Diffusion of small-scale pump irrigation technologies: Evaluating adoption processes in Malawi

Jean Kamwamba-Mtethiwa, PhD Researcher
Supervisors: Prof K Weatherhead & Dr J Knox
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Irrigation development in Malawi

- Agriculture accounts for about 37% GDP, employs over 80% and mainly dependent on rainfall (Chirwa, 2008).

- Rain-fed production is affected by climate change contributing to increased poverty & food insecurity.

- Irrigation considered as a solution & categorized into private estate and smallholder.

- Smallholder irrigation (SSI) characterized by the use of various technologies e.g. small pumps
The state of SSI in Malawi and research gap

- The estimated potential irrigated area for Malawi is about 450,000ha.
- Presently, 97,932ha is developed out which only 47% is under SSI (DOI, 2014).

<table>
<thead>
<tr>
<th>Technology</th>
<th>Total area developed (Ha)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gravity/river diversion</td>
<td>26,015.24</td>
<td>53</td>
</tr>
<tr>
<td>Treadle Pump</td>
<td>13,657.30</td>
<td>28</td>
</tr>
<tr>
<td>Watering can</td>
<td>5,494.14</td>
<td>11</td>
</tr>
<tr>
<td>Motorised pump</td>
<td>3,949.36</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>49,116.04</td>
<td>100</td>
</tr>
</tbody>
</table>

The gap:

- Evidence show disparities on suitability of small pumps for the smallholders.
- Need for evidence to inform policies on sustainable promotion of SSI pumps: scope of this research.
Exploring farmer adoption process

- Used the diffusion of innovation model (Rogers, 2003).

- Two field surveys: Semi-structured interviews with farmers & stakeholders

- Data analysis: descriptive statistics & content analysis
Selected results

- 4 pumps identified: (1) individual treadle pumps; (2) group treadle pumps; (3) individual motorised; (4) group motorized pumps.
- Increased adoption of individual motorized and treadle pumps.
- High proportion of non-operating group motorized & treadle pumps.
- Except for individual motorized pumps the rest were accessed for free/subsidised
### Characteristics of the SSI pumps and their adopters

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Individual TP*</th>
<th>Group TP*</th>
<th>Individual MP*</th>
<th>Group MP*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pump weight (kg)</td>
<td>20-35</td>
<td>20-35</td>
<td>17-310</td>
<td>100-310</td>
</tr>
<tr>
<td>Means of access</td>
<td>Free/subsidised/private</td>
<td>Free/subsidised</td>
<td>Private</td>
<td>Free</td>
</tr>
<tr>
<td>Percent still operating (%)</td>
<td>83</td>
<td>27</td>
<td>84</td>
<td>54</td>
</tr>
<tr>
<td>Pump manufacturers</td>
<td>Money Maker</td>
<td>Advainth</td>
<td>Mostly Chinese</td>
<td>Variant</td>
</tr>
<tr>
<td>Size of the irrigated area</td>
<td>Medium</td>
<td>Small</td>
<td>Large</td>
<td>Very small</td>
</tr>
<tr>
<td>Assets owned</td>
<td>Substantial</td>
<td>Substantial</td>
<td>Significant</td>
<td>Few</td>
</tr>
<tr>
<td>Stakeholders involved</td>
<td>Govt., NGOs, politicians, donors</td>
<td>Govt., NGOs, politicians, donors</td>
<td>Commercial distributors</td>
<td>Govt.</td>
</tr>
</tbody>
</table>

*TP-Treadle pumps; MP-Motorized pumps*
Mapping the conditions influencing farmers to adopt

PRIOR CONDITIONS
- Experienced
- Innovative
- Large irrigated areas

KNOWLEDGE
- Not experienced
- Less innovative
- Small irrigated areas

PERSUASION
- Rented or borrowed the pumps to test
- Adopted: (Attracted by pump attributes)

DECISION
- Dealt locally with pump technical issues & no external support

IMPLEMENTING
- All pumps continued-use

CONFIRMATION
- Except for Individual TPs the rest were discontinued
- Adopted (attracted by the free or subsidised pumps)
- Technical issues referred to promoters & external supported

Less assets, not exposed & relied on pump promoters
Less opportunity to test the pumps
-No assets, exposed, curious & socially networked
Pumps adopted by incentives (free/subsidised), do not necessarily follow the diffusion of innovation decision-making stages.

Apart from the incentives, the ability to fit in the existing farmers conditions, be observed and tried, facilitated the adoption and sustainability of the individual treadle pumps.

The increased adoption of private motorized pumps can be explained by increased inflow of cheap-Chinese pumps and could be an indication of success for treadle pump irrigation (since over 90% graduated from using treadle pumps).
The adoption choices for farmers with limited resources are narrow. If the target beneficiaries are the pro-poor – then policies promoting the uptake should consider supporting the potential adopters beyond pump affordability in order to be sustainable.

Adoption of the private pumps are based on socio-economic attributes of the adopters & pumps (Rogers, 2003). Policies that provide an enabling environment are sustainable.
Thank you

j.t.mtethiwa@cranfield.ac.uk
Refer my PhD thesis and papers