

**SRDC Monitoring and Evaluation Manual**  
**For SRDC and Researchers**

**April 2011**

**Prepared by Agtrans Research**

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# 1. Framework, Definitions and Evaluation Methods

## Framework

An impact evaluation framework encompasses a cohesive structure for evaluating research investment at project, program and portfolio levels with accountability as the prime purpose.

An impact framework would normally include triple bottom line reporting whereby a broad set of economic, environmental and social impacts and benefits are considered. This is a convenient way of expressing the Australian community's interest in the wider outcomes produced by research investment.

Other purposes served from impact evaluation processes include improving current investment management and future investment planning.

It should be acknowledged that research is endeavouring to discover and understand facts and information not yet known. In this regard, a research project can by definition 'fail' in a direct application sense yet still be successful in a research sense.

## Objectives

By developing an evaluation framework and checklist of activities, SRDC is seeking to ensure that appropriate information and data are collected:

- to allow assessments of impact and potential impact of its research and development investments
- to meet its various reporting requirements
- to allow assessment of performance so that continuous improvement of management systems can be undertaken

## Targeting Reporting Requirements

It is important that the information and data collected and assembled for evaluation are appropriate for contributing to a wide range of uses, such as performance reviews and various reporting requirements. Currently, major reporting requirements for SRDC include reporting against SRDC's own R&D Plan, reporting to stakeholders (e.g. via the Annual Report), and reporting to the Australian Government and public through a contribution to the impact evaluation process of the Council of the Rural Research and Development Corporations (CRRDC) (economic, environmental and social impacts).

## Flexibility

In developing this framework it is recognised that some of the more specific reporting requirements may be only relatively short-term, and that investments being made in the future may need to report on various other requirements that develop. Therefore data and information collection requirements need to be flexible enough so that the resulting information will be robust with regard to any future reporting needs that may develop.

## Learning Lessons

It is also important that the evaluation framework developed is appropriate for eliciting lessons learnt that can be applied in a continuous improvement process. This would include identifying factors affecting the overall success of R&D investments and therefore contributing to improving investment

strategies and investment selection processes. An example of the type of factors relevant here may be those factors that are influencing levels of adoption for different knowledge applications (such as communication effort).

