TERMS OF REFERENCE FOR

Case Studies of Social and Economic Value of RCA Projects

July 2019

I. BACKGROUND

The Technical Cooperation (TC) programme supports sustainable socioeconomic development by assisting IAEA Member States to build, strengthen and maintain capacities in the safe, peaceful and secure use of nuclear technologies.

These Terms of Reference pertain to a project jointly developed by the TC Divisions for Asia-Pacific (TCAP) and Programme Support and Coordination (TCPC).

The objective of this project is to demonstrate a methodology for assessing the social and economic value of TCAP projects, using between 1 and 4 selected case studies.

The methodology to be applied in the case studies was developed during an expert meeting held in in Vienna, 1-4 July 2019. Further details on this methodology are provided in subsequent sections and Annexes of these Terms of Reference.

The selected case studies will be drawn from thematic or sub-thematic areas within the Regional Cooperative Agreement (RCA), in preparation for the 50th Anniversary of the RCA.

This project is aligned with the interests of the RCA National Representatives (NRs), as expressed by the following decisions of the 41st NR Meeting in March 2019:

- The Meeting agreed to hold a RCA Exhibition in 2022 to showcase the socioeconomic impact of the RCA in the region over the 50 years; and

- The Meeting suggested the host country, the RCA Regional Office and the Agency draw on … any inputs on the socio-economic impacts of the RCA Programme in the region for the organisation of the 50th Anniversary of the RCA.

II. PROJECT DELIVERABLES

This project will produce an evidence-based report demonstrating the social and economic value of the sequence of RCA projects in the mutation breeding sub-thematic area.

If time and resources permit, additional reports may be produced for up to three additional RCA sub-thematic areas. It is proposed to address the sub-thematic area of air pollution management, with the two other case studies yet to be determined but drawn from the industry and human health thematic areas.

Each case study report will consist of ca. 20 pages and will synthesise information from the sequence of relevant projects over the past ca. 10-20 years. The reports will be written to appeal to a general audience, and will follow the proposed format shown in **Annex 1**, including:

1. Brief summary of the breadth of countries involved and their key collective activities and outputs;
2. At a high level, a showcase of the range of near-term (intermediary) outcomes delivered;
3. In more depth, highlights of 1-3 selected successes and the social and/or economic value delivered to the RCA Government Parties (GPs); and
4. Potential for the future directions and focus of the sub-thematic area.

The methodology to be applied in the case studies is composed of eight steps, as described in **Annex 2**. The first four steps comprise the design of the evaluation:

1. Prepare a detailed theory of change, to ensure there is a clear and common understanding of the intended functioning and results of each RCA sub-thematic area
2. From the theory of change, identify and define criteria: for priority aspects of performance, impact and value that will be focal points for the evaluation
3. For each criterion, define standards: what the evidence would look like at different levels of performance (e.g., excellent, good, adequate, and inadequate)
4. Identify sources of evidence, and appropriate methods to suit the particular context of the sub-thematic area under consideration.

The second four steps comprise implementation of the evaluation, including gathering and evidence, analyzing, synthesizing and reporting.

In applying the above-listed eight steps, the case studies will also give particular regard to identifying the regional contribution of the RCA to the reported social and/or

economic outcomes, beyond what would have been achieved from any national programmes in the same sub-thematic area.

III. PROJECT TEAM

This project will be undertaken under the guidance of the Director TCAP and the Director TCPC.

This project will be implemented analogously to other TC projects, with a Project Management Officer (PMO) and Technical Officers (TOs) within the Agency.

- The role of PMO will be fulfilled by Mr Sinh van Hoang, the RCA Focal Person.
- TOs may include Eloisa de Villalobos and Frank Bruhn, or others identified by the PMO.

The PMO will arrange for additional input as may be necessary, such as experts in the evaluation of socio-economic outcomes and impacts for complex, multinational development programmes.

The project will depend upon input from a range of RCA stakeholders, including NRs, National Project Coordinators (NPCs) and end-users in RCA projects.

Upon mutual agreement with the PMO, contributions to the project may be made by members of the RCA Programme Advisory Committee (RCA PAC), the RCA Regional Office (RCARO), and/or the RCA Working Group for Coordination of the Medium Term Strategy (WG MTSC).

