Research Assessment Exercise 2020
Impact Case Study

University: City University of Hong Kong
Unit of Assessment (UoA): 25 - political science (incl. public policy & administration & international relations)
Title of case study: Turning green to gold: remaking theoretical and methodological models for sustainable development

(1) Summary of the impact

Research conducted at City University has influenced major actors in the sustainable built environment field in China, ranging from urban scale to industry organizations and NGOs. Alongside the mobilization of economic, social, and institutional forces under the common goal of promoting sustainability, her work addresses a fundamental concern in the trade-off between promoting the environment and the economy by helping to shape the intention and willingness of homebuilders/developers/energy-saving companies by providing a better understanding of the positive effects of environmentally orientated strategies on their financial performance.

(2) Underpinning research

Professor Zhang's research examines the theorization and practice of sustainability through cross-disciplinary approaches. She addresses the concern of the private sector, which assumes that environmental protection involves additional costs that may erode financial performance. The response to environmental protection is conventionally seen as an 'economic' issue and was long evaluated using cost-benefit analysis. The growing importance of articulating green concerns to the private sector is diminished by the lack of an empirically-founded, plausible theoretical model to understand how environmental strategies affect a firm's financial performance. Zhang's research meets that concern, and began with several internally funded projects in CityU and two funded projects by the Hong Kong Government's highly competitive and prestigious General Research Fund (GRF) as follows.

The Curvilinear Link between Environment Strategies (ES)/Corporate Social Responsibility (CSR) and Financial Performance (FP)

Zhang and her colleagues offer a theoretical critique of the conventional way in which empirical studies are caught in a "linear", or "dichotomy", mindset, which assumes that ES/CSR and FP are either allies or adversaries. She proposes an alternative approach, hypothesizing that, as homebuilders adopt additional environmental strategies (CSRs), their financial returns decline in the short term, but then rebound as CSRs are increasingly adopted in the long term due to improved efficiencies due to economies of scale and with the increased general recognition of the benefits involved [R1]. Zhang and her colleagues provide the first empirical evidence on whether and how "greenness" is valued by hotel customers, which indicates that obliging hotels will simultaneously reduce their operating costs and create a better indoor environment in a financially feasible manner at little or no extra cost to the customers [R2].

The Urban sustainability discourses

Zhang's second important piece of research focuses on remaking traditional top-down urban sustainability, which results in cities overemphasizing energy and resources at the expense of the vulnerability of urban ecosystems. Zhang and her colleagues present research projects to uncover urban sustainability discourses, focusing on the following aspects:

Clarifying urban sustainability and sustainable urbanization concepts, practices, and evaluation approaches. This includes proposing a comparative International Urban Sustainability Indicators List (IUSIL) to better understand the drivers and goals of urban sustainability

practice, and identifying the circumstances under which practices select their indicators [R3]. Combining resilience and sustainability thinking in terms of compliance, inter-connections, and contradictions [R4]. Developing a model to evaluate whether the urbanization process aligns with sustainability principles. This captures the dynamic nature of the urbanization process by two parameters of urbanization velocity (VR) and urban sustainability velocity (VS) to form a "VR-VS" coordinate, which presents four scenarios of urbanization practice, depicted in four quadrants [R5]. These two parameters are also used to further develop sustainable urbanization elasticity coefficient (eSU), which can be used to determine whether an urbanization process is sustainable (i.e. whether a particular process of urbanization improves sustainability [R5]). Developing urban ecological infrastructure (UEI) – defined as an organic integration of blue (water-based), green (vegetated), and grey (non-living) landscapes, combined with exits (outflows, treatment, or recycling) and arteries (corridors) at an ecosystem scale – into a UEI framework to represents the biotic and abiotic interactions within an ecosystem, and stresses an integrated relationship between artificial and natural systems. This links the grey, blue, and green infrastructures and integrates them through both exits and arteries, providing insights that help improve the circulation and reuse of resources throughout the urban ecosystem. This comprehensive conceptual framework can facilitate more rational urban development and improve urban ecosystem services and regional sustainability [R6].

