MUTUAL LEARNING EXERCISE ON R&I STRATEGIES AND POLICIES

Session 5: Technology Needs Assessment

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UNITED NATIONS TECHNOLOGY BANK FOR LEAST DEVELOPED COUNTRIES

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OACPS R&I

TECHNOLOGY FACILITATION MECHANISM

The least developed countries

- LDCs are 46 low-income countries suffering the most severe structural impediments to sustainable and inclusive development.
- Countries are included into the category when they meet the established inclusion thresholds for all three criteria: GNI, HAI and EVI

Common traits: small economies, isolation and remoteness from major markets, and low resilience/high vulnerability to external shocks

Dependence on natural resource-based economic activities (agriculture, forestry, fishing, hunting, and mining) for employment, value added and exports

Low level of productive capacities, high dependence on imports

- LDCs need to develop productive capacities: diversify economic structure and exports, upgrade the technologies with which the sectors operate
- No country achieved successful development without technological learning and upgrading and the development of innovative capabilities.

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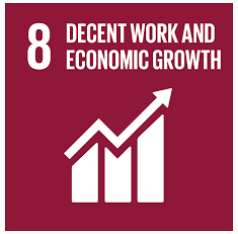
Technology and the SDGs

- STI cross cutting to all areas of sustainable development and sectors. Clear link between technology development and/or adoption and SDGs targets. Some examples:

- Increasing agricultural productivity (target 2.3)
- Maintain the genetic diversity of seeds (target 2.5)

- ICT for women empowerment (target 5.b)
- Maintain the genetic diversity of seeds (target 2.5)

- Renewable energy (target 7.2)
- Energy efficiency (target 7.3)



- Economic productivity, diversification (target 8.2)
- Global resource efficiency (target 8.4)

- Sustainable housing and transportation (target 11.1, 11.2)
- Air quality and municipal waste (target 11.6)

- Reduce food losses (target 12.3)
- Reduce waste generation, recycling (target 12.5)

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Why Technology Needs Assessment?

- LDCs are the furthest behind to achieve the SDGs: where to start?
- TNAs help LDCs identify key areas where they can take advantage of technological opportunities needed to contribute to their development plans, and identify strategies for priority technologies to be transferred.

Identify priority development challenges that can be addressed using technologies

Identify and prioritize technologies that can address the priority needs in the LDCs

Identify barriers/challenges for the applications of the technologies in the focal countries

Evaluate the enabling environment for the utilization & application of the technologies

Present implementation plans on how to strengthen the countries' technological development

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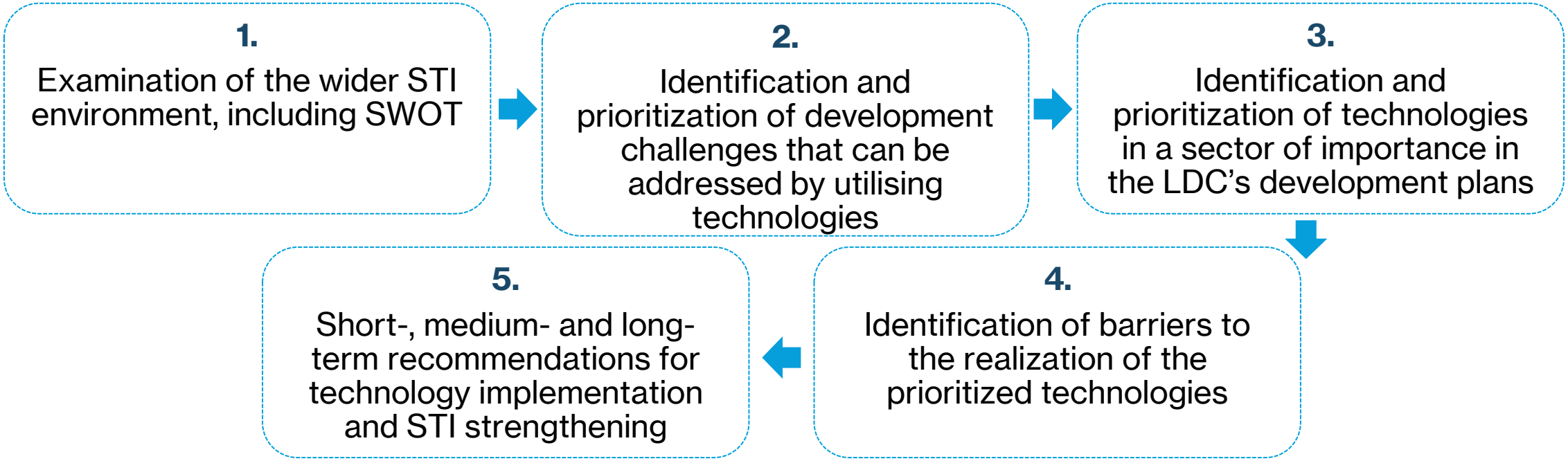
The TNA process



- The overall TNA framework is adapted to the contry context and needs
- **Starting point**: national development plans, ambitions, agendas + STI policy
- STI cut across different sectors and ministries, coordination and involvement of other **NSI stakeholders** through a Technology Working Group is essential

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How to prioritize?