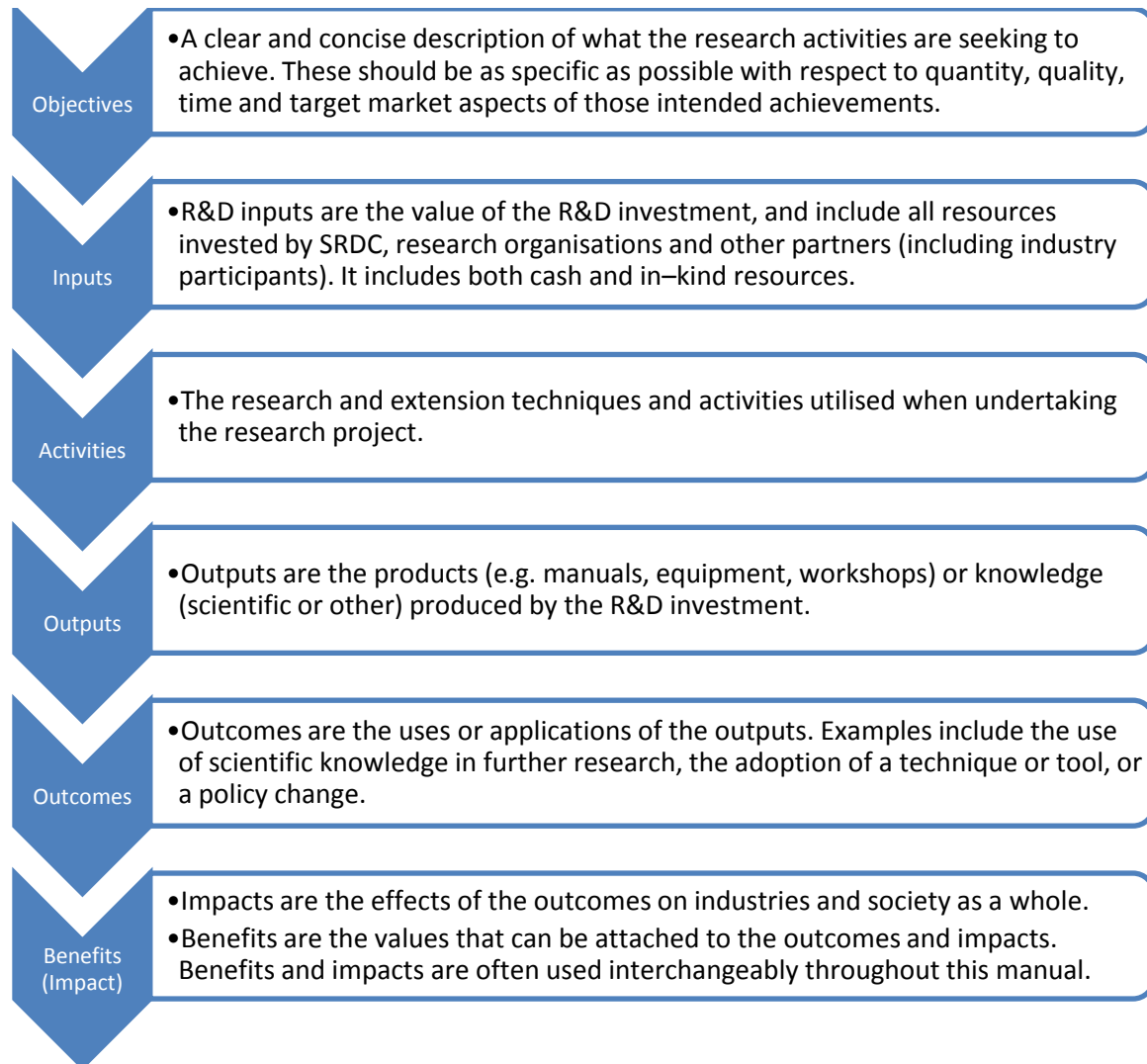
### **Program Logic Approach**

An evaluation framework should be comprehensive but simple. Therefore SRDC uses a logical framework approach with an emphasis on impacts and benefits as end points incorporating a sustainable development or triple bottom line approach to identifying benefits delivered.

The logical framework approach to R&D monitoring and evaluation refers to inputs, outputs, outcomes and benefits. Inputs refer to the value of the investment, outputs are the products or knowledge produced by the R&D investment, the outcomes are the use/changes that have been made by application of the outputs and the benefits are the values that can be attached to the outcomes. The approach can be applied at project, cluster, Sub-arena or Arena levels. Benefits can be addressed in a qualitative manner via a triple bottom line analysis, or can be valued resulting in an integrated effectiveness measure via the use of cost benefit analysis.

Figure 1 shows the steps in the logical framework.

Figure 1: Logical Framework



For each of the steps in the framework (outputs, outcomes and benefits in particular), there may be performance indicators (or even targets) that may be established. Performance at any given time can then be assessed through data that may be collected and assembled during the project's life.

There are a number of terms commonly used when describing the impacts of projects; and these are defined here. It should be noted that for some of these words, there are a number of different definitions. The definitions here are provided as those used when developing the current manual.

There are also various quantitative and semi-quantitative methods that can be used to understand and/or quantify the impact of an investment, or series of investments. These are briefly addressed as well.

## Definitions

### **Pure basic research**

Experimental and theoretical work undertaken to acquire new knowledge without looking for long term benefits other than the advancement of knowledge (Australian Bureau of Statistics (ABS) website).

### **Strategic basic research**

Experimental and theoretical work undertaken to acquire new knowledge in specified broad areas in the expectation of practical discoveries. It provides the broad base of knowledge necessary for the solution of recognised practical problems (ABS website).

### **Applied Research**

Original work undertaken primarily to acquire new knowledge with a specific application in view. It is undertaken either to determine possible uses for the findings of basic research or to determine new ways of achieving some specific and predetermined objectives (ABS website).

### **Experimental Development**

Systematic work, using existing knowledge gained from research or practical experience, which is directed to producing new materials, products, devices, policies, behaviours or outlooks; to installing new processes, systems and services; or to improving substantially those already produced or installed (ABS website).

### **Baseline**

The baseline refers to various characteristics of the situation before the investment was made and which may change as a result of the investment. It can refer to the baseline state of technology or scientific knowledge, or the baseline state of a particular issue in the industry (e.g. yield, sediment run-off) or the level of baseline adoption of a particular technology or technique.

### **Inputs**

R&D inputs are the value of the R&D investment, and include all resources invested by SRDC, research organisations and other partners (including industry participants). It includes both cash and in-kind resources.

