

論文審査の結果の要旨

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The university is well placed to play a decisive role in cross-sector partnerships for sustainability. This is due to a capacity to generate technological and social innovation, link vast areas of societal expertise and activity, amass research funds and donations, in addition to a high level of societal trust from non-profit status and commitment to the public good, and extensive portfolios of real-estate assets in urban areas. This potential to initiate, fund and direct cross-sector attempts to co-create urban sustainability is reflected by a worldwide flourishing of partnerships. However, emphasis on economic contributions through technology transfer to industry continues to dominate expectations on desirable forms of societal contribution for the university. A key instrument for propagating the technology transfer model is the idea of a ‘third mission’, alongside existing responsibilities of education and research. Despite widely promoted success in so-called ‘entrepreneurial’ universities, the capacity of this model to drive societal transformations towards sustainability appears highly limited. Although studies exist on both university partnerships for sustainability and conventional technology transfer practices, none so far have bridged and cross-examined these two forms of stakeholder collaboration. The second gap is the absence of systematic comparisons across cases and a lack of robust analytical frameworks for understanding key characteristics and mechanisms of sustainability partnerships.

This study therefore aimed to examine the distinguishing features and mechanisms of co-creative university partnerships for urban transformations towards sustainability with special regard to the conventional technology transfer model. Specific objectives were to consider a large sample pool and generate global-level knowledge on defining features, in addition to commonly encountered drivers, barriers and potential impacts. In parallel, the study sought to generate a detailed understanding of the processes, mechanisms, impacts and challenges encountered by pioneering cases from contrasting institutions and socio-economic conditions. The scope of this study is on university-driven cross-sector partnerships for sustainability in urban or sub-urban areas within industrialised Europe, Asia and North America. The research approach is empirical, employing both qualitative and quantitative methods. It includes a macro-dimension (global statistical analysis) and a micro-dimension (two case studies). The macro-level analysis involved identifying 70 cases from around the world, together with collecting and integrating qualitative secondary data into a database. Three analytical tools were created: 1) a typology of partnership types; 2) a framework for identifying key attributes such as sub-systems targeted, actors involved, geographic scope, triggers and mechanisms; and 3) a second framework for identifying drivers, barriers and appraising impacts. These were then applied to the sample using primary data from quantitative and qualitative surveys, in addition to secondary evidence. The macro-level analysis consisted of a twin case study: the 2000 Watt Society Basel Pilot Region by the ETH domain (Swiss Federal Institutes of Technology) and the Oberlin Project by Oberlin College, USA. These were conducted via document analysis and the production of

primary data through fieldtrips and semi-structured interviews.

Macro-level research results show that partnerships typically seek to simultaneously transform multiple urban sub-systems, usually at the local scale. Common partners for co-creative university partnerships for sustainability are local government, together with strong contributions from civil society. This study shed light on mechanisms used to drive societal transformations towards urban sustainability; the most common being activities related to knowledge management and governance and planning. A bias towards techno-centric approaches was identified, especially in Asia, with a reluctance to pursue social innovation. Results show that surveyed cases are demonstrating positive impacts in regards to environmental, social and sustainability dimensions, with significantly less confidence regarding economic aspects. Lastly, frequently cited barriers were human rather than technical and mostly related to internal partnership dynamics such as time restraints, lack of unity and harmony and communication difficulties. Other issues related to funding availability and potential tensions between differing 'worldviews', incentives and timespans influencing operating cultures in local government and academia.

Micro-level case study results demonstrated the potential of the emerging co-creative model to cater for highly contrasting institutional characteristics, motivations, socio-economic conditions and societal needs. The 2000 Watt Society Basel Pilot Region illustrated a case unfolding in thriving socio-economic circumstances and a research-intense institution. This partnership aimed to implement the scientific vision of a '2000-watt society' and trial emerging technologies for long-term sustainability targets in mobility and the built environment. It was driven principally by research and a technical approach, with key partners from local government and large industry. On the other hand, the Oberlin Project illustrated a case emerging in circumstances of severe socio-economic decline, from a liberal arts institution desiring to improve social and physical conditions to ensure long-term competitiveness and resiliency towards climate change and sustainability challenges. Ambitions of spurring post-carbon economic regeneration required civil society engagement and a social innovation approach with real-estate development.

