Chapter 8
Perception is Reality:
Factors Influencing the Adoption of Commercial Aquaponics in the Great Lakes Region

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EXECUTIVE SUMMARY

Despite the cold weather climate conditions of the Great Lakes region, an increasing number of organizations are growing local food on a year round basis. The utilization of commercial aquaponics has allowed these organizations to grow both fish and produce indoors while creating new jobs and community development opportunities. Research has shown that there are significant challenges to maintaining profitable commercial aquaponics ventures in temperate climates; however, the popularity of the technology in urban agriculture seems to be increasing. In this chapter, the authors use diffusion of innovation theory to explain the adoption of this sustainable development innovation in the face of financial challenges. They find that the perception of relative advantage, compatibility, complexity, trialability, and observability may be explanatory factors in the adoption of commercial aquaponics in the face of financial challenge.

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ORGANIZATIONAL BACKGROUND

Although human development has benefitted from 10,000 years of uncharacteristic environmental stability, today our activities threaten "planetary boundaries," or the limits of Earth's biogeochemical resilience (Rockstrom et al., 2009). Activities such as fossil fuel consumption and industrial agriculture are driving global environmental changes in climate, land use, biodiversity, nitrogen and phosphorus cycles, and chemical pollution among others (Rockstrom et al., 2009). These processes provide valuable ecosystem services that are critical to human well-being. Operating within planetary boundaries lowers the risk of changing biogeochemical processes at rapid rates and will require significant changes in human activities.

This balancing act between human activity and ecological stability underpins the goals of environmentally sustainable development. Individuals meet most of their needs by participating in the human economy, a subsystem of the biosphere subject to growth limits (Daly, 2007). However, we commonly overlook the ecological impacts of economic growth, treating ecosystems as subsystems of economic systems. Our quality of life very much depends on a harmony between economic development and ecological capacity, as well as the development of social practices that ensure the long-term equity and flourishing of our communities (Raworth, 2012). Development strategies are therefore most effective when they target the intersection of economic, ecological, and social sustainability. The goal of sustainable development is not only to develop within the thresholds of biophysical processes, but also to ensure that all communities can develop without deprivation and receive an equitable share of the planet's natural resources (Raworth, 2012).

Since the Industrial Revolution, the global population has relied on land, energy, and fertilizer intensive agriculture. Paradoxically, this has dramatically increasing food production while failing to ameliorate food deprivation in many parts of the world. The industrialized approach to agriculture presents a difficult challenge for sustainable development. On one hand, large-scale production and distribution of food, fiber, and other goods impacts most of the biophysical processes discussed above. On the other hand, meeting the nutritional needs of a growing population requires effective and efficient food production. Sustainable agriculture stands apart from industrial agriculture; whereas industrial agriculture is often characterized by environmentally destructive practices, sustainable agriculture seeks technologies and farming practices that satisfy human needs while maintaining the ecological capacity of agricultural systems.

As local food markets continue to grow (USDA, 2010), so will the need for agricultural technology innovations that will aid in the adaptation of food production processes to new environments like industrial warehouses, rooftops, and vacant lots. Commercial aquaponic production systems have diffused into cities