1.

An examination of the wider STI environment, including an analysis of strengths, weaknesses, opportunities and threats (SWOT).

- What is the historical background of STI in the country?
- Who are the main actors/organizations that play a role in promoting the technological development? What system is in place to supports these actors (i.e. policies, funds, programs, legal frameworks, governance structure (i.e, institutional arrangements for managing STI), etc.)?
- Are there some success stories of technology development and implementation in the country?
- Has the country attempted to address its technological challenges and, if so, how?

2.

Identification and prioritization of particular development challenges that can be addressed by utilising technologies.

- What are the main development needs of the country?
- What are the priority needs for technological development? Are there any ongoing STI initiatives to address these needs?
- What sector should the TNA focus on? What existing policies/regulations target the focal sector?
- What are the current technology capabilities in the sector?
- Who are the expected users of the technology? What are the organisations/firms working in the sector?

How to prioritize?

3.

Identification and prioritization of technologies in a sector of importance to the LDC's needs

4.

Identification of barriers to the realization of the prioritized technologies

- Identify and rank the main technologies that can address the priority needs focused on in the TNA
  - Multi-criteria decision analysis, depending on number of tech solutions identified and complexity
- Prepare technology factsheets, including technical features and socio-economic features (e.g. gender dimensions)
- Identify possible barriers and enabling environments for the implementation of the technologies

- Once technologies are identified, a technology implementation plan looks at:
  - Capacity to adopt and use (i.e, existing absorptive capacity), access to identified technology/transfer, risk factors, regulations, responsibilities, support needed

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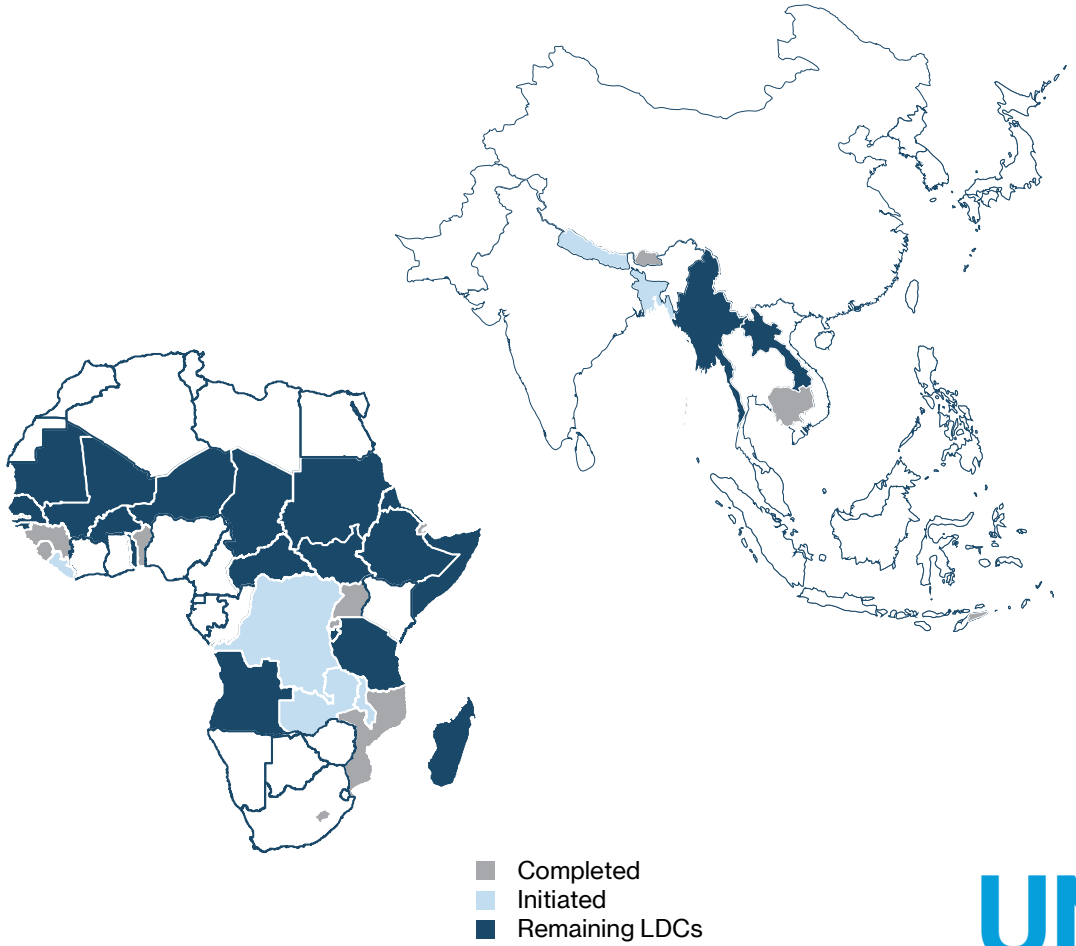
Key success factors

- **Wide conceptualization of technology** as the systematic knowledge and skills used in the process of production or service delivery. The knowledge can be based on science/research or on experience and can be embodied in products or in processes.
- TNA must be a **country-driven process**:
  - political buy-in must be secured (demand driven)
  - TNAs to build upon or contribute to similar ongoing processes
  - countries to own the report and mobilize development partners to implement
- TNAs are **participatory in nature**: success depends upon coordination and involvement of all relevant stakeholders.
  - It cannot be an exercise led by Ministries of STI/HE alone.
  - Technology analysis needs to be informed by sectoral experts.
  - Technology solutions are more likely to be understood, accepted and implemented if relevant stakeholders are involved throughout the process.