It is noted that the WG MTSC undertook an Outcome Harvesting exercise at the Final Coordination Meeting of the Air Pollution project RAS7029, and that the WG MTSC's 2019 work plan involves evaluation of the reported outcomes, which may be useful input if a case study report on the air pollution sub-thematic area is progressed under these Terms of Reference.

IV. TIMELINE AND IMPLEMENTATION

The following table explains the six major stages within a single case study of one thematic area, and indicates the expected duration of each stage, the contact time (in person-weeks) for Experts, IAEA staff, and RCA counterparts, and notes how each of these project participants will be involved in each stage.

Note that Stage 1 on this table includes Steps 1 to 4 of the evaluative methodology explained in Section II.

Estimated person involvement for case study on ONE sub-thematic area							
Stage number	Stage Description	Modality	Stage duration (months)	Person time (number people x number weeks)			Notes
				Experts	IAEA staff	RCA Counter-parts	
1	Evaluation design completed	Workshop	1	1 x 3	2 x 1	3 x 1	Stage is led by one Expert. Two IAEA staff and 3 RCA CPs provide input
2	Electronic survey or similar developed based, piloted with a few GPs, then implemented across all GPs	IAEA Activity	3	1 x 1	1 x 3	22 x 0.2	Stage is led by IAEA staff. One Expert provides guidance. Assume 22 participating GPs will complete survey
3	In-depth analysis of selected outcomes, e.g. interviews completed with project counterparts, written up by Expert and endorsed by project counterparts	Expert Mission	3	3 x 3	2 x 1	9 x 0.2	Costed assuming 3 outcomes are assessed. Assessing each outcome is led by 1 Expert and involves 3 RCA CPs (LCC and 2 NPCs). High-level economic analysis is performed. IAEA staff Assist.
4	Drafting of reports based on surveys (or similar) and in-depth assessments, including opportunity to address feedback provided by RCA NRs	Home-based assignment	3	1 x 5	1 x 0.5	22 x 0.2	Stage is led by one Expert in close collaboration with IAEA staff. 22 RCA CPs (one from each GP) provide review.
5	Assessment of overarching value statement of RCA (including summary report)	Workshop and Home-based assignment	1	3 x 3	2 x 2	3 x 1	Stage is led by IAEA staff. Workshop is attended by the 3 Experts and the RCA LCC.
6	Develop draft posters, brochures and/or videos for 50th anniversary celebration of RCA	RCARO	3	1 x 1	2 x 0.5	3 x 0.5	Stage is led by RCARO. Expert, IAEA staff and RCA CPs provide review.
	SUM Person-Weeks			28	12.5	20.8	
	SUM Person-Days			140	62.5	104	

The following table illustrates the timeline for undertaking each of the six project stages across the four proposed case studies.

The major stages for each case study are identical for each case study, but the specific methodologies will need to be adapted to suit the context of the sub-thematic area under consideration.

The project plan indicates that the first four stages of the first case study (mutation breeding) will be completed before any other case studies start. This is so that experiences from undertaking the first case study can be used to optimize the remaining case studies.

The three remaining case studies would operate concurrently but with slight phasing of their main stages.

Stages 5 and 6 would be undertaken across all four case studies, once they have all reached the end of Stage 4.

All case studies and all stages are scheduled to allow for engagement with the RCA

NRs at NRMs and GCMs. It is noted that the celebrations of the 50th anniversary of the RCA will take place at the NRM in 2022, and therefore all project work must be completed by that time.

	Mutation Breeding	Air Pollution	Industrial Application	Human health (TBC)
Sep-19	NRs informed of this project			
Oct-19	Stage 1			
Nov-19	Stages 2 and 3			
Dec-19				
Jan-20				
Feb-20	Stage 4			
Mar-20	NRs provide feedback on work to date			
Apr-20	Stage 4			
May-20		Stage 1	Stage 1	Stage 1
Jun-20		Stage 2	Stage 2	Stage 2
Jul-20				
Aug-20				
Sep-20	NRs provide feedback on work to date			
Oct-20		Stage 3		
Nov-20			Stage 3	
Dec-20				Stage 3
Jan-21		Stage 4		
Feb-21			Stage 4	
Mar-21				Stage 4
Apr-21	NRs provide feedback on work to date			
May-21		Stage 4	Stage 4	Stage 4
Jun-21	Stage 5			
Jul-21	Stage 6			
Aug-21				
Sep-21	NRs provide feedback on work to date			
Oct-21		Stage 6		
Nov-21			Stage 6	
Dec-21				Stage 6
Jan-22				
Feb-22				
Mar-22				
Apr-22	Celebrations of 50th anniversary of RCA at 44th NRM, Vietnam			

