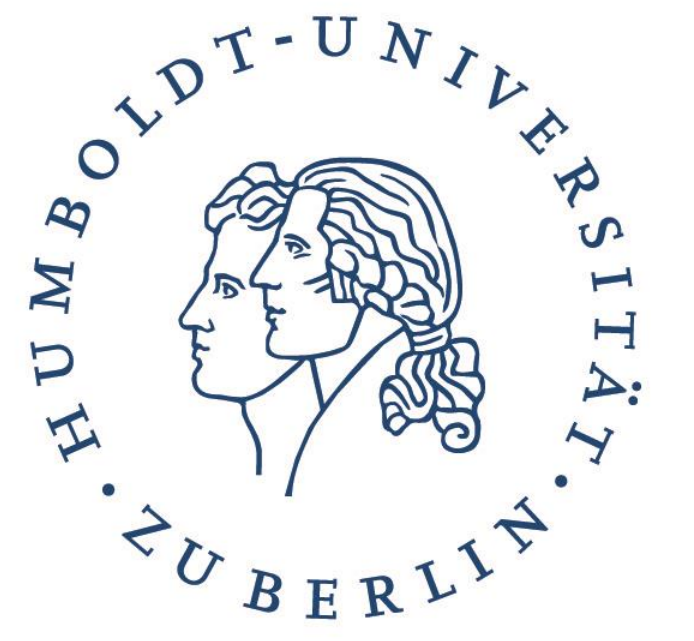




Understanding Farmers' Policy Preferences for Solar Powered Irrigation Systems in Karnataka, India: A Choice Experiment Approach

Aditya Korekallu Srinivasa and Dagmar Mithöfer
Agrifood Chain Management Group, Humboldt-Universität zu Berlin



