

Innovation for Climate Adaptation and Resilience (iCARE)

Social Innovation Through Technology Nudging:
Developing a Behavioral Toolkit for Diffusing Solar
Irrigation

Six Monthly Progress Report

Reporting period: Jan– June 2024

Prepared by: [Durham University](#)

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1. Project Information

Project Title:	Social Innovation Through Technology Nudging: Developing a Behavioral Toolkit for Diffusing Solar Irrigation
Project Code:	WBCAR
Partner Organisation:	Curtin University Australia, University of Rajshahi Bangladesh, American International University-Bangladesh, Khulna University Bangladesh
Reporting Period:	January – June, 2024
Date of Submission:	26 July 2024
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Status of project progress in this reporting period	<input type="checkbox"/> Significant delay <input checked="" type="checkbox"/> Delay <input type="checkbox"/> On Track
Report sign Off	<input checked="" type="checkbox"/> I have reviewed all the information provided for each section including number of beneficiaries. The information provided for each section of the report is complete. Name: Dr Habib Rahman Designation: Associate Professor, Durham University

2. Summary of the Achievements

Overall progress

The outcome of this project is to develop the ADOPT training manual- a behavioral toolkit in nudging towards climate-smart agricultural technology. The project site is Bangladesh and the focused area is solar irrigation. To address this outcome, this project has planned three outputs - Output 1: Deployment, Output 2: Adaption, and Output 3: Serviced. During the reporting period, January-June 2024, this project completed nine (09) activities for two (02) outputs and submitted the first deliverable of the project- the ADOPT training manual. The team also submitted the Inception Report during this period. Regarding the overall progress, there was a delay in the second quarter of the project timeline due to weather extremes at the project site- Bangladesh. The second deliverable- the baseline survey report is in progress. The following section describes the output-wise progress in activities and achievements.

Output 1: Deployment

This output generates the ADOPT training manual as the first deliverable of this project. The manual is the prime knowledge product and achievement of this project addressing the program indicator (**PDO: 3 Government ministries and 1400 non-solar-using farmers having access to climate-resilient solutions (social innovation model for upscaling solar irrigation) tested under the project**). This document is prepared using i) secondary documents, ii) local agricultural conditions, iii) extension services, and iv) economic and environmental modeling. During the reporting period, we completed- i) an inception workshop (titled, Initiation of Policy Engagement Workshop), ii) a desktop literature review, iii) brainstorming with local partners for study design, iv) networking with stakeholders for project site visit, and survey and v) the ADOPT training manual.

The ADOPT training manual is a comprehensive document for trainers and trainees on solar irrigation systems. This manual contains four behavioral nudge treatment modules on solar irrigation: Advocacy, Demonstration, Omitting misinformation, and Peer pressure. Each treatment module describes learning objectives, training contents, delivery methods, risk management, and training assessments. The purpose of each treatment module is to provide trainers with effective delivery of nudges for a behavioral change towards adopting solar irrigation technology. Therefore, various types/contents of advocacy, demonstration, omitting misinformation, and peer pressure have been included in the manual. Each treatment is supported by relevant case studies so that farmers understand national commitment, and preparedness for renewable energy initiatives and receive the evidence of successful implementation of these initiatives. Training assessment methods are included in the manual for effecting and participatory learning. Risk management instructions will help trainers assess local issues and challenges, and foster a proactive approach to a more resilient training/learning environment.

