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A New Paradigm for Sustainable Adoption of Advanced Irrigation in LDCs

The conceptual frameworks of models for agricultural development from the middle of the 20th century onward have focused on private and public investment for agricultural research and development. "The world's agricultural economy underwent a remarkable transformation during the 20th century as the result of agricultural productivity growth, which was primarily generated by agricultural R&D financed and conducted by a small group of rich countries—especially the United States, but also Japan, the United Kingdom, France, and Germany" (Lowder & Carisma, 2011) and Israel.

This "Green Revolution" of the 1960's and 70's was characterized by "the breeding of improved varieties, combined with the expanded use of fertilizers, other chemical inputs, and irrigation (which) led to dramatic yield increases in the developed world and Asia and Latin America" (IFPRI, 2002). During this period the technology of drip irrigation, developed in Israel, was developed and, shortly afterward, exported to the developed and developing world.

The focus of this paper is the divergence of the Developed world and Under-developed world during the period of the 1970's and 80's in terms of how the advanced technologies of irrigation were distributed and supported. It is the position of this research that the fundamental approaches to distribution are paradigmatically distinct and that only a customization of the model used in the Developed world can serve the current and future needs of the Least Developed countries (LDCs).

In the Developed world, in particular in the western United States and Australia, the private agricultural sector viewed this revolution as a business opportunity and changed their business models. The companies that had heretofore sold and provided service for pumps changed their titles and developed expertise in the field of irrigation. The model is fundamentally one of private enterprise. However, many of these distribution wholesale companies are cooperatively owned by groups of growers and the model serves as the administrator for publicly sponsored subsidy and rebate programs. The proliferation of irrigation distributors was a key element for the successful adoption and implementation of advanced irrigation. In the LDCs, on the other hand, the task to provide materials and support for smallholder growers fell to the Development community largely made up of Non-Government Organizations which do not provide epistemic space for all appropriate and needed professional agricultural institutions and organizations.

This paper posits that the phenomenon of "dis-adoption" of drip irrigation in much of Africa (Burney & Naylor, 2011) and the disappointingly paltry 2% per annum growth in agricultural production in LDCs (Wollenberg, Nihart, Tapio-Biström, & Grieg-Gran, 2012) are indicators of the absence of the distribution value chain that proliferated in the Developed world during this period and continues today.

This paper unpacks and explains the institutional value chain in the Developed world which is characterized by three interdependent and financially interlinked actors: the grower; the irrigation distribution wholesaler; and the manufacturer of irrigation equipment. This triangular relationship has developed rules of behavior and institutional structures that have served to create a sustainable model for adoption of advanced irrigation products and methodologies and can be adapted and adopted in LDCs. Finally, this paper discusses the associated financial, social and climatic implications of the model under consideration and the criticality of utilizing professional irrigation organizations and institutions to incorporate newly emerging technologies.