
How do New Zealand's agricultural cooperatives positively impact climate change? By getting farmers, managers and scientists in the same room

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Rising sea levels, climate extremes, and pollution are among the most complex and pressing challenges contemporary societies face. Tackling these climate change consequences requires unconventional and innovative solutions that combine technical know-how and a good understanding of things that are distinctly 'human' in origin. Given the urgency of the issue, it is no surprise that magazines and academic journals are full of articles about organisations that are doing their part in addressing social- and ecological challenges. Most media attention is on investor-owned multinational corporations, such as Tesla, that seek to tackle complex challenges through technical solutions or small-scale initiatives (sometimes called social- and ecopreneurs) that make a difference locally. Yet, it is questionable whether single organisations can galvanise the large-scale changes that contemporary challenges demand. Indeed, experts agree that tackling grand challenges like climate change needs to be a collaborative affair where individual organisations from different sectors work together to pursue sustainable transformation.

So, who can coordinate the search for and implementation of innovative solutions to grand challenges from an isolated to a collective effort? Our research points to one organisational form not typically associated with innovation and sustainable development: Agricultural cooperatives. We interviewed individuals— from the members (who are farmers) to top-level managers and directors—in five Kiwi cooperatives. Our analysis shed more light on how cooperatives facilitate and orchestrate collaborative innovation that addresses one of the most pressing grand challenges New Zealand faces: Land- and water use. For decades, industrialised agriculture has exacerbated land degradation by draining natural aquifers for farming, polluted land and water with effluent run-off, and creating food safety concerns through residues. And while some agricultural cooperatives are (perhaps rightly so) portrayed as the 'bad guys' that contribute to the issue, the corporations in our study have developed methods and approaches to respond to the issue pro- actively.

First, they organise workshops where members learn about the latest policy requirements and how customer expectations are changing. Instead of presenting 'ready made' solutions to these external trends, the cooperatives support their members to experiment with novel ideas in response to identified issues. As one manager told us: *"Farmers are an innovative bunch... they are not just trying to meet the minimum requirements but actively look at how they go beyond that"*. Motivated by increased awareness of ecological issues, pro-active farmers came up with pioneering solutions— such as novel effluent systems—that made a positive environmental impact and saved money. Cooperatives coordinate activities that help innovative ideas spread rapidly across the cooperatives' broader membership. Again, farmers take pivotal roles in these endeavours: They act as champions and thought-leaders to promote novel ideas on roadshows and field days.

At the same time, cooperatives ensure that solutions developed on-farm hold up against scientific scrutiny. They establish working groups where researchers from public research institutes in the New Zealand science and innovation ecosystem collaborate with farmers, ensuring solutions work for everyone. The promising ideas even receive funding to conduct 'on-farm trials' to explore whether novel methods work in 'real life' and meet the practical requirements of farmers. For one cooperative manager, getting farmers and scientists in the same room was vital:

"A lot of farmers often see science as purely academic and not practical. So, getting the farmer's a say in that whole process is vital. You've got to install that trust, and once you instil that trust, that's when you are getting results."

Third, cooperatives codify novel agricultural methods into best-practice guidelines and audit them

regularly. By combining these efforts, cooperatives can achieve widespread acceptance of new farming practices. These findings highlight that large-scale sustainable transformation rests on finding ways to orchestrate the efforts of many individuals and organisations towards a common goal. Our insights add to the knowledge-based toolkit that government, industry, public research, and other stakeholders can employ to tackle grand challenges. Regulation and science-driven innovation are both crucial in shifting organisational behaviours. Our study shows the orchestrating role that cooperatives can play, enabling the active engagement of organisations who operate 'on the ground' and giving some degree of trust and legitimacy to their innovative effort.