Output 2: Adaption

This output is concerned with the identification and recruitment of farmers for survey and training interventions. During the reporting period, this project recruited 1400 non-solar-using farmers in 28 districts (major administrative units) in Bangladesh for baseline survey and the ADOPT training intervention. By the process of matching similar covariate distributions and random sampling, this project recruited and surveyed (in the baseline) 1120 farmers for the ADOPT trial intervention group (the treatment group) and 280 farmers for comparison (the control group). Logistic and administrative preparations for the ADOPT training (for the treatment group) and placebo training (for the control group) are in progress. During the reporting period, we completed- i) building research teams for training and survey, ii) technical preparation and transfer of baseline survey questionnaire to survey app, iii) training of surveyors on baseline survey, iv) project site visits, farmers' recruitment for survey and v) baseline survey. The other vital issues addressed in this project for performing the activities and planning future steps include gender balance in research teams, building survey teams, and selecting the ADOPT trainers. We completed all in-person and online training of surveyors and field supervisors for conducting the baseline survey in May 2024. There was a delay in completing the in-person training and commencing the baseline survey due to severe heat waves in March-April in the project sites. However, we managed to complete the baseline survey and this delay will not affect the final delivery of the project outcome and finishing this project in due time.

The main deliverable of this output is the baseline survey report. This report will provide an analysis of the behavioral traits of non-solar-using farmers towards solar irrigation. Data cleaning and analysis for the report are in progress. We expect to submit the report by the end of August 2024. This report will contain the following information and analysis-

- Describe socio-economic characteristics of treatment and control groups and group and provide comparison tests;
- Describe statistics of farm and farming characteristics of treatment and control groups and provide group comparison tests;
- Describe the scenarios and extent of four nudges (advocacy, demonstration, omitting misinformation, and peer pressure) if accessible by treatment and control groups;
- Explore farmers' perceptions about solar irrigation and the four nudges; and
- Assess factors determining farmers' perceptions about solar irrigation and the four nudges.

Next step

The next step regarding the achievements includes the following activities-

- Preparing the baseline survey (of 1400 non-solar-using farmers) report;

- Bengali translation and review of the ADOPT training manual to make it accessible and understandable for local community use;
- Instruct the ADOPT trainers before commencing the training of farmers;
- Provide the ADOPT training of 1120 farmers (in four separate groups) using the ADOPT training manual;
- Conduct a placebo training of 280 farmers (control group);
- Prepare end-line survey questionnaire and train surveyors for the survey;
- Conduct end-line survey of 1400 farmers after the training intervention; and
- Prepare the final report of the project and organize its dissemination workshop.

3. Summary of Project Beneficiaries

- **Direct Project Beneficiaries who have been provided with or who have accessed iCARE innovation project activities and deliverables include-**

i. National Government

Ministry of Agriculture-GOB

Ministry of Power, Energy and Mineral Resources-GOB

Ministry of Environment, Forest and Climate Change-GOB

Sustainable and Renewable Energy Development Authority (SREDA),
Bangladesh

ii. Subnational and Local Government

28 districts (major administrative units) in Bangladesh

iii. Education and Research Institutions

Durham University, UK

Curtin University, Australia

University of Rajshahi, Bangladesh

Khulna University, Bangladesh

American International University-Bangladesh

iv. International Organizations

The World Bank

Asian Disaster Preparedness Centre (ADPC)

v. Individuals (number)

Research Assistants (05)

Surveyors (30)

Field supervisors (03)

Consultants (04)

- **Indirect Project Beneficiaries include the targeted non-solar-using farmers recruited for this project's intervention- the ADOPT training.** A total of 1120 farmers will receive the ADOPT training to adopt solar irrigation: 280 farmers will receive advocacy, 280 farmers will receive demonstration, 280 farmers will receive training on omitting misinformation and 280 farmers will experience peer pressure.

