“Farmer organizations are gatekeepers of food safety”

MIT research team examines quality factors along China’s value chain

China’s food value chain has a huge number of small farms and other stakeholders. This structure makes it hard to standardize production and establish traceability systems for food safety and quality. In 2017, the Syngenta Foundation launched a research project with Yanchong Zheng, Associate Professor of Operations Management at the Sloan School of Management, Massachusetts Institute of Technology (MIT), and her graduate students. The project focuses on management of agricultural produce sourcing.

This year, one of the students, Wenjia Wang, wrote her master’s thesis on ‘Organizational Models in Smallholder Farming and Implications for Food Safety’, documenting the team’s research outcomes to date.

The thesis first examines various types of farmer organizations and their implications for food safety. Attention then turns to consumer responses to food safety information at the point of purchase. SFSA recently filmed an interview* with Wenjia. The following text is an abridged adaptation.

Syngenta Foundation: What was your personal motivation for this research?
Wenjia Wang: Food is a central and emotional aspect of our culture. China has suffered from a series of food safety scandals. Seeing the damage done by contaminated baby formula particularly affected me. I want to contribute to food safety improvements. But I was also highly motivated to interview farmers in the field, and better understand their lives and limitations.

Before we hear about your thesis, a background question: What are the main sources of contamination along the food value chain?
At a high level, the major value chain steps are production, transport / storage, processing and finally retail. The latter includes import and export. My thesis concentrates on production. Potential threats there to food safety include misuse or overuse of farm inputs. These include crop protection products, fertilizers and chemicals not certified for food production. There can also be toxic chemicals in the environment, such as arsenic. In the other phases, a transport company might use illegal preservatives. During processing, food can be contaminated by microbes or chemicals. Illegal additives can also be a concern. In retail, import and export, products can be contaminated by packaging or illegal preservatives.

Your research covered three provinces. How did you choose them?

We were interested in farmer organizational models, e.g. cooperatives and large businesses. Shaanxi, Shandong and Henan provinces vary greatly in agriculture, geography and economic patterns. They therefore have a broad spectrum of farmer organizations. Ziyang County in Shaanxi is mountainous, so farming is labor-intensive. It has some fairly young cooperatives. They work with new crop types and production contracts. Shandong province is flat and has a long cooperative history. It is also home to China's largest wholesale vegetable market. Farmers there have more money. They invest in greenhouses, for example, and adopt new traceability systems. The Henan businesses we studied work with thousands of farmers – which makes managing food quality and safety quite a challenge!

What was the goal of your field work?

The goal was to understand how different organizations work, and the implications for food safety and quality. We also wanted to observe how cooperatives and agribusinesses control quality and safety.

What were your major findings?

One was that organizations' motivations to mitigate food safety issues depend on where they stand in the value chain. For example, those that sell directly to consumers and compete against other brands are highly aware of safety issues. So they are keen to obtain certification. They also tend to centralize production, for example pooling farmers' land and managing it themselves. That way, they can control input use.

Cooperatives, on the other hand, sell to downstream processors. They are less directly concerned with food safety, and just want to meet their buyers' minimum standards. Not many are motivated to obtain quality certification.

What else did you notice?

The importance of local governments' role in food safety. The authorities in some counties of Weifang (Shangdong), for example, strongly support village quality-testing stations. Some local governments also help with traceability. Where they make less effort, the difference is noticeable. In Ziyang (Shaanxi), we didn't find any cooperatives with a traceability program. This is partially because the cooperatives there are much younger. Local government is still developing the infrastructure of a traceability system for all the county's farm produce.

What about the role of farmers' organizations?

Co-ops and agribusinesses are gatekeepers. They can set high standards, and help farmers meet them, e.g. with training and technical advice. But there are also risks. If production goes really large-scale, it can become hard to manage. Organizations need to tackle that situation with good

processes and suitable technology. Our interview partners at Baohetang, the agribusiness in Henan, have done exactly that.

In what other ways does the scale of production affect food safety and quality?
Chinese agriculture is still dominated by 200 million small farms. Their one to two acres are typically split across several plots. There are also a lot of small, family-run processors. The food sector is enormous and fragmented. That makes it very hard to standardize food production.

Your thesis also looks at Chinese consumers. What are their main concerns, and how do these relate to purchasing behavior?
Food scandals have seriously dented public trust. Nonetheless: consumers are primarily interested in appearance, freshness and taste. They don't know much about the main food certificates. According to one study, 80% have heard of 'Green Food', but only half know 'Hazard-free'; 'Organic' scores 25%. So I think purchasing behavior is often unguided.

You ran some experiments on purchasing behavior. What can you tell us about those?
We wanted to assess response to food safety communication, and how this affects willingness to pay. For example: will people pay more for 'Organic' products, if they can see the certification? We adapted screenshots from a major e-commerce website to design our experiment. The test group who were shown pictures with an organic certificate were more willing to buy the corresponding product than the control group who just saw a photo and textual description that the product was organic. With processed food, consumers respond more positively to the ingredients being organic than to the fact that no preservatives were used. And fathers are more likely to buy 'Organic' than single women without children! We also found that additional transparency and food safety information significantly raise consumer confidence in products and companies.

If you were advising the Chinese government on food safety, what would be your major recommendations?
The most important one would be to educate customers on different food safety and quality, plus the related certifications and standards. Secondly, it's really important to help local governments provide more testing facilities and traceability programs. My third recommendation would be more detailed regulation of farmer organizations and, for example, their procurement contracts with producers.

How will your research benefit smallholders in poorer parts of China? What lessons does it carry for improving smallholders' livelihoods in other countries?

Our research is largely concerned with organizations' role in standardizing practices and improving food safety. Put another way: we looked at how they can help smallholders plug in profitably to the national agricultural economy. In principle, all farmers stand to gain. And since smallholder farming is prevalent in most developing, agriculture-intensive countries, I hope a lot of our research could also benefit smallholders elsewhere.

Professor Yanchong Zheng says that Wenjia Wang's research represents "the first systematic market survey to better understand Chinese consumers' attitudes toward food safety and quality information". MIT can now "begin drawing a complete picture of the various production and organization models. We can also contrast, compare and determine the conditions under which certain models may perform better than others."

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Read **more about our work** on food safety in China: https://www.syngentafoundation.org/policy/food-safety-china

What do you think about the topic? Let us know via syngenta.foundation@syngenta.com

*If you would like to watch the **full video** interview and/or read a **transcript**, please contact us via the same address.

Interested in **sourcing in general** (i.e. not just in China)? Then you may also like to know more about CONSUS. This digital tool helps food companies make production and buying decisions. We supported its development. In February 2018, the CONSUS team published a paper in *ScienceDirect*