TNAs key sectors: often common priorities

- Out of 14 TNAs completed in LDCs:

86%	Agriculture
71%	Education
71%	Health
57%	Energy
43%	Environment



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In practice

- TNA in Country X identified two priority sector of focus: Agriculture and Manifacturing
- Technology solutions identified:

Technologies in the **Affordable and Inclusive ("low-tech")** range

Online systems and **platform technologies**

Technologies in the **"high-tech" range**, that is, advanced technologies

Technologies for **e-businesses**

	Low-tech solutions	
Key issues	**Greenhouses**	**Biodigesters**
Status of the technology in the Country	Outlined as focus area to support innovation and extension (MIN, 2018)	As FAO (2021) highlights, it is important, needs to be better exploited
Existing institutions with capacities to develop and transfer this technology	MoA, cooperatives, some private sector, grassroots innovators, and entrepreneurs	Inst. of Sc., Tech., and Mgt., academia...

In practice

Key issues	Greenhouses	Biodigesters
Will new capabilities be required?	Yes – funding, set up, operation. However, some capabilities already exist within the agriculture sector	Some capabilities exist e.g., in ISc; additional capabilities are essential for e.g., transfer of this technology
Main beneficiaries	Farmers, agriculture sector ecosystem actors	Farmers, agriculture ecosystem actors, SDGs
Main benefits of implementing the technology	1. Increased productivity 2. Higher incomes and improved well-being 3. Addressing the SDGs 1-17	1. Lower production cost; higher incomes 2. Increased productivity 3. Addressing the SDGs 1-17
Gender dimension of the technology	Can significantly enhance inclusion for women and youths	Can be operated by women and youths, fostering inclusion
Environmental dimension of the technology	If well managed, can reduce GHGs from farming	Can help address challenges on energy and fertilizer use
Main disadvantages of implementing the technology	1. Requires time, capabilities and skills for monitoring and management 2. Set up and maintenance costs 3. Others: pollination, maintaining regular supplies of nursery plans, aesthetics	1. Initial set up and maintenance costs 2. Capabilities and skills gaps 3. Raw materials – the challenge of maintaining a regular and sustainable supply of inputs
Implementation cost estimate	Low to medium	Low to medium

In practice

	Low-tech solutions	
Key issues	**Processing**	**Cooling**
Main features and objectives	Central to production functions, value addition	Mainly refrigeration, but other forms possible
Status of the technology in the Country	Requires more efforts to e.g., reduce post-harvest losses (PHL) in agriculture and improve	Progress being made but far from the required level to help stem PHL in fruits and vegetables
Existing institutions with capacities to develop and transfer this technology	Multiple: private sector, academia, government. Capacities also available within the region	Multiple: private sector, academia, government. Capacities also available within the region
Will new capabilities be required? If yes, what will they be?	Yes – equipment, funding, training, skills etc. Some of these can be obtained in-country and within the region	Yes – equipment, funding, training, skills etc. Some of these can be obtained in-country and within the region
How will this technology address the needs?	Processing is vital in 1) agriculture to stemming the high levels of PHL in fruits and vegetables - major export products for the Country, and 2) manufacturing, for value addition to raw materials – e.g., textiles, minerals – in readiness for export	Cooling, e.g., via refrigeration, is an important aspect of storage and processing. Therefore, can contribute to stemming PHL and improve productivity, income and wellbeing of farmers and industrialists

In practice

	Low-tech solutions	
Key issues	**Processing**	**Cooling**
Main benefits of implementing the technology	1. Reduced PHL 2. Increased productivity, profit, and wellbeing 3. Waste reduction; less impacts on environments	1. Improved storage, extends shelf life 2. Reduced PHL 3. Waste reduction; less impacts on environments
Gender dimension of the technology	Needs better articulation; to ensure good inclusion	Needs better articulation; to ensure good inclusion
Environmental dimension of the technology	Can increase impacts on environment e.g., via use of chemicals in processing	Can increase impacts on environment e.g., via emission of GHGs and high energy use
Main disadvantages of implementing the technology	1. Potentials for high impact on environment 2. Requires capabilities and skills, and finance 3. High energy costs/use	1. Potentials for high impact on environment 2. Requires capabilities and skills, and finance 3. High energy costs/use
Implementation cost estimate	Low, medium, or high depending on scale of implementation	Low, medium, or high depending on scale of implementation

- TIP needs to identify clear stakeholders' capacities, roles and responsibilities across the National Innovation System for successful implementation
- NIS stakeholders' engagement in the process is essential at all stages

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