4. Performance Outcome Mapping

Table 2: Implementation progress as of 30th June 2024

Description	Approved budget (in US\$)	Actual expenditure in US\$	Target	Result/achievements
Outcome: To develop the ADOPT manual in nudging towards climate-smart agricultural technology				
Output 1: Deployment	\$9,300.00	\$9,000.00	2 deliverables	Completed
Activity 1.1: Inception Workshop	\$1,000.00	\$1,000.00	The Inception Report	Completed
Activity 1.2: Literature review	\$1,000.00	\$1,000.00		Completed
Activity 1.3: Brainstorming with local partners	\$1,300.00	\$1,000.00		Completed
Activity 1.4: Networking with Stakeholders	\$1,000.00	\$1,000.00		Completed
Activity 1.5: The ADOPT manual development	\$5,000.00	\$5,000.00	The ADOPT training manual	Completed
Output 2: Adaption	\$40,700.00	\$30,000.00	2 deliverables	Delayed Activity 2.5 and Activity 2.6 are delayed due to late commencement of surveyors' training and the baseline survey. This delay occurred because of weather extremes and farmers' harvesting season in the project sites.
Activity 2.1: Building research teams	\$2,600.00	\$2,000.00		Completed
Activity 2.2: Survey App & baseline questionnaire	\$5,700.00	\$5,000.00		Completed
Activity 2.3: Surveyors training	\$3,600.00	\$3,000.00		Completed

Activity 2.4: Project site visits, farmer recruitment & baseline survey	\$18,500.00	\$20,000.00		Completed
Activity 2.5: Report on farmers behavioural traits	\$5,500.00	To be calculated		Delayed
Activity 2.6: Case study preparations	\$4,800.00	To be calculated		Delayed
Total	\$50,000.00	\$39,000.00		

5. Partnership

The lead of this project, Durham University has partnered with Curtin University for managing the project, designing the field experiment and other research-related activities and for implementing the project by maintaining close collaboration with Bangladesh partners. Three local partners (University of Rajshahi, Bangladesh, Khulna University, Bangladesh and American International University Bangladesh) are taken in the consortium for conducting surveys, providing ADOPT training, and organizing dissemination workshop. Bangladesh Institute of International and Strategic Studies (BIISS) is the liaison coordinator for ensuring the timely delivery of this project. An advisor from Bangladesh Agricultural University has been contacted for engagement activities, e.g., networking with local agricultural extension offices, and logistics support in Bangladesh. ¹

We collaborated with the Ministry of Agriculture, Government of Bangladesh. Local agricultural extension officers (they are field-level workers in the Department of Agricultural Extension under the Ministry of Agriculture) will facilitate networking and communications with farmers and other influential stakeholders in their communities. Our key collaborating partners and end-users include the Ministry of Agriculture, the Ministry of Power, Energy and Mineral Resources, and the Sustainable and Renewable Energy Development Authority (SREDA) in Bangladesh. Another collaboration has been completed with the Ministry of Environment, Forestry, and Climate Change. The solution of this project (i.e., the ADOPT training manual) will be publicly available online and offline for the use of the ministries, renewable energy authority, and solar energy providers.

6. Sustainability

Key results achieved in the last 6 months include the development of the ADOPT training manual and conducting the baseline survey of 1400 non-solar-using farmers in 28 project sites in Bangladesh. With these two significant achievements, it will help us address and achieve the following **four** outcomes:

- Farmers' behavioural traits influencing their decisions in adopting climate-smart technologies will be identified from the baseline survey of 1400 farmers who use non-solar (diesel/electricity) irrigation.
- Farmers will be trained to understand solar irrigation systems using the ADOPT training.
- Farmers will be incentivized to adopt solar irrigation systems using the ADOPT

¹ While we do not sign any formal MoU or any sub-contract with local partners and end-users, we are working closely with them.

training intervention.

- Relevant policymakers, i.e., the Ministry of Agriculture, the Ministry of Power, Energy and Mineral Resources, the Ministry of Environment, Forestry and Climate Change of the Government of Bangladesh, the Sustainable Renewable Energy Development Authority (SREDA), and solar provider, e.g., Infrastructure Development Company Limited (IDCOL) Bangladesh will be informed by obtaining evidence-based recommendations on incorporating behavioural insights into the adoption of solar irrigation policies.