A key finding in the cases was that socio-economic conditions and institutional motivations and characteristics strongly influence the model of co-creation. Two distinctive models of co-creation for urban sustainability were thus defined—one for innovation and the other for regeneration. Co-creation for innovation would be expected to emerge from prosperous socio-economic conditions and research-intense universities strong in engineering. Objectives would be to drive urban sustainability through technical innovation, demonstrations and implementation projects with scientific value. Core partners would be industry and local government. Macro (and micro-level) research suggests that potential impacts of this model could include: integration of scientific knowledge into real-world implementation projects and long-term government planning; verification of both technical and social aspects of emerging technologies in 'urban laboratories'; and the creation and export of technical tools such as new technologies, decision making instruments and socio-technical systems for driving wider societal transformations. Other outcomes could include changes in industry practice via science-backed reform of governance frameworks, and the transfer of innovation to industry and local government—with or without patenting. Case study results suggest that strengths of this model would include the use of scientific research to measure sustainability, shape public policy and influence industry behaviour. Potential limitations could arise from incapacity to tackle lifestyles due to overwhelmingly technical approaches and absence of civil society actors. Other difficulties could include tensions when aligning

long-term scientific research agendas with local government priorities on short-term implementation projects. This highlights the need for strategies to co-design projects in ‘middle ground’ to generate value for both academic and government actors.

On the other hand, co-creation for regeneration could be expected in declining socio-economic and built-environment settings. It could emerge from less research-intense institutions with priorities in improving social and environmental conditions and developing real estate assets in the neighbouring community. Objectives would be to drive socio-economic regeneration via sustainable development, with chiefly social innovation approach and less emphasis on scientific research. Core partners would be diverse actors from civil society, together with local government. Case study analyses suggest that potential impacts would encompass: advancement of human dimensions of sustainable development such as community engagement, capacity building and fostering of social entrepreneurship; the institutionalisation of sustainability into government policy; societal transformations or prototypes of new configurations of energy, transport, carbon finance and food systems; with potential economic regeneration achieved via increased economic activity, reduced leakage (i.e. expenditures on imported energy, goods and services) and creation of new low-carbon businesses and employment. Strengths of this model would include the potential to generate widespread social engagement around sustainability due to a high civil sector involvement. Challenges would be encountered in seeking to drive economic growth due to the complexity and time required for this task in a contracting economy.

The empirically demonstrated capacity to serve differing university profiles and motivations—whilst addressing highly distinctive societal needs and socio-economic circumstances—suggests vast potential applications for the emerging co-creative model. Further, with its ability to provide a framework to integrate and enhance various university functions such as research, education, outreach, technology transfer and real estate development, benefits of co-creative partnerships for both stakeholders and the university appear significant. This spectrum of possibility hence justifies the call for a re-interpretation of the third mission away from narrow conceptions of economic growth achieved predominantly through technology transfer. A reform of government policies regarding university appraisal systems and research funding selection is needed to foster the co-creative potential of the university to pursue a much broader form of societal development—one more aligned to the complex sustainability needs of human settlements in this century.

Contributions of this study are triple. Firstly, through a statistical analysis of 70 cases it has laid out theoretical and empirical foundations and the first ‘bird’s eye view’ of an emerging global phenomenon that, until now, was examined case by case. New theoretical concepts were then elaborated via two case studies demonstrating the characteristics and potential impacts of emerging forms of co-creative collaboration with society. Secondly, by linking two separate bodies of literature, it has demonstrated the limitations of the dominating model of technology transfer vis-à-vis the challenge of urban sustainability. Conversely, it has empirically illustrated how the emerging co-creative model can address these limitations and function as a collaborative innovation platform for creating socio-economic, technological, environmental and political transformations towards sustainability. Lastly and most importantly, it has laid out a powerful way for diverse university actors to respond to the sustainability crisis and mounting pressures from governmental, international and scientific organisations to tie university functions to the needs of surrounding communities and regions.

This dissertation hereby has been approved for fulfilling the requirement for the degree of Ph.D. in Sustainability Science.

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