

論文の内容の要旨

Co-creative university partnerships for urban transformations towards sustainability:

Beyond the third mission through technology transfer

(サステナビリティに向けた都市の転換のための大学の共創的パートナーシップ：
技術移転を通じた第三のミッションを超えて)

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The grand sustainability challenges of our time—such as climate change, food, water and resource security, pollution, environmental degradation and interlinked socio-economic concerns—are symptomatic of systematic failures. Unlike market failures merely require ‘tinkering’ or ‘re-adjustment’, tackling modern sustainability ailments requires a fundamental re-configuration of that system and therefore, *societal transformations*. With the majority of humanity concentrated in urban centres, transformations toward sustainability must begin here. Yet doing so requires collaboration between various societal sectors. The university is well placed to play a decisive role in cross-sector partnerships for this task. This is due in part to a capacity to generate technological and social innovation, link vast areas of societal expertise and activity, amassing research funds and donations, in addition to a high level of societal trust from non-profit status and commitment to the public good and an extensive portfolio of land and real-estate sources in urban areas. This potential to initiate, fund and direct cross-sector attempts to co-create urban sustainability is testified by a flourishing of such partnerships around the globe. However, despite the emergence of this co-creative potential with regards to sustainability, emphasis on economic contributions attained through technology transfer to industry continue to dominate expectations regarding desirable forms of societal contribution. A key ‘marketing’ instrument for this is the idea of a ‘third mission’, alongside existing university missions of education and research.

Although studies exist on both university partnerships for sustainability and conventional technology transfer practices, to date none have bridged these two forms of stakeholder collaboration. Consequently, the dominating model of university-industry collaboration through technology transfer remains unscrutinised from the perspective of sustainability. Conversely, the implications of the emerging phenomenon of co-creative university partnerships for societal transformations toward sustainability have not been considered with regard to the dominating model and the idea of a third mission. This is the first gap addressed by this study. The second is an overwhelming presence of single or small-*n* sets of case studies and the absence of robust frameworks for understanding key attributes and mechanisms of co-creative university partnerships.

This study therefore aims to assess the significance and implications of co-creative university partnerships for urban transformations towards sustainability with regard to the more established model of technology transfer. Responding to the above-mentioned gaps, specific objectives were to consider a large sample pool and generate global-level knowledge on defining features, in addition to assessing commonly encountered drivers, barriers and impacts that can be expected. 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 collaborations for sustainability (either complete or ongoing) in urban or sub-urban areas in industrialised nations in Europe, Asia and North America.

The research approach is empirical, employing both qualitative and quantitative methods. These consist of a *macro*-dimension (analysis of a global sample) and a *micro*-dimension (two case studies). The macro-level analysis involved identification of 70 cases from industrialised Europe, Asia and North America and the collection and integration of qualitative secondary data into an Excel database. Three analytical tools were created to identify key attributes across this sample: 1) a typology of partnership types; 2) a framework for identifying key properties such as sub-systems targeted, actors involved, geographic scope, partnership triggers and lastly, mechanisms; and 3) a second framework for identifying drivers, barriers and appraising impacts. These tools were then applied to the sample using the secondary data, in addition to primary evidence obtained from quantitative and qualitative surveys. The macro-level analysis consisted of a twin case study: *2000 Watt Society Basel Pilot Region* by the ETH domain (Swiss Institutes of Technology) and the *Oberlin Project* by Oberlin College, USA. These were conducted via analysis of secondary documents and the production of primary data through fieldtrips and semi-structured interviews.

