21 March 2023, 26th meeting of the UNFCCC Technology Executive Committee

Setup and implementation of National Systems of Innovation

Good practices and lessons learned – full compilation

Dian Phylipsen (SQ Consult), Heleen de Coninck & Clara Rabele Caiafa Pereira (Eindhoven University of Technology), Ambuj Sagar & Nimisha Pandey (IIT Delhi)

Objective and scope of analysis

Objective:

- To understand what lessons can be learned from setting up and implementing National Systems of Innovation (NSIs) for the use of developing country policymakers looking to strengthen their NSI in the context of climate action
- To deepen the understanding of NSIs – or parts thereof - and identify measures and approaches which have improved the effectiveness of innovation systems in specific cases and translate them into good practices that can be replicated in other countries

Scope:

'National Systems of Innovation, or parts thereof' for climate technology:

- In-country systems to produce, diffuse and use innovations at the national, sectoral or technology level
- Innovation can relate to processes (organizational and technological changes) or 'products' (changes in materials, goods, services):
  - Relates not only to new knowledge and products, but also to first use in a certain context
- Climate technology for mitigation and adaptation (IPCC definition)

Caveat:

Setup and implementation of a whole NSI is very complex since it is economy-wide and unlikely driven only by climate challenges. Hence, focus is on case studies with mitigation/adaptation gains from strengthening specific parts of NSIs, with concrete lessons and good practices pertinent to the climate context.

Approach

Assessing selected successful case studies based on a methodological frame-work developed to evaluate strengths and weaknesses of (parts of) NSIs:

1. Development of methodological framework

Focus on innovation functions and barriers that exist for the system to perform such functions for structural components actors, institutions, interactions & technologies

#	Function
F1	Knowledge development & diffusion
F2	Entrepreneurial experimentation
F3	Market formation
F4	Influence on the direction of search
F5	Resource mobilization
F6	Legitimation
F7	Development of positive externalities

2. Identification of case studies

Diversity in terms of:

- Regions and type of countries involved
- Mitigation and/or adaptation
- Sectoral/technology focus
- Different innovation functions

Considering:

- Maturity
- Data availability
- Potential for good practices
- Replicability

3. Case studies analysis

Assessing:

- Delivery of the initiative's functions
- Contribution of the initiative in addressing barriers to climate innovation and strengthening core areas in the innovation system

to pinpoint success factors

Looks at initiatives' contribution to:

- Enhancing capabilities of relevant actors
- Strengthening institutional context in which actors operate
- Enhancing linkages between actors, and institutional settings
- Catalyzing changes for knowledge production and implementation to achieve climate mitigation and adaptation goals

Main changes in 2nd draft

- 3 new case studies – as per TEC requests: 1 adaptation case, 1 from developed country:
  - Bio-ethanol activities in Brazil
  - Urban flood management in Jakarta, Indonesia
  - Wind energy in Denmark
- A summary for policy makers - as requested by the TEC
- Section 4 now split into 2 sub-sections
  - A new section 4.1 that includes various comparisons across cases, addressing a number of TEC requests for additional analyses
- Reflection of lessons learned, good practices in new cases in overall lessons, conclusions, recommendations
- Inclusion of a number of visuals - as requested by the TEC

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Selected case studies

Case study	Country - region	Mitigation/ adaptation	Sector	Type of country/ income level	Top-down/ bottom-up	Main IS functions
1st version (August 2022)						
BEE **Bureau of Energy efficiency**	India – Asia	Mitigation	Energy efficiency – economy wide	Lower Middle Income	Top-down	F1 Knowledge development & diffusion F2 Entrepreneurial experimentation F3 Market formation
KCIC **Kenya Climate Innovation Center**	Kenya – Africa	Mitigation + adaptation	Energy (RE + EE), agri-culture, water, waste, forestry	Lower Middle Income	Top-down	F1 Knowledge development & diffusion F2 Entrepreneurial experimentation F3 Market formation F5 Resource mobilization
Disaster Risk Reduction	Haiti - Caribbean	Adaptation	All sectors	Low-Income	Top-down & bottom-up	F1 Knowledge development & diffusion F4 Guidance of search F5 Resource mobilization F6 Legitimation