### **Outputs**

Outputs are the products (e.g. manuals, equipment, workshops) or knowledge (scientific or other) produced by the R&D investment.

### **Outcomes**

Outcomes are the uses or applications of the outputs. Examples include the use of scientific knowledge in further research, the adoption of a technique or tool, or a policy change.

### **Impact**

Impacts are the effects of the outcomes on industries and society as a whole.

### **Benefits**

Benefits are the values that can be attached to the outcomes and impacts. Benefits and impacts are often used interchangeably throughout this manual.

## Beneficiaries

These are the individuals, industries or groups in society that capture the benefits produced. At a broad scale, they can be public and/or private in nature.

## Triple bottom line

This is an approach that identifies and categorises the impacts of an investment as being economic, environmental or social in nature.

## Economic benefits

These are usually considered the market related benefits produced from the investment. Examples include increased yields, reduced costs, improved utilisation of capital, and saved government expenditure.

## Environmental benefits

These are the benefits to the physical and biological environment produced from the investment such as improved biodiversity and/or water quality.

## Social benefits

These are the community benefits produced from the investment. Examples include health, building innovation and research skills, and creating resilient regional communities.

## Categorisation of benefits by triple bottom line and beneficiary

Table 1 presents a matrix that can be used to classify identified benefits by both their triple bottom line category (economic, environmental, social), and the beneficiary type (levy payers, other industries, the public). Any benefit from the research identified can be placed in the relevant cell in the table.

Table 1: Categories of Benefits from the Investment

Levy Paying Industry (Sugar)	Spillovers	
	Other Industries (primary and other industries)	Public
<u>Economic Benefits</u>		
•	•	•
<u>Environmental Benefits</u>		
•	•	•
<u>Social Benefits</u>		
•	•	•

## Evaluation Methods

The focus in this manual is in using a logical framework approach to qualitatively describe the logic by which impact is achieved, and then economic evaluation methods to place a value on some of those impacts. Even if not placing an economic value on impacts, it is helpful to use some metrics when

describing the outputs, outcomes and impacts of research. Descriptions of outputs, outcomes and impacts where possible should be clear in terms of quality, quantity, time, location and target group. When setting research objectives, these factors should also be considered, as should a means of verifying that objectives and other performance indicators that may have been established have been achieved or otherwise.

The economic evaluation method of cost benefit analysis, the main focus of this manual, is described in some detail below, and two other quantitative evaluation methods are also briefly described.

### **Cost Benefit Analysis (CBA)**

Cost benefit analysis is a method for assessing the merit of an investment by measuring the benefits of a proposed project in monetary terms, and comparing the value of such benefits with the value of the costs incurred. While costs are often known in the case of R&D investment, benefits are usually more difficult to measure.

A simplified concept for measuring benefits from agricultural research is that annual benefits are generally estimated from the formula  $B_i = k_i Q_i$  where

$B_i$  is the estimated benefit for year  $i$

$k_i$  is the unit impact for year  $i$  measured in \$ terms (e.g. a cost reduction per tonne )

$Q_i$  is the quantity of production (e.g. hectares or tonnes) in year  $i$  that is subject to the impact

This underlying concept drives much of the data required for producing accurate investment criteria via CBAs. For example, the impact or change requires assumptions on the cost of a process before the impact as well as the cost after the impact. This is why baseline data are important. Likewise, with  $Q$ , it is important to estimate the quantity of production to which the likely change will apply.

In the context of R&D investment evaluation, the CBA approach is directed towards socioeconomic analysis that considers all costs and benefits to Australian society as a whole rather than private investment analysis that is usually orientated towards benefits and costs to the individual firm.

#### *Ex-post and ex-ante CBAs*

Ex-post (historical) analyses are those undertaken after the R&D investment has been made, whereas ex-ante (prospective) analyses are those undertaken before the investment is made, usually to guide the investment decision.

#### *The concept of discounting*

Discounting refers to the application of a 'discount rate' that takes account of the time value of money. That is, individuals value a financial return tomorrow higher than the same financial return in one year's time. Future values are therefore 'discounted' to reflect this.

#### *Discount rate*

A discount rate of 5% should be used in CBAs carried out for SRDC, as nominated by the CRRDC.

#### *Present Value of Benefits (PVB)*

The PVB refers to the sum of the discounted annual net benefits from the investment (allowing for any costs to the adopter) over the time period of benefits considered.