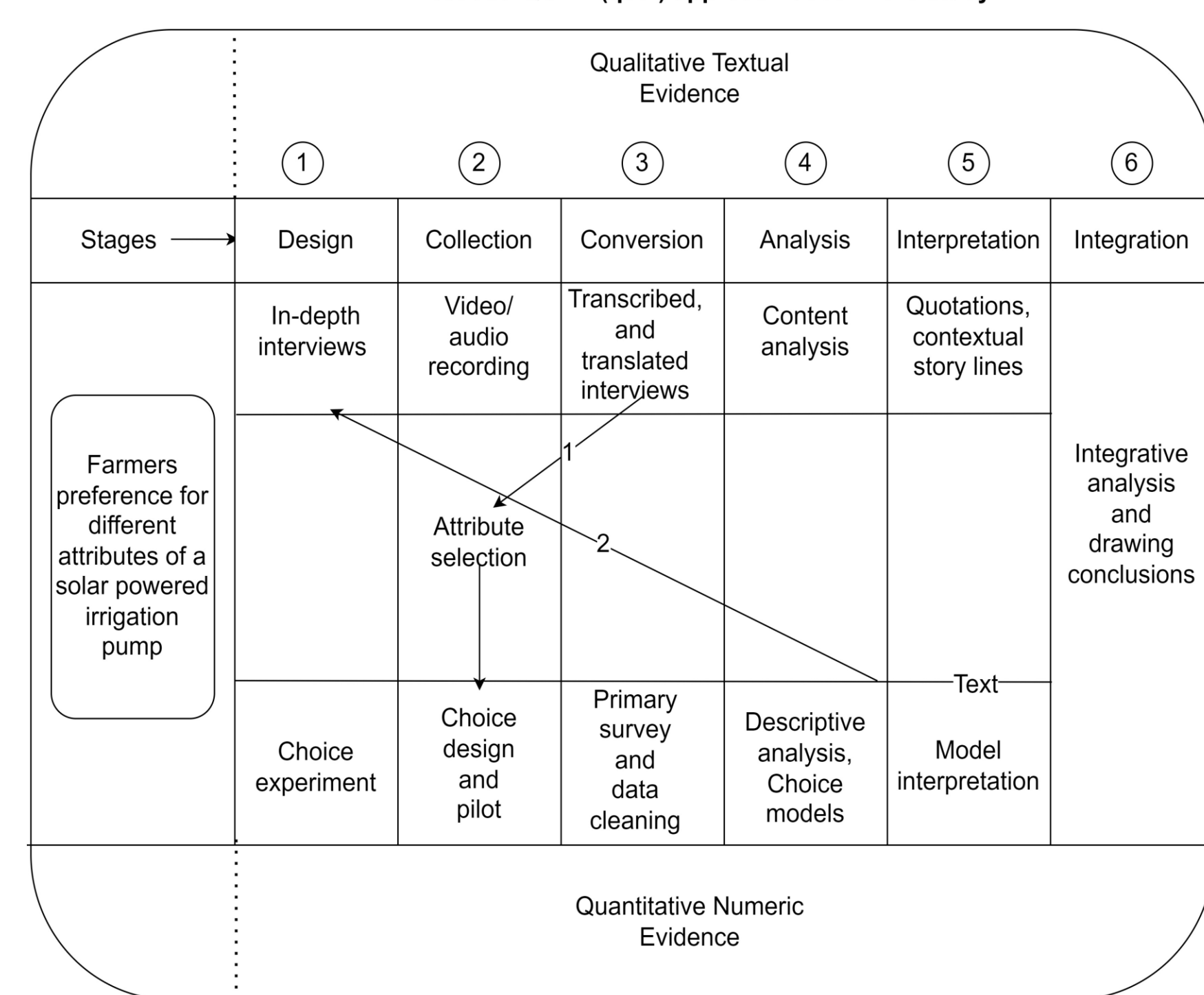
Background

- India aims to meet at least 50% of the total energy consumption through renewable sources by 2030 (GoI 2021^a).
- Solar Powered Irrigation Systems (SPIS) - sustainable energy transition in agriculture.
- However, this could also incentivize over exploitation of water.
- India launched PM-KUSUM scheme, solar pump with monetary incentive to save water through grid connection and feed in tariff (GoI 2019).
- However, adoption of SPIS is very low (<10% of the target) (GoI 2021^b).
- Possible mismatch between what farmer wants v/s what is offered.
- In this study, we examine the farmers preference for grid connected SPIS and the heterogeneity in preferences.

Concepts and methods

- Embedded QUAN(qual) approach.
- 21 in-depth interviews with stakeholders.
- D efficient experimental design for choice experiment.
- Primary survey of 500 farmers 31 villages, Mysore, Karnataka.
- Data analysis – Random Parameter Logit (RPL).
- Attitudinal construct like Technophobia, Collectivism and Environmental concern used to explain heterogeneity in preferences.
- Six follow up, structured, in-depth interviews for triangulation.

