

## Co-creation of affordable and clean pumped irrigation for smallholders: lessons from Nepal and Malawi

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### Abstract-

Pumped irrigation is a way to intensify smallholder production. In this context, the Dutch company aQysta has developed the Barsha pump (BP), the first-ever commercial version of the spiral pumps. BPs, however, face several constraints that affect the decision-making and access of smallholders to this and other agricultural technologies, and thus to their benefits. On this subject, Product Service System (PSS) is a type of business model able to potentially cope with a number of restrictions of different nature. Moreover, if co-created with the feedback of the users, and by addressing contextual tensions of different cases, these models can be substantially richer than their top-down counterparts. Six cases of the use of BPs have been addressed in Nepal and Malawi. Both primary and secondary data, analyzed qualitatively under the analytic induction approach, were collected through unstructured interviews and Q-methodology. Evidence shows a wide range of (non-)technical facilitating and hampering conditions for the BP, as well as preferences of the smallholders in regard to existing and proposed business model elements. Based on the corresponding analysis, a set of opportunities for an improved BP-based business model - PSS, aiming to fulfil several (and at times opposing) needs, is ultimately proposed in the current paper.

**Index Terms-** Barsha pump, business model, hydro-powered pump, irrigation, Product Service System, smallholder

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