

Doctoral Dissertation

Interuniversity Doctoral Program in **Urban and Regional Development** (37th Cycle)

Examining Rural Landscape Change Driven by the Digitalisation of Agriculture

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Abstract

The advent of information and communication technologies has brought about a profound transformation in the way of production and agriculture is no exception. Variety of digital technologies have been progressively integrated into the farming processes with the objectives of enhancing resource and labour efficiency while reducing the negative impact on the environment. This kind of practices have been labelled as ‘digital agriculture’. At the same time, an increasing number of policies and strategies have been developed to facilitate the digital transformation of the farming sector. Concurrently, there has been a notable rise in interest in the management, planning and protection of landscape towards sustainability. Nevertheless, there is a noticeable absence of comprehension regarding the impacts of digital agriculture on the landscape, despite the simultaneous developing trends. A substantial body of research has concentrated on the socio-economic and environmental impact of digital agriculture. However, there has been a paucity of studies that have considered this issue from a landscape perspective despite the fact that technological advancement has been widely acknowledged as a significant driving force of landscape change. Therefore, it raises the question on whether digital agriculture exerts influences on landscape and if this leads to landscape change. On this account, this research intends to investigate the influences of digital agriculture on the landscape, focusing on three key questions: (1) whether and how does the implementation of digital agriculture influence the landscape? (2) which landscape aspects are affected by digital agriculture, and is there any evidence of change? (3) what potential future development trajectories might be anticipated for landscape change?

By adopting the landscape approach, the analytical framework of landscape change checklist has been proposed to facilitate this study to comprehend the impacts on different aspects of landscape. The checklist has divided landscape into three dimensions, cultural-social, bio-physical and perceptual-aesthetic. Each of these dimensions comprises multiple aspects. A variety of methods have been employed to address the research questions from different perspectives, including a systematic literature review, an example review, and an expert survey, and the landscape change checklist has been incorporated with these methods to acquire knowledge about digital agriculture related landscape change. With the exception of the literature review, which does not limit to a specific geographic scope, this research has primarily focused on the related issues in the EU and China, to exhibit the diverse situations in these two different regions but under the same/similar trends of farming digitalization and landscape sustainability. The research findings indicate that digital agriculture exerts influences on all landscape aspects included in the checklist to varied degrees, ranging from physical features to intangible aspects. The knowledge obtained from the aforementioned methods has been integrated and employed in the construction of landscape scenarios, which are intended to illustrate the plausible future of landscape in the context of farming digitalisation. A 2×2 scenarios matrix with four possible scenarios have been proposed, among which two landscape scenarios, landscape of productivism and eco-friendly farming landscape, have been elaborated in detail. The landscape scenarios can be considered a fundamental step for comprehending the influence of farming digitalisation on landscape, bridging the disciplinary gap, stimulating discussions and raising awareness on this issue. Moreover, lists of possible changes to each landscape aspect have also been incorporated into the scenarios, making them also have potential uses in the landscape practices.

Keywords: landscape change, landscape scenario, digital agriculture, smart farming, agricultural policy