(3) References to the research

[R1] Wang H., Lu W., Ye M., Chau K.W., and Zhang Xiaoling. (2016). The curvilinear relationship between corporate social performance and corporate financial performance: Evidence from the international construction industry, Journal of Cleaner Production 137, 1313-1322. (Google Scholar: 2 citations)
[R2] Zhang, Li, Jing Wu, Hongyu Liu, and Zhang Xiaoling. (2017). The value of going green in the hotel industry: evidence from Beijing, Real Estate Economics.
[R3] Shen, Li-Yin, J. Jorge Ochoa, Mona N. Shah, and Xiaoling Zhang. (2011). The application of urban sustainability indicators–A comparison between various practices, Habitat International 35, no. 1: 17-29.
[R4] Zhang, Xiaoling and Li, Huan. (2018). Urban resilience and urban sustainability: What we know and what do not know? Cities 72: 141-148.
[R5] Shen, Liyin, Yi Peng, Zhang Xiaoling, and Yuzhe Wu. (2012). An alternative model for evaluating sustainable urbanization, Cities 29, no. 1: 32-39.
[R6] Li, Feng, Xusheng Liu, Xiaoling Zhang, Dan Zhao, Hongxiao Liu, Chuanbin Zhou, and Rusong Wang. (2017). Urban ecological infrastructure: an integrated network for ecosystem services and sustainable urban systems, Journal of Cleaner Production 163: S12-S18.
Much of the work at the UoA was supported by GRF research grants in 2016-2019 (both grants as PI)：

(4) Details of the impact

Zhang's work has enriched state-society as well as environment-economy relationships. At corporate level, she investigated the current intention and willingness of

homebuilders/developers and investors. Established in 2010, [redacted] is committed to becoming a leading integrated low carbon service provider in China with a focus on pushing low carbon development and ecological civilization construction in China through various innovative practices. Its main business covers low-carbon think-tank, corporate carbon management, third-party business, low-carbon IT solutions, low-carbon education and training. [redacted] visits to Zhang involved several focus group meetings from 2013 to 2019. Through these visits, Zhang shared the findings of her research which reveals that, after an initial dip, a firm's financial performance benefits from adopting green/low carbon strategic initiatives (e.g. "bringing new ideas and practical benefits to the company's business development and strategic orientation" and "providing important benchmarking and guidelines for formulating the long-term development strategy in low-carbon consulting services for the company (quote from the supporting letter of [redacted],S6). It is found that [redacted] had been convinced by Dr. Zhang's suggestion that corporate management should building low-carbon eco-industrial chain and promote high quality resource integration, which is also echoed with Zhang's one publication (R1).

[redacted] also has adopted Zhang's work on low-carbon communities, construction, energy, and carbon emissions. Initially, [redacted] "ignored the unique value and characteristics of developing low-carbon new towns and communities in Chinese cities," but now understand that they require the "comprehensive consideration of energy consumption intensity, population growth, urbanization rate, and GDP per capita," and that the "efficient utilization of new and renewable energy … may have the great investment prospect and commercial value." Zhang's findings now provide them with "effective solutions to constructing an evaluation indicator system for low carbon communities and the business of construction and energy application, including consulting and evaluation, planning, design, and operation." As a result, Zhang's above consulting suggestions and indicator systems (details from [R4]) are now included in [redacted]'s low-carbon training courses and consulting service chains, all of which "have been well received by customers especially in policy studies, low-carbon information, consulting services of low-carbon community construction and other related business activities." Zhang also established an effective university-enterprise partnership in green building investment management, energy conservation and environmental protection, and corporate social responsibility. Her advanced management concepts, such as "Turning Green into Gold," "Green Strategic Plan (GSP)," "Sustainable-JIT," "Building Waste Management (CWM)," and other business strategies brought tangible economic benefits (an approximate 5% annual increase in profit margin) and social benefits (the "green brand effect") for [redacted] investment decisions and transformation. Established in 2008, [redacted] is specializing in building energy-saving design and consultation, project management, energy contract management, building contract management, and renewable energy technology development. The value of the company is to provide cost-effective building energy-saving solutions and related equipment and construction products. For example, Zhang's proposed cost-benefit analysis model (Zhang et al., 2015) for building and real estate companies to measure the whole life cycle was applied by [redacted] for their practical development strategy and behavioral user practice (see S7).

