Challenges of decentralized electrification for economic development: lessons from experience

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Introduction

- The Collaborative Smart Mapping of Mini grid Action (CoSMMA)
- Lessons learnt from a meta-analysis
 - Source of energy
 - System size (power)
 - Top-down vs. bottom-up approaches
 - Role given to stakeholders
 - National regulation/institutional framework

The CoSMMA (1/4)



The CoSMMA (2/4)



The CoSMMA (3/4)

Type of effect Mode of evaluation	Total						
SDGs related effects (SDG nb)							
Education (4)	205	65	79	349			
Health (3)	174	47	92	313			
Electricity access (7)	136	339	508	983			
Economic transformation (8)	32	80	132	244			
Income & living conditions (1)	30	25	36	91			
Gender (5)	24	15	42	81			
Security (16)	21	28	7	56			
Community (11)	1	20	61	82			
Environment (13)	0	42	180	222			
Others	129	72	90	291			
Total	752	733	###	2712			

The CoSMMA (4/4)

Energy source Mode of evaluation	Scientific	Quantified	Expert	Total
Solar	698	457	451	1606
Fossil Fuels	22	2 36	34	92
Hydropower source	16	5 46	148	210
Hybrid with Fossil fuel	15	5 73	71	159
Others		121	523	645
Total	752	733	1227	2712
of which nano	729	309	288	1326

Meta-analysis on scientific data

Explanatory factors	(1): proven favorable	(2): unproven favorable	(3): proven unfavorable	(4): unproven unfavorable	(5): inconclusiv e
Hydropower source	0.000	0.000	0.000	0.000	0.000
Solar	0.282***	0.318***	0.125***	-0.746***	0.021***
Hybrid – Solar/Fossil fuel	0.203	0.344***	0.038*	-0.673***	0.088
Fossil Fuels	-0.005	0.969***	-0.003***	-0.974***	0.013
Nano size	-1.244**	-0.261	0.564***	0.979**	-0.039
Country	0.060	-0.101	0.167***	-0.029	-0.097
Province	-0.360*	0.224***	0.070^{**}	0.183***	-0.116
County	-0.409***	-0.024	-0.076***	0.653***	-0.145
Local	0.000	0.000	0.000	0.000	0.000
Stakeholdersrol,	0.958***	-0.850***	0.606***	-0.930***	0.216***
Obs. Number of outcome	208	261	71	191	20

Results of meta-analysis: Role of source of energy

• Solar-based systems have the highest probability pf proven favorable effects



Results of meta-analysis: Role of system size

• Nano systems have the lowest probability ofpr proven favorable effects



Descriptve data: succesful projects by size and type of effect

• Nano systems are much less succesful in economic transformation effects



Results of meta-analysis: top-dpwn vs bottom-up approaches

• Effect of decision level on the probability of proven favorable effect:



Results of meta-analysis: role given to stakeholder

- Clear and public role given to stakeholders increases to a very large extent the probability of proven favorable effects
- This positive role of stakeholder inclusion in governance may contribute to success for reasons that can be analyzed alongside Elinor Ostrom's design principles for common pool of resources.
 - It contributes to guarantee the congruence between appropriation and provision rules and local conditions.
 - It facilitates collective-choice arrangements and monitoring accountable to the commoners.

Descriptive data: role of the quality of institutional framework (RISE data)

• The quality of off-grid institutional framework increases the chances of success



Conclusion

- Despite scarcity of scientific evidence based impact assessments we are able to derive from the existing material collected in CoSMMA clear conclusions on two aspects: the necessity to build systems larger than SHS; and correlatively the necessity to invest in governance systems facilitatigd collective action..
 - As for size effects, Relatively small investments are more likely to emerge but are also more likely to be unsustainable for lack of transformation effects.
 - As for governance, the conceptual framework built by Eli nor Ostrom to analyze the governance of common pools of resources provides a useful toolbox. The three decision levels involved in the governance of local public goods, stakeholders, local community and national regulation are equally important.
- Collecting more statistical evaluation data, particularly on micro and mimigrids, and along the governance dimensions, would be necessary for a deeper identification of best practices.

Thank you