ANNEX 1:

RCA Social and Economic Impact Report Template

RCA Thematic area:	Example: Food and Agriculture
Sub-theme:	Example: Mutation Breeding

Relevant projects:

RCA number	Project title	Start and finish dates

Executive Summary

1-2 page overview of the impact story, highlighting economic and social value in particular.

Background

1-2 pages; sourced from project and programme documents – design, business case, achievement reports, stocktake of projects, RCA Annual Reports

Content:

- What are the issues or problems that the projects sought to address in this thematic area?
- What were the objectives of the projects collectively?

Examples:

- Food security and climate change are growing problems across ASPAC
- Nuclear technology has much to offer...
- The ultimate objective of this thematic area is...
- It was important that this was a regional project because...
- In overview, the projects in this sub-thematic area sought to... (cumulatively summarising the 10-20-year history or as far back as relevant for the sequence of projects – for example, thematic analysis of projects' individual intervention logics)
- For details of specific projects, refer to original source documents for each project.

Outputs

1-2 pages; sourced from project documents, RCA Annual Reports, and survey.

Content:

- What did the projects deliver?

Example: Collectively these projects have delivered:

- 96 researchers trained in international workshops
- 96 peer reviewed journal articles
- 39 MS and 17 PhD graduates
- Following participation in the project, most of the counterparts have enhanced their national, regional and interregional collaborations on the use mutation breeding.
- More than 4,528 advanced mutants with significant improved stress tolerance, quality and yield potential characteristics in cereals, legumes, fruits & vegetables were developed in the participating GPs, among them 351 mutant lines were in the regional multi-location trial for release and 102 well characterized mutants were used to genetic studies.
    - Cereals: A total of 27 advanced mutant lines of rice (Bangladesh 1, Malaysia 2, Pakistan 1, Korea 8, Vietnam 33; 61 wheat (Australia 2, China 50, Mongolia 4, India 2, Pakistan 3), 4 barley (Australia 4) and 36 sorghum (Indonesia).
    - Grain Legumes: A total of 11 advanced mutant lines of mungbean (India 2, Thailand 9) 170 soybean (Thailand 5, Vietnam 165), peanut 4 (India), 1 Black gram (India).
    - Fruits & Vegetables: Tomato 4 (Vietnam) and 2 banana (Sri Lanka)
    - Other Crops: Sugarcane 6 (Pakistan 1, Vietnam 2 and India 3), cotton 1 (Pakistan), kenaf 5 (Korea), cassava 1 (Vietnam)

Refer to original source documents (e.g. project reports) for achievements of individual projects.

Outcomes

4-5 pages; sourced from survey and/or outcome harvesting and/or one-sentence outcome.

Content:

- What intermediary outcomes did the thematic area achieve overall? How valuable were these outcomes?
- To what extent and in what ways were the outcomes enhanced by having a regional programme?
- This section will focus on outcomes that can be analysed systematically across all participating government parties; usually these will be intermediary outcomes – e.g., actions taken by a competent authority on the basis of information provided by RCA projects
- The value of the outcomes will be assessed using rubrics (see Annex 2)

Example: Collectively these projects have achieved:

- 28 mutant varieties officially released and put into production in the member states. The extension areas of the officially released eight wheat mutant varieties in China were about 2 Mha with the cooperation of the local seed companies from 2012 to 2015.
    - In 2012 a total of 10 mutant varieties where released in: 1 rice (Myanmar), 5 wheat (China), 1 barley (Australia) and 1 sorghum (Indonesia); 1 mungbean (Thailand),

- In 2013, 6 mutant varieties were released in: 1 rice (Bangladesh), 1 wheat (China), 2 sorghum (Indonesia), 1 pigeon pea (India), 1 black gram (India) and 1 kenaf (Korea).
- In 2014, 6 mutant varieties in: 1 rice (Pakistan), 3 wheat (China 2, Mongolia 1), 1 sugarcane (Pakistan), 1 cotton (Pakistan)
- In 2015, 6 mutant varieties where released in: 1 rice (Korea), 3 sorghum (Indonesia) 2 kenaf (Korea)

Economic and social value

1-2 pages *per example,* for 2-3 examples. Sourced from interviews, plus documentation and data provided by interviewees.