Embedded QUAN (qual) approach used in the study



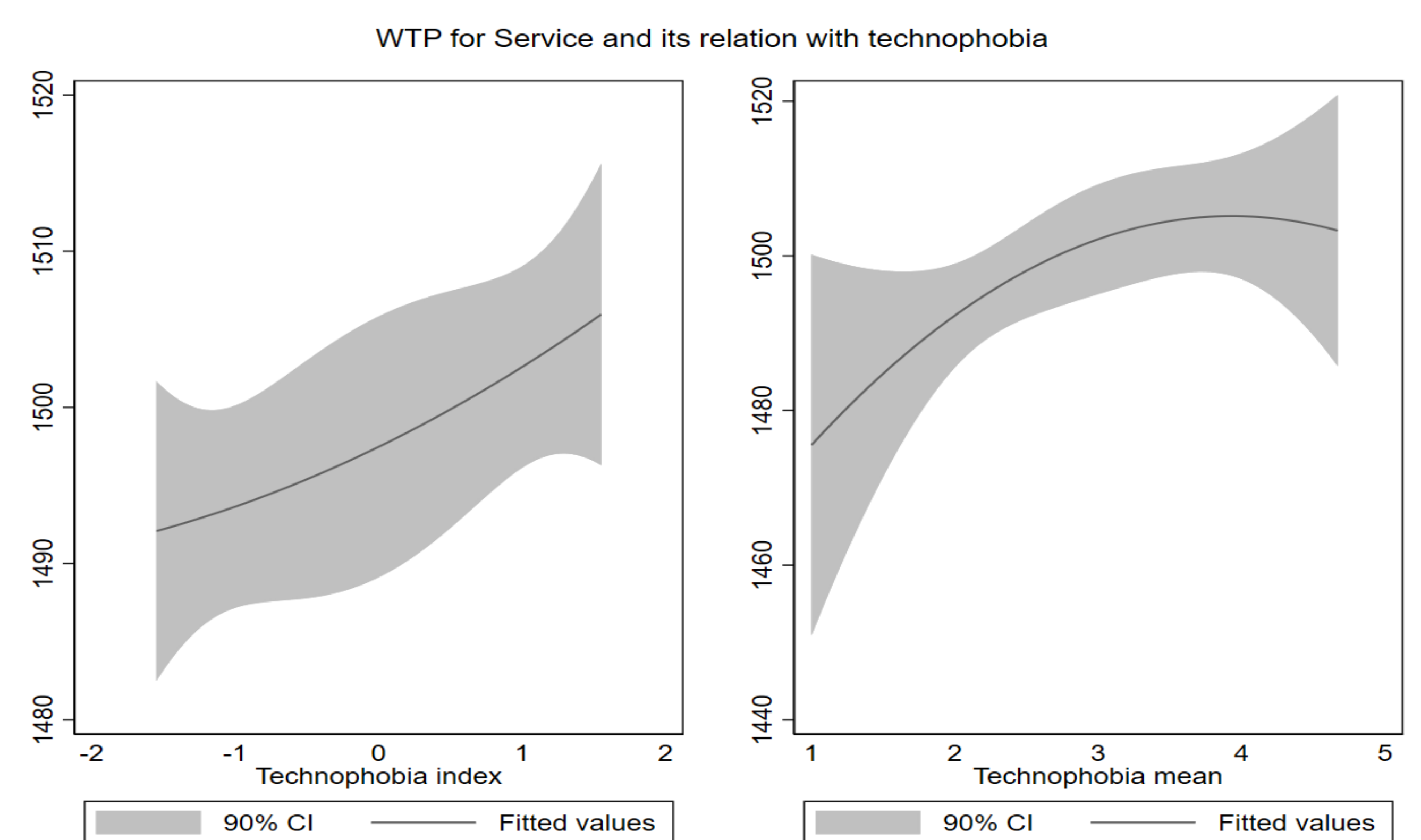
Results of Choice Experiment

Willingness to Pay (WTP) for different attributes in US\$

Coeff.	Loan 1	Loan 2	Loan 3	Grid	Service 1	Service 2	M. Use
WTP	587	1518	1905	239	107	1498	466
Lower CI	531	1452	1838	207	57	1445	433
Upper CI	644	1587	1976	269	159	1555	498

- Highest preference for loan with 10 years repayment period.
- Service with 10 years warranty is also preferred by farmers.
- Low preference for grid connection!

Heterogeneity in WTP



- Technophobia (measures reluctance to try new technology) had positive association with WTP for service.
- Lack of local service providers & expensive submersible pump repair could be the reasons for higher preference for service with longer warranty period.
- Grid connection as an incentive for adoption may not be effective.
- Qualitative interviews highlighted irregular power supply & human wild life conflict leads to preference for day time power (and SPIS!).
- Interviews also highlighted that the choice experiment overestimated the WTP.

Conclusion

- Farmers in the region has high preference for SPIS.
- Without credit linkage, farmers may not prefer SPIS.
- Longer warranty periods can substitute for lack of local repair services for pumps.
- The study demonstrate the utility of mixed method approach in choice experiments.

Acknowledgement

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Reference

- GoI (2021)^a: National Statement by Prime Minister Shri Narendra Modi at COP26 Summit in Glasgow. New Delhi, India.
- GoI (2021)^b: Ministry of New and Renewable Energy, Government of India, New Delhi, India.
- GoI (2019): Guidelines for Implementation of Pradhan Mantri Kisan Urja Suraksha evam Utthan Mahabhiyan (PM KUSUM) Scheme. MNRE, Government of India. New Delhi, India.
- Urban, J. B., & van Eeden-Moorefield, B. M. (2018). *Designing and proposing your research project*. American Psychological Association.

Attributes and levels for the choice experiment

Attribute	Levels of the attribute
Cost of the pump	<ul style="list-style-type: none"> 20 % of the original cost (original cost taken as 3 lakh Rs for a 7.5 HP pump) – Rs. 60,000 30 % of the original cost – Rs. 90,000 40 % of the original cost – Rs. 1,20,000 50 % of the original cost – Rs. 1,50,000
Term of the loan	<ul style="list-style-type: none"> No loan 5 years - annual repayment (Loan 1) 7 years - annual repayment (Loan 2) 10 years - initial 3 years repayment holiday, followed by 7 annual repayment (Loan 3)
Grid connection	<ul style="list-style-type: none"> Standalone (Grid) Grid connected
Service Provision	<ul style="list-style-type: none"> 2 year Annual Maintenance Contract (AMC). 5 year AMC (Service 1) 10 year AMC (Service 2)
Multiple uses of the solar energy	<ul style="list-style-type: none"> No Yes (M. use)

Note: Dummy effect coding used for all variables except cost of the pump