Selected case studies

Case study	Country - region	Mitigation/ adaptation	Sector	Type of country/ income level	Top-down/ bottom-up	Main IS functions
2nd version (March 2023)						
Bio-ethanol programme	Brazil – Latin America	Mitigation	Transport (Energy/ Agriculture)	Upper Middle Income	Top-down & Bottom-up	F1 Knowledge development and diffusion F2 Entrepreneurial experimentation F3 Market formation F5 Resource mobilization F7 Development of positive externalities
Urban flood management	Jakarta, Indonesia - Asia	Adaptation	Urban flood management	Upper Middle Income	Top-down & bottom-up	F1 Knowledge development and diffusion F5 Resource mobilization
Wind energy sector	Denmark – Europe	Mitigation	Energy supply	High Income	Top-down & bottom-up	F1 Knowledge development and diffusion F2 Entrepreneurial experimentation F3 Market formation F4 Guidance of the search F5 Resource mobilization F6 Legitimation F7 Development of positive externalities

Lessons learned: success factors

1. Take a systemic perspective towards the establishment/strengthening of the NSI, integrated with host country development objectives (all cases)…
2. … yet a tailored approach to bridging sector- and innovation phase-specific gaps (all cases)
3. Leadership with a collaborative attitude and an understanding of local context (all cases)
4. Participation of/interactions among local actors facilitates innovation and alignment (all cases)
5. Engage with international institutions and collaborations to help build local institutions, networks (BEE, KCIC, Haiti DRR, Jakarta)
6. Ensure that innovation/organizations are evolutionary and able to adapt to new circum-stances, through continuous monitoring and review (all cases)
7. Use a portfolio of solutions (all cases)
8. Deal with structural underlying problems (Jakarta, Haïti DRR, Brazil)

Recommendations

Overall recommendation

Implementation of the NSI is best guided through a systematic approach to help ensure that the NSI is organized and resourced to perform the functions required for successful innovation.

Given sector-specifics, the process preferably starts with identifying sectoral priorities aligned with national policy goals and socio-economic objectives to guide and facilitate the process of strengthening of NSI functions, marshalling of resources, and addressing weaknesses/gaps in structural elements in NSIs.

Specific recommendations based on identified good practices

Preparatory practices (continuing during implementation)

- Develop climate-action plan in alignment with long-term policy framework and socio-economic priorities
- Map the NSI before designing and implementing strategies
- Look for win-win measures across the various stakeholders
- Engage both public and private sectors

Design & implementation practices

- Establish a coordinating agency with clear roles and responsibilities
- Design innovative, customized, and flexible funding frameworks
- Put together a suitable mix of actors and policies
- Allow flexibility in how policy goals are met
- Pay attention to market creation for climate technologies
- Focus beyond hardware innovation to include software and orgware (capacity building, communication, policies)
- Strengthen local capabilities, while ensuring coordination
- Create complementary knowledge and servicing infrastructure
- Maximize productive engagement with international actors and opportunities

Evaluation and realignment practices

- Ensure there is adequate and systematic monitoring, evaluation and review
- Evolve and improve through learning by doing and learning through analysis
- Adapt to evolving context and needs

Note:

Given the complexity of innovation activities, attributing outcomes exclusively to specific initiatives can be challenging. Nonetheless, the broader context in which the innovation is embedded and which leads to the delivery of particular outcomes can be used to identify good practices.

Different target audiences

- Recommendations mostly to be operationalized through government entities tasked with planning, implementing, or monitoring and evaluating innovation
- But many are also relevant for other audiences:
  - Multi- and bilateral organizations can use them in the design of their support activities for national governments and other stakeholders
  - Civil society organizations, citizens and communities can use them to strengthen their public engagement activities, esp in preparation to ensure that the prioiritization is robust and provide their knowledge
  - The private sector can make use of lessons learned in developing/implementing their plans in terms of entrepreneurial opportunities, how to address barriers for development and deployment of their technologies, routes for successful ways to engage with local partners and stakeholders, and the importance of using appropriate impact assessment, forecasting and risk management tools
  - Academic/research organizations can use lessons to help direct their research and educational activities to increase their relevance and effectiveness and can play a role in the evaluation phase

For further information:

Dian Phylipsen

SQ Consult BV

+31 6 55 80 46 19

d.phylipsen@sqconsult.com

Heleen de Coninck

Eindhoven University of Technology

h.c.de.coninck@tue.nl

Ambuj Sagar

Indian Institute of Technology, Delhi

asagar@iitd.ac.in