Content:

- What are the most significant impacts achieved in this thematic area to date?
- This section will focus on longer-term, big-picture, social and economic value created by the projects in the thematic area.
- Example cases will be selected on the basis that they showcase an achievement resulting from RCA project(s) that provides significant economic and/or social value.
- Example cases will include relevant facts and figures to substantiate the RCA's contributory and value claims.
- Economic evaluation (e.g. cost-benefit analyis or break-even analysis) will be included where feasible and appropriate.

Economic benefits example:

- 2Mha for 8 wheat mutant varieties in China from 2012 to 2015.
- Luyuan 502 with high lodging resistance, wide adaptability and 10.6% yield increase compared to the national control.
- From 2012 to 2018, a total of 5.13 million ha of dissemination areas of Luyuan 502 was achieved, increasing productivity by 3.891 billion kilograms and generating an additional income (economic benefits)of 1.33 billion USD to farmers.
- In which from 2016 to 2018, a total of 3.42 million ha of dissemination areas of Luyuan 502 was achieved, increasing productivity by 2.593 billion kilograms and generating an additional economic benefit of 0.88 billion USD to farmers.

Social benefits example:

- Large-scale promotion of improved new mutant varieties developed by the project will significantly upgrade crop yield, quality, stress resistance and resource utilization efficiency, reduce production costs and increase farmers' income, and enhance the market competitiveness of agricultural products (BATAN sorghum variety Pahat)
- The promotion of new mutant varieties with elite mutations can effectively promote the replacement of main varieties in the main agricultural areas of participating country, which plays an important role in ensuring national and regional food security
- Numbers of excellent new germplasm and new mutants created under the project will become the key materials for major breakthroughs in conventional breeding and

heterosis breeding, which will be used as hybrid parents to breed more excellent varieties to promote crop yield increase and sustainable agricultural development in a larger scope.

Looking to the future

1 page; sourced from programme documents.

Content:

- The aspiration for this thematic area is...
- We will measure *and evaluate* our success by...
- Potentially, link in with SDGs, context of development discussion (IAEA contributes to 9 – in Eloises slides)

Note: audience is RCA members and third parties.

ANNEX 2:

Methodological design principles

Each impact story will follow a consistent overarching structure, as outlined in Annex 1.

The specific methods used to gather and analyse evidence, and prepare each impact story, will reflect the unique context of the selected thematic areas. However, a common set of principles will guide the approaches and methods used, as follows.

Four steps for sound evaluation design

Evaluation differs from research because it involves not only measuring or describing a state of affairs, but making a sound and transparent judgement about the quality or value of that state of affairs (Schwandt, 2015).

Good evaluation practice follows a logical approach to the design and conduct of an evaluation, so that the basis for making judgements is transparent (King et al., 2013). This process has been described in a series of eight steps (King & OPM, 2018). The process hinges on developing context-specific criteria (aspects of performance) and standards (levels of performance). These criteria and standards provide a systematic framework to ensure the evaluation is aligned with the RCA activities and outcomes, collects and analyses appropriate evidence, draws sound conclusions, and tells a clear performance and value story (King, 2019).