7. Communication and Knowledge Management

During the reporting period, we organized one “Initiation of Policy Engagement Workshop” as an inception event of this project in Bangladesh. The theme of the workshop was: Policy Engagement Workshop for An Introduction to the ADOPT model and Discussion on the project in Bangladesh. The objectives and outcomes of the event were- i) to introduce the project and ii) to extend the network with policymakers in Bangladesh. Around 50 people participated in the policy engagement workshop organized in Dhaka, Bangladesh. They were the representatives of 3 Ministries of the government of Bangladesh, resource people from 5 public universities in Bangladesh, and representatives of solar providers in Bangladesh.

Table 3: Communication and Knowledge products activity and progress achieved

Related activity number	Communications Activity. Strategy/Tactic	Related communications or Knowledge product	Impact /Change perceived. Big or Small wins. Numbers (If any)
<i>Activity 1.4</i>	<i>Workshop</i>	<i>Online posts, electronic media communications and dissemination of project brief</i>	<i>Views and discussions</i>

8. Challenges and Risks

During the reporting period, this project came across several challenges and risks in completing the planned activities which delayed the progress of project activities in the second quarter of the project timeline. They are listed as follows.

- **While brainstorming for study design**, the crucial phase was the preparation of the ADOPT training contents and training approaches (e.g.,

identification of potential ADOPT trainers who will understand the contents comfortably and easily, selecting comparison groups (treatment and control groups), and training evaluation (e.g., evaluation strategy and methodological framework).

- **During the review phase of the ADOPT manual**, the challenge was to finalize the draft by making it simple, clear, and comprehensive for the selected trainers and to ensure adaptability and engaged learning for farmers to receive training.
- During the reporting period, the team **faced an ongoing heat wave in the project site- Bangladesh**. Therefore, we had to move later the tasks of completing in-person training and commencing the baseline survey (also preparations for survey, e.g., completion of the project site visit, sampling frame, and farmers' recruitment) considering the health risks of farmers, surveyors, and trainers.

9. Lessons Learnt

During the reporting period, the project consortium faced several challenges and also managed to combat them. Considering the challenges and our team effort to mitigate them, we gathered the following insights.

- Discussions with subject experts and methodology specialists provided significant insights for designing the ADOPT training manual, its contents, training delivery techniques, and training evaluation strategies.
- Structuring the ADOPT training manual in a logical manner was required, e.g., using similar sequence for each module- advocacy, demonstration, omitting misinformation and peer pressure and including relevant contents on solar irrigation features and benefits, national policies and Acts regarding sustainable energy and water use and agricultural technology diffusion, and government and private action programmes for reference (as case studies, videos and photo gallery). For adaptability and engaged learning, it was required to incorporate various methods of training-learning and receiving feedback from trainees (farmers). Translating the manual into the local language (i.e., Bangla) will be helpful for better delivery by the trainers.
- For conducting baseline survey, it was useful and effective to plan three separate sessions for the surveyors- i) one session with the core research team, ii) one session between the survey team and the corresponding local partner, and iii) one session with field supervisors and research assistants. Monitoring plan for local partners, their field supervisors, and survey teams for the sampling frame and farmers' recruitment for the baseline survey was also important for the quality of survey.

Annex 1: Records of Events

Activity Title	Progress in last 6 months
Activity 1.1: Inception Workshop (Nov-Dec 2023)	Completed
Activity 1.2: Literature review (Jan-Feb 2024)	Completed
Activity 1.3: Brainstorming with local partners (Jan – Mar 2024)	Completed
Activity 1.4: Networking with Stakeholders (Feb-Mar 2024)	Completed
Activity 1.5: The ADOPT Training Manual development (Feb-Mar 2024)	Completed Note: This activity was delayed due to changes in study design, case study materials selection, and challenges in identifying local community trainers on the ADOPT manual. We submitted the deliverable in the first week of June 2024.
Activity 2.1: Building research teams (Feb-Mar 2024)	Completed
Activity 2.2: Survey App & baseline questionnaire (Mar-April 2024)	Completed
Activity 2.3: Surveyors training (Mar-April 2024)	Completed Note: This activity was delayed due to a heat wave in Bangladesh. We completed in-person training in the third week of May 2024.
Activity 2.4: Project site visits, farmer recruitment & baseline survey (April-May 2024)	Completed Note: The baseline survey is delayed due to extreme weather conditions and farmers' harvesting seasons in project sites.
Activity 2.5: Report on farmers' behavioural traits (June 2024)	In progress Preparation of baseline survey data cleaning and data analysis Note: The baseline survey is delayed due to extreme weather conditions and farmers' harvesting seasons in project sites.