### *Present Value of Costs (PVC)*

The PVC refers to the sum of the discounted annual R&D costs invested.

### *Net Present Value (NPV)*

The NPV is the discounted value of the benefits of an investment less the discounted value of the costs, i.e. PVB - PVC. This investment criterion gives an indication of the size of the benefits, but does not provide a rate of return to the investment.

### *Benefit:cost Ratio (B/C Ratio)*

The B/C Ratio is ratio of the PVB to the PVC. This investment criterion gives an indication of the rate of return and can be interpreted as when greater than 1, the time discounted benefits are greater than the time discounted costs. Unlike the NPV, it provides no indication of the magnitude of the benefits.

### *Internal Rate of Return (IRR)*

The IRR is the discount rate which would have to be applied for an investment to have an NPV of zero, i.e. where present value of benefits = present value of costs. This criterion gives an indication of return. The timing of benefits is a major influence on the IRR, as the earlier the benefits are achieved, the higher the discount rate needs to be to achieve a return of zero.

### *Counterfactual*

The counterfactual is the situation that is most likely to have occurred without the R&D investment. It is sometimes referred to as the 'without research' situation.

### *Willingness to pay (WTP)*

The WTP is a value that can be elicited from a community relevant to an environmental or social benefit that has no market value. The WTP value is often derived through the use of techniques such as Choice Modelling or the Contingent Valuation Method.

### *Benefit transfer*

The process of using a WTP value defined in one situation to value a similar improvement in another situation.

### *Attribution factor*

Where the R&D investment is not the only factor contributing to a defined benefit, an attribution factor can be used to allocate a part of the benefit to the R&D investment.

### **Goal Attainment Scoring (GAS)**

GAS is a monitoring and evaluation technique that can be used to rate the achievement of goals through stakeholder involvement in assessing the achievement of expected outcomes.

### **Multi Criteria Analysis (MCA)**

MCA is an impact assessment technique that uses a weighted scoring method that takes into account several criteria simultaneously and is used primarily where some impacts cannot be easily valued in dollar terms.

## 2. SRDC Context

There are three key purposes for undertaking monitoring and evaluation. These are:

- ensuring a high level of accountability to stakeholders,
- facilitating continuous improvement in management, and
- improving communication and extending information about project results and achievements.

SRDC has a number of reporting needs with respect to information derived from monitoring and evaluation, spread across the spectrum of these three purposes. Each of these needs is briefly described below in order to provide an indication of the ways in which information and data may be used by SRDC for reporting.

### **The Research and Development Plan**

The SRDC R&D Plan is to guide the Corporation's R&D investment decisions for the five year period to which it applies. The Plan is reviewed every five years. The current R&D Plan (2007 to 2012) takes an outcome/output/input approach to planning across three Arenas; namely Regional Futures, Emerging Technologies and People Development. Target ranges of total investment are set for inputs for each of these three Arenas.

Outcomes are specified for each Arena, and Key Deliverables and Strategies for several outcomes for each Arena are described in qualitative terms. Each Investment Arena has 2 to 3 Key Performance Indicators (KPIs) specified and associated measures are stated for assessing performance against the KPIs. The R&D Plan states that reports, case studies, benefit-cost analyses and surveys will be conducted to document and illustrate achievements, including both public good and private benefits. The intention is to document the return on R&D investment and guide future investment targets. This is to provide evidence at the end of the plan for the measures that qualify each KPI in each Arena.

The R&D Plan also states that monitoring and evaluation at the individual project level will be undertaken in terms of delivery against outputs and outcomes. Each project will be required to conduct baseline evaluations and assess performance in terms of output and outcomes delivered against that baseline and how R&D impacts will be achieved.

### **The Annual Report**

The SRDC Annual Report is submitted to the Minister for Agriculture, Fisheries and Forestry. It is backward looking and reports against the current R&D Plan. This requires reporting investment and achievements over the past year against the inputs, outputs, and outcomes specified in the R&D Plan and the AOP (Annual Operating Plan) for that financial year. For each Arena in which SRDC invests qualitative assessments are made and reported with assistance from specified indicators and qualitative performance measures that appear in the R&D Plan.

