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An Iterative Approach for Knowledge Production in the Agricultural Systems and Insights for IS Development

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ABSTRACT

There is motivation in many rural areas and communities to resolve the issues slowing achievement of a sustainable future, and to embrace the concept of the circular economy for agro-food systems. Increased consumption of resources is not an option and therefore best use must be made of capital, incorporating the "reduce, re-use, recycle" mantra. Research projects addressing sustainable land use can help to accomplish this aim, and the studies have demonstrated that stakeholders may be helped to understand and act on new knowledge especially if they are involved in more than one project. This is because they gain confidence to evaluate research ideas in the light of their own experience. In the Basilicata region of southern Italy there has been a succession of research projects since the 1990s to study the processes of land degradation and appropriate technologies to combat the risk of desertification. Most recently, the attitudes and perceptions of groups of cereal farmers included in both the DESIRE and REACT projects, or the REACT project alone, were compared using a Questionnaire, and the results highlighted the success of the iterative approach. This is an important finding, and can encourage understanding and action to overcome constraints and support the circular economy in agro-food systems.

KEYWORDS

Circular Economy, Iterative Dissemination Model, Social Learning, Stakeholder Participation, Sustainable Land Management

INTRODUCTION

Recent studies highlight an increasing number of interconnected challenges faced by agro-food systems (Foresight, 2011; McIntyre et al., 2009; Rockström et al., 2009; SCAR, 2011; Thompson et al., 2007; UNCTAD, 2013). The challenges include environmental issues such as raised greenhouse gas emissions from agriculture contributing significantly to climate change. The unsustainable exploitation of non-renewable resources (such as phosphorous) is also of increasing concern. Agricultural soils, known to be great reservoirs for carbon and other key resources, are showing signs that industrial agricultural practices are having a detrimental effect: compaction negatively impacts soil structure; depletion of nutrients and soil organic matter decreases fertility and erosion by wind

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and water degrade arable lands. Furthermore, excessive nutrient runoff and leaching from agriculture has a detrimental effect on the aquatic environment. The UNCCD (2016) recognise the importance of halting negative effects and promote the idea of land degradation neutrality, where the aims are to: maintain or improve ecosystem services; maintain or improve productivity, in order to enhance food security; increase resilience of the land and populations dependent on the land; seek synergies with other environmental objectives; and reinforce responsible governance of land tenure. Changes in policy decisions affecting the rural economy are likely to affect a diverse range of ecosystem services (Reed et al., 2013a), and in this context it is gradually becoming clearer how multiple ecosystem services can be evaluated and compared. Ferrarini et al. (2017) provide an example of networks of plant-based bioenergy buffers in a rural landscape that help to conserve resources such as soil, water and organic carbon. They cite measurements of biomass and energy in relation to transport costs etc. but similar calculations could be made with regard to agro-food production. Challenges in the agro-food system related to social aspects are also frequently highlighted in recent literature, with issues related to unequal access to food and exploitation of farm and food workers a particular cause for concern. Moreover, the negative economic effects caused by both hunger and obesity are increasingly coming to the attention of decision makers.

As a reaction agro-food research in recent years has seen important contributions in relation to studies of alternative food networks and the "quality turn". This term is used in sociological studies to indicate the shift both in policy making and practice toward more local and quality food, rather than traditional mass consumption (Vermuelen & Bienabe, 2007). These research agendas have challenged the current logic of the food system in terms of offering alternative visions of future development. The Circular Economy is an approach that is gaining prominence and it has recently been adopted by a number of agenda setting stakeholders such as the European Commission. The circular economy concept can be used in relation to food and agriculture: «agricultural practices aim at optimising yields while also improving the quality of soil, water, and air. It views the long-term health of our agricultural systems as our best chance for long-term performance» (Ellen MacArthur Foundation, 2013, pp. 23–24). In this scenario the food system undergoes systemic circular change towards a situation where the «[food] system would be generative, closing nutrient loops with minimal leakage and maximum long-term value extraction from each loop in short, local supply chains with almost zero waste» (Ellen MacArthur Foundation, 2015, p.76). With these visions and ideas specifically related to the agro-food system the proponents of the circular economy have clearly begun to engage directly with questions about sustainable agro-food futures. Highlighting the long-term perspective is of crucial importance for addressing and reorienting the unsustainable practices in agriculture, hence, circular economy thinking—at least to some degree—is going beyond the pursuit of technological quick fixes that have been a characteristic feature of historic agro-food development. The types of farming practices that can be considered circular or regenerative include organic farming and zero-tillage, because the removal of positive resources from the system are minimised (Ellen MacArthur Foundation, 2015). The ecological recycling agriculture concept which has been promoted in the Baltic region is also highlighted as an important example (BERAS, 2015). Other approaches such as "agroforestry, holistic planned grazing, silvo-pastoral systems, and pasture-based dairy systems with no/minimal fertiliser use" are also included as part of the repertoire of practices seen as promising in terms of sustainability (Ellen MacArthur Foundation, 2015).

This paradigm shift in philosophy makes it more and more apparent that many traditional scientific approaches are left struggling as they attempt to confront the uncertainty and unpredictability of future food security. It is with this background that a discussion about adopting approaches, which has been termed post-normal science, becomes relevant (Kristensen, et al., 2016; Ravetz & Funtowicz, 1999). Hence the challenges are not only related to the organization of the food system, but also related to our mode of producing knowledge regarding the agro-food system (Alrøe & Noe, 2014).

The "wicked problems" (as described by Alrøe & Noe, 2014) that are most in need of interdisciplinary (and international) cooperation include real and potential disasters such as food supply

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