Annex 2: Event reports/minutes, Learning documents, Knowledge products, Communication products or other documents

Events	Reports/minutes	Learning documents
Policy Engagement Workshop	<p>Insights from discussions:</p> <ul style="list-style-type: none"> • Importance of energy-efficient irrigation in the context of climate change and increasing groundwater depletion in Bangladesh • Effectiveness of the ADOPT nudging tools as social innovation approaches, particular emphasis on peer pressure • Usefulness of the social innovation model to address solar irrigation management • Concerns about gender and generations in solar plant management • Discussion on the technical and financial assistance in extending solar irrigation 	Press briefing
The ADOPT training manual	The ADOPT training manual is a comprehensive document that serves as a guide for trainers and trainees on solar irrigation systems. This manual contains four behavioural nudge treatment modules on solar irrigation: Advocacy, Demonstration, Omitting misinformation and Peer pressure. Each treatment module describes learning objectives, training contents, delivery methods, risk management and training assessments.	The ADOPT training manual is one of the project deliverables and knowledge products.
Baseline survey training	Online and in-person training of surveyors and field supervisors on project site visit, sampling frame preparations, farmers' recruitment and baseline survey	Baseline survey questionnaire

Annex 3: Results Framework

PDO Indicator Description: Government agencies and Citizens who have access to climate-resilient solutions tested under the project (Number)		
	Current Value	End Target
Government Agencies	4	4
Male Citizen	TBD among 1400	TBD among 1400
Female Citizen	TBD among 1400	TBD among 1400
Date	June 2024	January 2025
Comments	After the baseline survey data analysis, we will be able to know about the number of male and female farmers.	
Output Indicator Description: Number of people trained (in person) (by sex, country, topic, year, participant category)		
Value	33	33
Date	June 2024	January 2025
Comments	We provided 30 surveyors and 3 field supervisors 2 in-person training on baseline survey preparations and conducting the survey.	
Output Indicator Description: Number of people trained (online) (by sex, country, topic, year, participant category)		
Value	33	33
Date	June 2024	January 2025
Comments	We provided 30 surveyors and 3 field supervisors 3 online training on baseline survey preparations and conducting the survey.	
Output Indicator Description: Number of knowledge products provided- 1 (ONE) knowledge product (The ADOPT training manual)		

Value	1	4
Date	June 2024	January 2025
Comments	Our second deliverable planned for the first six months of the project timeline is delayed due to the late commencement of the baseline survey in weather extremes at the project site.	
Output Indicator Description: Number of people / organizations provided with knowledge products (by recipient category, type of knowledge product, country, theme)		
Value	0	4
Date	June 2024	January 2025
Comments	We will provide our end-users and beneficiary citizens with our knowledge products (the ADOPT training manual) during the training intervention and both the manual and reports at the final dissemination workshop to be held in December 2024. However, we shared our project brief with end-users in the ministries of the Government of Bangladesh at the Initiation of Policy Engagement Workshop held in February 2024.	
Output Indicator Description: Number of events supported		
Value	1	2
Date	June 2024	January 2025
Comments	We organized an inception workshop and we will organize the final dissemination workshop in Bangladesh at the end of the project.	
Output Indicator Description: Number of people participating in supported events- 50 (FIFTY) people participated in the policy engagement workshop organized in Bangladesh.		
Value	50	300
Date	June 2024	January 2025
Comments		



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