

A Taxonomy of Failure Modes of Agricultural Technology Ventures in Developing Countries: Part 1

Jerrel Gilliam

The Pennsylvania State University, United States

Khanjan Mehta

Lehigh University, United States

krm716@lehigh.edu

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1 TARGET AUDIENCE

Agricultural entrepreneurs (both within and outside emerging economies), agricultural and food value chain researchers, social innovators, non-governmental organisations and entrepreneurs in underserved communities, humanitarian engineering educators, social venture investors.

2 BACKGROUND

Despite the prevalence and importance of agricultural technology ventures in developing countries, comparatively little scholarly research has been undertaken documenting lessons learned and best practices. This information is largely conveyed via more informal media, and many insights from in-country practitioners are not documented at all. This article aims to bring many of these lessons into the realm of scholarly literature by presenting a taxonomy of common failure modes for agricultural ventures particularly in developing economies.

3 3 PURPOSE

This article presents the rationale and methodology for a presentation (continued in Part 2) of descriptions of 26 different failure modes that can occur when designing, implementing, and maturing or scaling up agricultural technology ventures.

4 METHODS

Literature reviews, field experiences, and informal interviews with professors and practitioners from numerous universities and organisations in the United States and Kenya helped us develop a two-pronged approach for this study. First, we studied the business models of 120 agricultural technology projects/ventures using Osterwalder and Pigneur's Business Models Canvas. Second, we conducted 512 semi-structured interviews with smallholder farmers, agricultural technologists, entrepreneurs, commission agents, exporters and other food value chain (FVC) actors in Kenya, Cameroon, Rwanda, and Sierra Leone.

Through a series of white-boarding exercises, our team then synthesised the insights to develop the taxonomy of failure modes.

5 RESULTS

Innovators face a wide variety of technical, economic, social, cultural, political, regulatory, and other challenges when developing new agricultural technologies and commercialising them in emerging economies. Upon reviewing over 120 agricultural technology ventures with different products, business models, and socio-economic and business contexts, a common set of failure modes emerge. These common pitfalls can be manifested and described in several ways, but herein a 26-mode taxonomy is proposed for the purposes of further understanding and discussion. This taxonomy divides the venture lifecycle into three phases: design, implementation, and maturity and presents an overview of associated failure modes in each phase. Part 1 of this two-part article covers the taxonomy's background and development as well as the design phase failure modes, which are failure to meet a need, poor manufacturability, designer limitations, poor usability, complexity, cultural factors, and contextual factors.

6 IMPLICATIONS FOR TARGET AUDIENCES

This taxonomy aims to inform and inspire technology innovators and entrepreneurs within and outside emerging economies. This initial version highlights and organises a wide variety of critical failure points for products, services, and enterprises to serve as a framework for design, assessment, and strategic reflection. It is the authors' hope that the lessons learned and ensuing scholarly and entrepreneurial development will help make future efforts at social innovation and entrepreneurship for FVCs more sustainable and successful.