flow to DEs, resulting in a double burden for LDEs. Ensuring best practices in asset production while prioritizing well-being outcomes is essential in addressing global inequalities and protecting the environment, and it requires a paradigm shift in sustainability science and policy to achieve this end.

E. Doran, J. Golden, **K. Matus**, L. Lebel, V. Timmer, M. van 't Zelfde & A. de Koning "The Emerging Role of Mega-Urban Regions in the Sustainability of Global Production-Consumption Systems." *npj Urban Sustainability* 3.1 (2023): 23.

Mega-urban regions (MURs) are important consumers or traders of resources from or producers of wastes destined for the global hinterlands. This paper uses three cases to illustrate governance innovation in MUR-PCS interactions: industrial symbiosis in Tianjin, China; electricity production in London, the UK; and the adoption of standards and labels for seafood in Bangkok, Thailand. In London and Tianjin, waste capture reduced consumption of hinterland resources, whereas, in Bangkok, the aim was to improve the sustainability of resource use in coastal and marine hinterlands. The authors suggest an agenda for research to evaluate the potential for transferrable MUR governance innovation to enable sustainable and equitable PCSs.

Wang, X., Li, H., Wang, Y., & **Zhao, X.** (2023). Quantifying the Potential Co-Benefit of Air Quality Improvement on Cultural Heritage in China. *Sustainability*, 15(11), 8709.

Atmospheric pollutants corrode heritage materials, especially stone, causing a loss far beyond the economic losses of the degraded materials. Over the past decades, conventional air pollutants have been slashed owing to clean air actions in China, producing a significant co-benefit for heritage conservation. However, the benefits may be offset by increases in the photochemical oxidants in smog, such as ozone, which damage heritage materials. This study employed dose-response functions to quantify the impacts of air pollutants on the surface recession of the limestone of heritage structures in China, assessed the potential benefits of air quality improvement for heritage conservation, and provided evidence for the benefits of air quality improvement for heritage conservation, putting forward policy recommendations for heritage conservation, including assessing pollution risk, promoting heritage conservation through social sustainability, and implementing differentiated conservation strategies.



Social and Urban Policy

He, A. J., Liu, P., Yumeng, F., & Liu, H. (2023). Sending Professors to the Field: Does Faculty-Practitioner Exchange Narrow the Theory-Practice Gap in China's MPA Programs? *Journal of Asian Public Policy*, 16(1), 96-113.

This paper examines the micro-dynamics of such exchange in Master of Public Administration (MPA) programs in China where the gap was particularly wide. 13 faculty instructors in Chinese MPA programs with experience in government engagement were interviewed. It was found that the instructors were predominantly driven by a keen awareness of their weak real-world exposure. The government engagement experience boosted their self-efficacy when teaching in-service students, and the empathy developed between instructors and students augmented educational outcomes. The engagement service strengthened the faculty instructors' awareness of the theory-practice gap and their appreciation of students' needs. They became more cognizant of the usefulness of various theories and more capable of relating theory to practice.

He, A. J., Qian, J., Chan, W. S., & Chou, K. L. (2023). Willingness to Purchase Hypothetical Private Long-Term Care Insurance Plans in a Super-ageing Society: Evidence from Hong Kong. *Journal of Aging & Social Policy*, 1-26.

This paper seeks to unravel the paradox of having soaring demand for long-term (LTC) services in aging societies on the one hand and the absence of a risk-pooling mechanism on the other through an empirical study in Hong Kong, a super-aging society. A survey sampled 1,105 respondents was conducted in 2020 to analyze middle-aged individuals' willingness to purchase hypothetical private LTC insurance plans derived from a discrete choice experiment; clear barriers toward potential purchase have been identified in the study despite encouraging acceptance. It is found that the desire for self-sufficiency and preference for formal care powerfully increased individuals' interest, but cognitive difficulty, habitual adherence to out-of-pocket payment, and unfamiliarity with the LTC insurance market reduced such interest. The results with reference to the changing social dynamics are explained, with policy implications for LTC reforms in Hong Kong and beyond drawn.

Zhu, P., Wang, K., Ho, S. N. R., & Tan, X. (2023). How is Commute Mode Choice Related to Built Environment in a High-Density Urban Context? *Cities*, 134, 104180.

This paper addresses the gap in mainstream studies that focus on the relationship between the built environment and travel behaviors in low-density urban settings by examining such relationships in highly dense urban settings, using Hong Kong as a case study. The findings highlight that built environment characteristics have a greater impact on people's choices among different public transport sub-modes compared to their choice between public transport and cars. Specifically, millennials are more influenced by built environment attributes when selecting rail-based and mixed-mode public transport, while older commuters are more influenced when choosing road-based transport. These results shed light on individuals' commuting mode preferences in transit-dominated urban contexts and provide a solid foundation for policymaking in encouraging the use of specific public transit sub-modes and catering to the needs of different age groups.

Zhu, P., Li, J., Wang, K., & Huang, J. (2023). Exploring Spatial Heterogeneity in the Impact of Built Environment on Taxi Ridership Using Multiscale Geographically Weighted Regression. *Transportation*, 1-35.

This paper applies multiscale geographically weighted regression (MGWR) to investigate the associations between taxi ridership and spatial contexts to address the effects of spatial heterogeneity in the built environment on taxi passengers' travel behaviours. The MGWR considerably improves modeling fit compared to the global OLS model by capturing the spatially varying processes at different scales. The results demonstrate the existence of strong spatial non-stationarity in the various built environment factors affecting the spatial distribution of taxi pick-ups and drop-offs. This study reveals the complex relationships between the built environment and the distribution of taxi ridership at different spatial scales and provides valuable insights for transport planning, taxi resource allocation, and urban governance.

Wang, K., Chen, Z., Cheng, L., **Zhu, P.**, Shi, J., & Bian, Z. (2023). Integrating Spatial Statistics and Machine Learning to Identify Relationships between E-Commerce and Distribution Facilities in Texas, US. *Transportation Research Part A: Policy and Practice*, 173, 103696.

This paper proposes a novel analytical framework that integrates spatial statistics and machine learning techniques to identify relationships between e-commerce and distribution facilities. The framework includes centro-graphic analysis, global and local spatial association measurements, and a recently popularized interpretable machine learning approach – gradient boosting decision trees (GBDT) – to analyze warehousing location choices. The GBDT results show that industrial activities and transportation network accessibility are key factors influencing warehousing location choices. It is also found that the relationship between warehouses and e-commerce establishments is weaker in Houston, a major maritime gateway for goods entering and leaving, compared to Dallas-Fort Worth and Austin. Implications for local freight transportation planners and decision-makers are discussed.

