Scaling appropriate agricultural mechanization world-wide
Two-wheel tractors and smallholders farmers

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Session 6: Examples of Successes and Failures; Lessons Learned
Scale Up Conference - Innovations in Agriculture: Scaling Up to Reach Millions
Purdue University, IL, USA – September 25-27, 2018
Challenges & Problems: Two-wheel tractors to intensify smallholders farms sustainably

- Farm mechanization has transformed agriculture in high-income countries
- Adoption of mechanization in low income countries has been below expectations for years, despite:
  - 80% of agricultural production in developing countries from smallholder farms ranging between 0.25 to 2 ha
  - significant labor shortages and high drudgery/cost of alternatives (e.g. animal traction)
  - urgent need to professionalize and rejuvenate farming to stay competitive locally and internationally
  - Opportunities for rural entrepreneurship and mechanized service provision to reach smallholder farmer

- Responsibility check
  - Use of fossil fuels and ‘dirty’ technology, and need for regular repairs and maintenance
  - Risk of job displacement and shift to more knowledge intensive employment
  - Risk of business monopolies as in certain regions it is a specialty tool

Large-scale adoption of the technology can aid smallholders farmers to become more competitive and more responsive to changing environment
Tension between groups: Matching business cases with strategic collaborations

- Farmers:
  - need to improve farming practices to stay competitive, but require labor and precision in operations
  - need capital to invest, but financial service providers often don’t have confidence in agriculture/farmers
  - need services at specific times (planting, harvesting) whereas machinery service providers would like to spread service supply over area and time

- Farm machinery service Providers:
  - need sufficient farmers clients in proximity and in time to increase ROI
  - many models and accessories require good value chain integration
  - Skilled labour and repair/maintenance tasks have to be recognized

- Politicians:
  - small mechanization is often seen as unprestigious
  - afraid of short term unemployment (job and skill displacement), while failing to recognize importance of service provision and rural entrepreneurship
  - misguided subsidy or support programs without proper extension and coaching

Adaptable business models and value chain facilitation to generate push and pull towards movement for adoption
Lessons learned:
Cross-regional feedback on scaling strategies

- Two-wheel tractors are technically viable
  - On-farm and fuel efficiencies are well-documented, but correct usage/maintenance is knowledge intensive
  - Multitude of accessories without clear notion of functional packages
  - Proximity and level of integration of value chain can complicate availability

- Financial viability is major bottleneck to scaling
  - Financial services do not invest spontaneously in tools for rural transformation
  - Investment cost is initially high and no collateral is available
  - Governments understand but poorly design subsidies

- Leadership and position brokers
  - The role of the leading institute should be flexible and adjusted on local situation
  - Clear collaborations on common goals and scaling effort should be brokered
  - Environment and job creation/displacement determine the optimal scale, rather than aiming for maximum scale

Two-wheel tractor smallholder farmers can become scale-catalysts offering mechanized and affordable services enabling rural transformation
Table 1: **Technology:** What are challenges and opportunities for scaling multifunctional innovations?

Table 2: **Finance:** What are challenges and opportunities for scaling innovations that require a shift from low investment-high operational costs to *high investment-low operational cost*?

Table 3: **Policy:** What are challenges and opportunities for scaling innovations that are popular to benefit from *subsidies*?

Break out: 3 groups

Groups discuss for 12 minutes

3x 2 minute feedback from each group