

# **Actor-network analysis of transition towards urban hi-tech horticulture. A comparative study of development and adoption of urban high-tech horticultural practices in Shanghai and Amsterdam.**

Hosseinfarhangi, M., M. Turvani, G.J. Carsjens, A. van der Valk

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## **Abstract**

Urbanization, urban poverty, food insecurity, rising food prices, growing dependency on food imports and challenges posed by climate change have placed food high on the urban agenda. Advanced technologies and alternative food production methods such as vertical farming and hydroponic cultivation methods support the transition of conventional food production methods to more decentralized and local production systems. The development of high-tech urban agriculture is one of the strategies for more sustainable and resilient urban food systems, being explored by cities worldwide to feed their increasing population. Although urban agriculture has been widely studied, the process and consequences of technology driven transitions on urban planning and development are hardly understood. This paper uses the theory of Multi-Level Perspective (MLP) on sustainability transitions and Actor-Network Theory (ANT) to explore this technology driven transition and its adoption in urban planning and development. MLP describes transition as a process of change of the socio-technical regime, resulting from a combination of external pressure (the landscape) and internal pressure by innovation (niches). ANT describes the relations between human and non-human entities (actants) in the process of (de)stabilizing of the regime. The circumstances of configuration and reconfiguration of actants, including horticultural technologies, policy documents, land use plans, spatial development plans and decision makers, were studied. Amsterdam and Shanghai were used as case studies. A comparative approach was used to analyse the role and relations of the various actants that were involved in the development and adoption of high-tech urban agriculture technologies in both cities. Studying the implementation of similar technologies in the different socio-political context of both cities allowed to identify the losses and gains in the process of transition and identify recommendations for policymakers, industry and other actors interested in bringing about change. The data were collected through observational research, document analysis and interviews. The research project studied socio-technical transition in three stages: 1- Disentanglement of incumbent socio-technical regime under pressure from landscape. 2- Punctualization process of novelties. 3- Reentanglement of punctualized actor-networks and creation of a new socio-technical regime. The results show that in Shanghai, the China Academy of Agricultural Science was a focal actant that used a top-down policy implementation approach to punctualize the high-tech urban agriculture practices into the socio-technical regime. In Amsterdam, the Top Consortium for Knowledge and Innovation (TKI) and Philips were the focal actant and the technologies that have been developed by Philips were obligatory passage point. However, in the Netherlands focus has been on private public partnership and promoting bottom-up policy implementation approaches to negotiate and define the identity of government, business, knowledge institutes, innovations and spatial development plans.