### **The Annual Operating Plan (AOP)**

The Annual Operating Plan sets out the investments that SRDC is to fund in the next year. The planned expenditure needs to be consistent with the current R&D Plan and government priorities. As with the Annual Report, this document presents intended outcomes, outputs and inputs by the three investment Arenas. This report contains a section on Monitoring and Evaluation that indicates reports, case studies and surveys are to be conducted to illustrate achievements, again to be measured against the indicators and measures for each Arena which are specified in the R&D Plan. Targets for the year to which the AOP

refers are specified in qualitative terms. Outcomes for each Arena that will be supported by investment in the year ahead are discussed in qualitative terms.

### **Industry Reporting**

There are three representative organisations to which the SRDC is accountable under the Primary Industries and Energy Research and Development (PIERD) Act: the Australian Cane Growers Council Limited (Canegrowers), the Australian Cane Farmers Association Limited (ACFA) and the Australian Sugar Milling Council Proprietary Limited (ASMC).

### **Review of the Previous R&D Plan**

While there is no statutory requirement, many RDCs review their achievements and performance at the end of a five year R&D plan. This can take various forms such as assessing performance against objectives, management and process performance and impact assessment. This review can be published or remain as an internal document. It can also be a valuable contribution to the process of developing the R&D Plan for the following five year period in terms of identifying past lessons learnt and future priorities and gaps. Conducting a detailed review at this time requires appropriate data and information to have been collected over the five year period of investment. It should be noted it can also be difficult to assess the impact of the R&D Plan in its final year, as many of the research investments made under the plan are still on-going. However, potential benefits can be predicted. Any review of an R&D plan should also consider not just the impact of the R&D investments, but also how the Corporation has performed in a management, governance and administrative sense. Some RDCs undertake such performance reviews but these vary in their emphasis and scope.

### **Development of the New R&D Plan**

A process of strategic planning is undertaken in order to develop the R&D Plan; and important inputs to this process include lessons learnt from the previous five years, an understanding of the current and likely future research needs of the sugarcane industry, and an understanding of the investments of other research funders and providers. Together with information on the industry and technological environments, all of this information helps to determine gaps and to provide a strategic focus in order to better address future research needs.

### **Meeting National and Rural R&D Priorities**

SRDC reports to the Australian Government on the degree to which SRDC has addressed the National and Rural R&D priorities. These priorities appear in SRDC's R&D Plan and the Annual Operating Plan, and are addressed specifically in the Annual Report.

### **Reporting against the Australian Sugarcane RD&E Framework**

A National Primary Industries Research, Development & Extension Framework is being developed through the Primary Industries Ministerial Council (PIMC). The states and Northern Territory, Rural R&D Corporations, CSIRO and universities are jointly developing the framework with the purpose of encouraging greater collaboration and promoting continuous improvement in the investment of RD&E resources nationally. The PIMC has endorsed the strategy for the sugarcane industry, as well as for the pork, wine, dairy, beef, sheepmeat, poultry, fish and forest industries. The sugar RD&E strategy will be implemented in 2011. The SRDC should consider any reporting requirements that are part of this strategy (or of the subsequent national framework) and ensure that all information required for reporting will be collected and collated.

### **Portfolio Budget Statement (Report to Department of Finance and Administration)**

The statement reports on outcomes, outputs, performance information and the Corporation's financial position each year. The purpose is to justify the budget for the coming year. The information presented should be aligned with that presented in the AOP and Annual Report.

### **Council of Rural Research and Development Corporations (CRRDCs) Reporting**

As part of the CRRDC reporting process, cost benefit analysis is required to assess the costs and benefits that have emerged or are likely to emerge from the 15 Rural Research & Development Corporations (RDCs). Each RDC is contributing to this effort within a standardised sampling and reporting framework. Valuation of these benefits, along with identification of investment expenditure, is required in order to demonstrate the RDC contribution to Australian rural industry as well as environmental and social benefits to Australia. The first three year period of this requirement has just been completed and an extension of the scheme is likely. The details of any continuing scheme are currently being developed.

The CRRDC is also developing a process for reporting on environmental and social impacts in a standardised way across RDCs, although the details of how this reporting will take place are uncertain at this time. It is important when reporting against environmental and social outcomes that information is provided that addresses not only the scale of potential impact through adoption data, but also that the causality between the output or action and any eventual impact from its adoption is made clear, and can be backed up by evidence where possible.