The four evaluation design steps are:

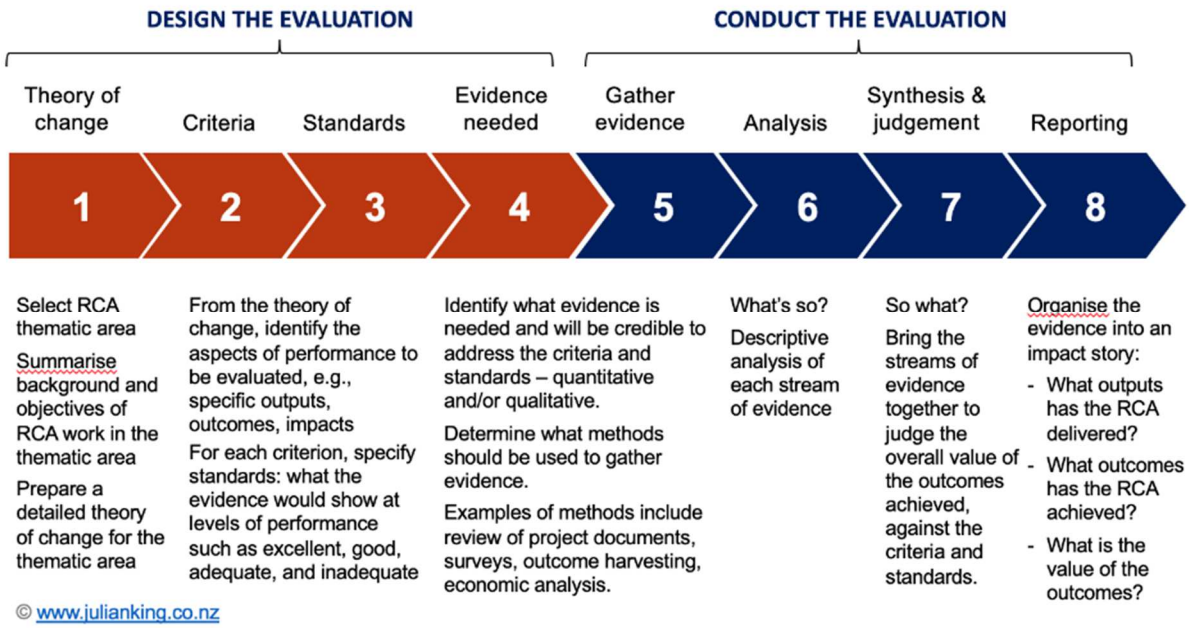
1. Prepare a detailed theory of change, to ensure there is a clear and common understanding of the intended functioning and results of each RCA thematic area

2. From the theory of change, identify and define criteria: priority aspects of performance, impact and value that will be focal points for the evaluation

3. For each criterion, define standards: what the evidence would look like at different levels of performance (e.g., excellent, good, adequate, and inadequate) (Davidson, 2005)

4. Identify sources of evidence, and appropriate methods for the context.

The full evaluation process is outlined in the following diagram (adapted from King, 2019). This includes the four design steps, followed by four steps of evidence gathering, analysis, synthesis, and reporting.