A key outcome from the theoretical research is a typology of different forms of university co-creation with stakeholders. Two distinctive types highlighted were co-creation *for innovation* and co-creation *for regeneration*. It was shown that these models are influenced by socio-economic conditions and strengths and priorities of the lead institution. Co-creation *for innovation* is typically the product of prosperous socio-economic conditions and a university with strengths in research and engineering. These factors shape the objective of utilising co-creative partnerships for R&D, technical demonstrations and knowledge production and sharing, with typical stakeholders consisting of government and large industry. On the other hand, co-creation *for regeneration* was shown to surface in reaction to conditions of post-industrial socio-economic decline. It typically emerges from less research-intense institutions with priorities in improving social and environmental conditions and real estate assets in the neighbouring community. These factors influence the objective and partnership function of reforming socio-economic circumstances and improving the built environment, typically involving stakeholders from local government and the civic sector.

An analysis of 70 cases unveiled further distinctive characteristics of co-creation for sustainability in relation to the dominating technology transfer model. These include a focus on a specific place (mostly local/neighbourhood and city/town level) and a strong tendency to collaborate with local government and civil society. Also significant are holistic social development objectives seeking to advance simultaneously the sustainability of multiple urban sub-systems through a wide array of societal engagement modes of which technology transfer and economic development is the least commonly used. The university function of co-creation for sustainability may hence be interpreted, in its typical manifestation, as the pursuit of a broad type of social development, involving a broad range of approaches and actors.

Two case studies demonstrated the potential of this model to cater for highly contrasting institutional strengths and priorities, as well as distinctive sets of 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 co-creation *for innovation* model aimed at implementing the scientific vision of a '2000-watt society' and testing emerging technologies for long-term sustainability targets in mobility and the built environment. It was driven principally by a *research* function and technical approach, with key partners from local government and large industry. Major impacts of this type of collaboration were the integration of science-based energy efficiency principles into major urban development projects and landmark demonstration buildings, in addition to the alignment of scientific R&D activities with societal needs regarding individual mobility. This resulted in a series of demonstration vehicles integrated into industry and government car fleets, generating both scientific knowledge and policy implications for fleet managers.

The Oberlin Project illustrated co-creation *for regeneration* in conditions of severe socio-economic decline, in a liberal arts institution motivated by converging needs for campus expansion, neighbourhood improvement and concerns about climate change and energy security. Ambitions of spurring low-carbon economic revitalisation required a strong civil society engagement and a mostly social innovation approach in tandem with real-estate development. In this much younger case, a key achievement was a transformation of the City power mix from coal to renewables and the mobilisation of a knowledge base and series of socio-technical experiments to springboard future actions toward citywide carbon neutrality. Despite acute qualitative differences, a major impact of both cases was the institutionalisation of long-term sustainability targets into city policy; largely through the engagement mode of governance and planning. Both examples also demonstrated the potential to function as a 'spin-off' governance framework for long-term societal transformation goals as ownership of university-initiated co-creative partnerships is transferred to local government.

An analysis of drivers and barriers in the micro- and macro-level empirical research has also shed insight into potential strategies for enhancing the effectiveness of co-creative partnerships. These include the need to find 'middle ground' and design projects to bridge differing needs of local government (typically focused on the short-term and implementation) and academia (focused on

long-term agendas with needs for scientific credibility and value). Also important in the pursuit of societal transformations towards sustainability is the alignment and synergising of government policy, university activities, industry behaviour and civil sector initiatives. Other tactics include the creation of 'bridging organisations' with devoted staff to supervise project management and communications to alleviate time and project management related bottlenecks. Both cases also demonstrated the potential limitations of pursuing social transformations toward sustainability with a predominantly techno-centric approach.

The empirically demonstrated capacity to serve differing university strengths and priorities, whilst addressing highly contrasting societal needs and socio-economic circumstances, is suggesting vast potential applications for the emerging co-creative model. Further, with its ability to provide a framework for integrating and tying various university functions such as research, education, outreach, technology transfer and real-estate development to societal needs—and enhance these roles—benefits of co-creative activity for both stakeholders and the university appear significant. This spectrum of creative 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 advance 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 the negative ramifications provoked by expectations for societal contributions based on narrow conceptions of a third mission via technology transfer. 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.