At the city level, Zhang acted as the strategic development consultant of Bureau of Housing and Urban Construction of [redacted] (China) and contributed to their urban redevelopment strategy and planning. As the pilot area of "three old renewals" (三旧改造) appointed by [redacted] used to face the dilemma of "pollution first and then treatment" or "pollute and control at the same time." The "three old renewals", which refers to old towns, old factories, and the old villages, has been implemented in 21 cities in [redacted] since 2008. Until May 2018, a total of 1.33 trillion yuan had been invested in the 10,235 projects of "three old renewals" and covering an area of 640,000 mu. Facing the poor infrastructure and degraded living environment in the process of three renewals, Zhang and her colleagues defined "urban ecological infrastructure" (UEI) and

proposed an integrated framework in which the infrastructure network provides ecosystem services and sustainable urban systems, despite changing landscapes and climate. The sharp increase in global urban population and rapid expansion of impervious urban surfaces raises concerns over more than just the quality of human life; researchers are also worried about ecosystem services and the stability and security of urban ecosystems and infrastructures. These concerns were addressed by Zhang and her colleagues in this project. Understanding the form and function of UEIs is an important first step in developing innovative strategies to address obstacles like rigid thinking, institutional fragmentation, and inflexible policies to provide a more resilient, stable, and sustainable urban system. This framework was applied to [redacted] Constructing low carbon and ecological city and community projects. For instance, the Guangzhou Panyu district urban planning project and [redacted] urban renewal project, etc.) In this regard, the UEI concept was translated into practical action (See S8).

(5) Sources to corroborate the impact

[S1] Zhang was interviewed by China Real Estate Business on "green development in China Mainland." 2014-07-28. http://news.dichan.sina.com.cn/2014/07/30/1171829.html
[S2] Zhang was interviewed by Reuters TV Green Roof Development in Hong Kong.
[S3] Zhang sought research support from Chairman of LEED, green building assessment's for research collaboration.
[S4] Chen, J., Zhang X., Guo Z., et al. (2014). 2014 Annual Report on Green Real Estate Development in China, China Real Estate Business Press, China: Beijing.
[S5] A press conference was organized in City University of Hong Kong on 26 October 2016 to publicize the key findings and policy recommendations of the research upon Householders' willingness to pay. Nine local newspapers, including seven Chinese and two English newspapers, covered the research project on 27 October 2016. In this context, the research attracted wide media coverage including, 文匯報, 信報, 蘋果日報, Southern China Morning Post, Gadoar.com, 東方日報, 經濟日報, 明声网 and etc.
[S6] Letter of corroboration from [redacted] to confirm and certify the adoption of Dr. Zhang's "Turning Green into Gold," "low-carbon community, construction & real estate development, energy and carbon emissions" models and methods on designing the firm's low carbon benchmarking and guidelines in low-carbon consulting services and long-term strategy.
[S7] Letter of corroboration from [redacted] to confirm and express satisfaction with the use of Zhang's proposed "Turning Green into Gold," "Green Strategic Plan (GSP)," "Sustainable-JIT," "Building Waste Management (CWM)," which helped them bring about tangible economic benefits (such as an approximate 5% annual increase in profit margin) and social benefits (such as the 'green brand effect').
[S8] Letter of corroboration from [redacted], to confirm and certify the use of Zhang's 'Urban Ecological Infrastructure' model in the application of Guangdong province's Constructing low carbon and ecological city and community project.