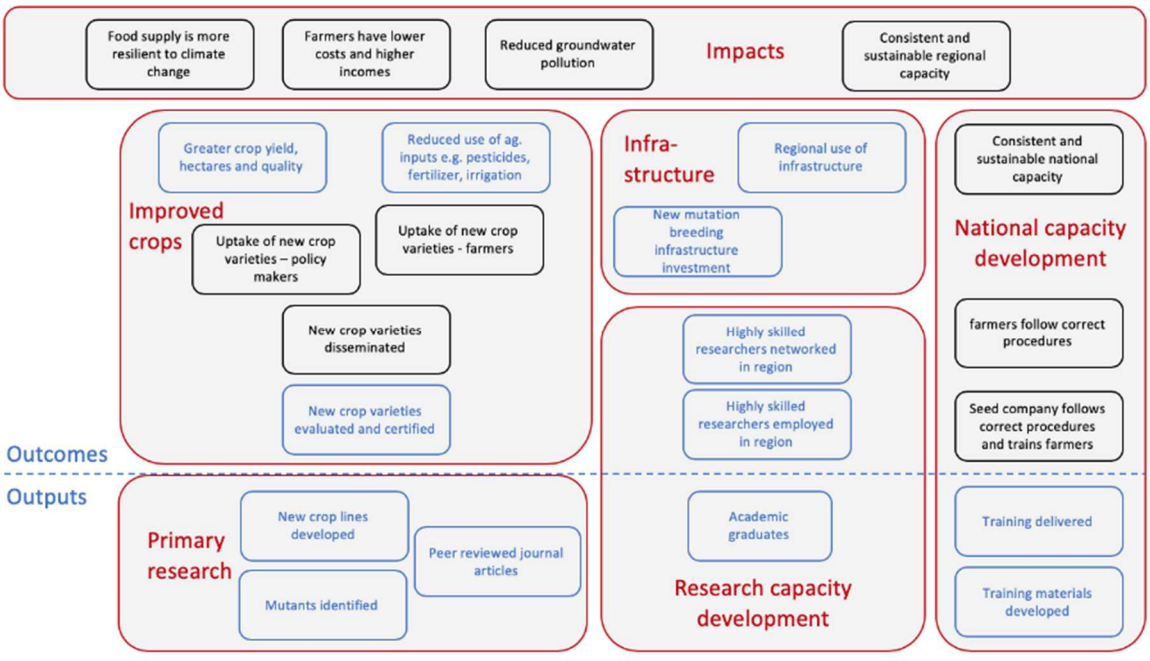


The following paragraphs illustrate the application of the four evaluation design steps.

Step 1: Theory of Change

A theory of change 'explains how activities are understood to produce a series of results that contribute to achieving the final intended impacts' (Rogers, 2014). One of the functions of a theory of change is to assist in the identification of criteria that accurately reflect the intended performance of the RCA projects.

For example, the following draft theory of change was prepared for illustrative purposes, based on the mutation breeding sub-theme.



Step 2: Criteria

Criteria are aspects of performance. From the theory of change, six criteria were identified (the six large red boxes), each containing multiple sub-criteria for specific outputs, outcomes or impacts (the smaller boxes). These criteria represent focus areas for evaluating the mutation breeding group of projects.

Each criterion needs to be defined in a short, clear statement of what is important about the criterion. For example, one of the criteria identified above is *Infrastructure*, and a sub-criterion is *Regional use of infrastructure* - which may be defined as follows:

Regional resource units (RRUs) are a mechanism to support member states to build capabilities – such as technical aspects, human resource aspects, efficiency, and sustainability beyond IAEA funding. RUUs are expected to enhance the ownership and leadership of the RCA mechanism.

Step 3: Standards

Standards are levels of performance. Building on the *Regional use of infrastructure* example above, standards may be defined as follows.

Standards	Definitions
Excellent	RRUs are proactive in providing projects with specific resources for use by other government parties participating in the project, through a range of modalities, anticipating requests and offering services to meet strategic needs of the region, fostering sustainability in the region and leading knowledge exchange in the region.
Good	RRUs meet the needs of their project, upon request, and support knowledge exchange in the region.
Adequate	There is at least one RRU for each project. Each RRU is operational and provides a minimally acceptable level of services to meet requests for at least three countries over the lifetime of a RCA project.
Inadequate	Criteria for 'adequate' are not met.

By specifying and agreeing definitions of excellent, good, adequate and inadequate performance from the outset of the evaluation, a clear and shared basis is established for making evaluative judgements from the evidence. This guards against individual subjectivity and promotes transparency. It enhances the credibility of the evaluation findings.

King and OPM (2018, p. 23) detailed a set of principles to guide sound development of criteria and standards: use participatory processes; get the right people in the room; suspend conversations about measurement; reference existing benchmarks where appropriate; tailor criteria and standards to context; aim for consistency in performance levels; and keep it simple.

Step 4: Evidence

In a logical and sequential process of evaluation design, it is only after clarifying the theory of change, and identifying agreed criteria and standards, that relevant sources of evidence and methods of evidence gathering can be identified (King & OPM, 2018). The detailed definition of criteria and sub-criteria ensures that data collection systematically collects the specific information needed to support the evaluation.

Specific methods are likely to vary between RCA thematic areas, depending on the nature of the projects and the types of evidence available. It will be important to adopt a flexible approach, tailoring methods to suit each context. However, it is anticipated that the following mix of methods is likely to apply to the impact stories collectively:

- Analysis of existing project documents and RCA documents – e.g., project reports, RCA Annual Reports, success stories.

- Systematic collection of core information from all participating government parties. In many instances an electronic survey offers an efficient and effective way to collect such data, with advantages of this approach including data validation at source (promoting consistency in responses) and automatic compilation of responses into a database. Surveys must be kept as brief and simple as possible, asking only the highest priorty questions to promote clarity and minimise respondent burden. As the survey involves collating data from various sources, and not just respondent recall, it will be important to provide a printable version of the survey, and the ability to save partially completed surveys and return to complete later. If some respondents struggle with concepts in the survey, telephone assistance could be offered to facilitate comprehensive and accurate collection of data. An example of a set of survey questions is provided below.

- Open-ended questioning (such as outcome harvesting or one-sentence outcome statements) to provide flexibility for each participating government party to supply information that reflects their unique contexts and circumstances. Such information is analysed after it is collected to identify themes and map these back to relevant sections of the theory of change and the evaluation criteria.

- In-depth investigative studies of specific examples that highlight success of RCA projects in achieving social and economic outcomes. For example, interviews may be conducted to add depth and rigour to existing success stories; economic modelling may be conducted to estimate the value of a particular set of outcomes.

Example: survey design

Referring to the theory of change above for mutation breeding, sub-criteria (small boxes) were identified that were amenable to systematic data collection across all participating government parties – i.e., these are areas of questioning where respondents can reasonably be expected to provide clear answers in a consistent format.

The relevant boxes are highlighted in blue. The general areas of survey questioning identified are:

- Training material developed – including protocols of mutation induction and mutant screening
- Training delivered*
- Academic graduates (and of those, how many are employed in relevant fields in the region)
- Highly skilled researchers networked in region*
- Peer reviewed journal articles published*
- Mutants identified
- New crop lines developed
- New crop varieties certified*
- New mutation breeding infrastructure (e.g. labs)
- Regional use of infrastructure*
- Reduced use of agricultural inputs (common set of indicators to be identified – e.g., specific pesticides, fertilisers, irrigation, which may be extrapolated from mutant evaluation data)
- Crop yield statistics for each mutant variety (common set of indicators to be identified, which need to be carefully structured to reflect complexities such as crop rotation and substitution of new crops on land previously used for other crops – e.g., baseline and follow-up values for hectares, yield per hectare, additional yield)

For those sub-criteria marked with an asterisk (*) above, it is anticipated that the RCA adds value as a regional programme, over and above what the countries could achieve if working independently. These effects can be explored through additional survey questions.

To illustrate how *one* of the questioning areas above is developed into a set of survey questions, the area of *regional use of infrastructure* is shown below.

Question X: Regional use of infrastructure

This question is about Regional Resource Units (RRU) – an organisation in one government party that provides services or support to other government parties to assist their implementation of a specific RCA project.

Does your government have a RRU? (tick one)
O YES
O NO

If you ticked 'yes' please provide the name of your RRU organisation _____
Please provide contact name _____
Please provide contact person's email address _____

What services or support has your RRU provided to other government parties in the last two years? (tick all that apply)
O regional training
O supply of personnel for expert missions
O provision of analytical services

O support for production of manuals or handbooks
O provision of standards or reagents
O other

If you ticked 'other' above: please explain _____

Have you used a RRU service? (tick one)
O YES
O NO

If you ticked 'yes' please provide the name of the main RRU organisation you used
_____

What services or support did you access from this RRU? (tick all that apply)
O regional training
O supply of personnel for expert missions
O provision of analytical services
O support for production of manuals or handbooks
O provision of standards or reagents
O other

If you ticked 'other' above: please explain _____

Please rate the overall performance of the RRU that you mainly accessed (tick one):

O **Excellent**: RRUs are proactive in providing projects with specific resources for use by other government parties participating in the project, through a range of modalities, anticipating requests and offering services to meet strategic needs of the region, fostering sustainability in the region and leading the knowledge exchange in the region.

O **Good**: RRUs meet the needs of their project, upon request, and support knowledge exchange in the region.

O **Adequate**: There is at least one RRU for each project. Each RRU is operational and provides a minimally acceptable level of services to meet requests for at least three countries over the lifetime of a RCA project

O **Inadequate**: Criteria for adequate are not met.

Note: The final survey will need to minimise respondent burden by only asking the highest priority questions. Survey could be piloted at final project meeting.

References

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