Through the CRRDC process, the RDCs are also required to address the concepts of 'additionality' and 'marginality'. Additionality refers to the degree to which public spillover benefits are being delivered by RDC supported research, and how the level of these public spillovers would have changed if public money to the RDCs was reduced (or increased), and therefore how the mix of investments and hence public spillovers would have changed with changes in public investment. That is, how the 'additional' public spillover benefit captured by the RDC would be affected by different levels of support to RDCs. Marginality refers to the degree of benefits being delivered by the projects 'at the margin'. That is, how successful were the funded projects that were the lowest priority, and at risk of not being funded. The aim is to determine whether the optimal level of overall funding has been reached. If the 'last' funded projects are still achieving a high return, then it could be said that there is underinvestment in research. If however these projects are delivering small or 'marginal' benefits in relation to their costs, it could be suggested that there is overinvestment, and that some industry and public funds should be redirected to higher value uses other than R&D. In the past, it has proven difficult for RDCs to provide information demonstrating performance in these two areas.

One important note is the distinction between the triple bottom line, and the concept of public versus private beneficiaries. The triple bottom line distinguishes between economic (or financial), environmental and social benefits. It should be noted however that not all private benefits are economic in nature, and not all environmental and social benefits are public in nature. When reporting on 'public' benefits, some economic and financial benefits should also be considered.

### **Reporting to Rural Research and Development (R&D) Council**

The Rural R&D Council is the government's key advisory body on rural R&D. The council provides high level advice and coordination to better target and improve the effectiveness of the government's investment in rural R&D. The council intends to work closely with the Rural R&D Corporations and companies (including SRDC) as well as research providers and government agencies to strengthen rural R&D through improved collaboration, facilitation and prioritisation of investment and performance

measurement and reporting. The Rural R&D Council is currently preparing an evaluation framework. When it is released, SRDC should confirm whether the framework or any reporting against the framework will require any information inputs from SRDC with respect to its investments, performance, or impacts.

### **Management Improvements**

Strategic directions, research priorities and resource allocation in new investment each year are major management decisions continually facing the SRDC Board and management. Impact assessment of past investment does not necessarily deliver clear advice in these areas, however in some cases evaluation of past and current investments can sometimes contribute to identifying lessons learnt that can be applied to manage future investments.

Tools other than those used in impact evaluation (considered to be the central focus in the current conceptual framework) are likely to be more useful. It is concluded that any data and information for direct use in management improvements out of applying an evaluation framework with emphasis on impacts would be largely opportunistic rather than targeted. However, highlighting impacts and outcomes through such a framework can implicitly contribute to an improved understanding of where management systems are directed and therefore likely improvement in processes used in management.

### **Communication and Extension**

SRDC produces and distributes a range of communication materials regarding its investments and activities (e.g. newsletters and factsheets). The use of monitoring and evaluation information that has been collected and collated in relation to individual projects will add value to these communication tools. In addition, sometimes extension materials are designed specifically to encourage further uptake of a practice or related group of practices. In some cases, monitoring and evaluation data will also be of value for improving the effectiveness and impact of the messages contained in these materials.

### 3. Guidelines for Researchers

This section provides guidelines for assisting researchers to provide information relevant to monitoring and evaluation in a number of key documents including applications and reports.

#### Scoping/Funding Stage

##### Expression of Interest

When answering **Question 3** in the Expression of Interest (What does the Project seek to achieve?) please answer the following sub-questions in order to frame your answer. While these questions may initially seem to be framed to applied research, those undertaking strategic or blue sky projects should still seek to answer the questions. However, the likely adopters of their research outputs, for example, might be other ongoing research projects. In this case it should be identified how the outputs from the project seeking funding will benefit those undertaking future research. In other cases the focus could be on the likely outputs and impacts of that future research (although the fact that future research will be required should be clearly indicated).

- a) How will the knowledge (or recommendations or tools) produced by the project be used by those adopting?
- b) What will be the nature of the benefit to those adopting, or to any secondary beneficiary (and who will that beneficiary be if it is not the adopter)?
- c) What will be the unit change in cost or revenue (e.g. yield/ha; \$/t) that would be realised by the beneficiary (in quantifiable terms if possible, including how that estimate was derived)?
- d) What is the likely maximum extent of adoption (e.g. in terms of number of growers, number of mills, quantity of production affected)?
- e) How many years might it take from the first year of research for outputs to be first adopted and used?
- f) How many years might it take from the first year of adoption to the maximum level of adoption assumed?
- g) How many years might it take from the time of adoption until the assumed benefit is experienced?
- h) What activities will need to occur for this adoption and benefits to occur within the expected timeframe (e.g. future R&D or commercialisation investment; please provide any indicative cost/timelines if appropriate)?

Appendix 1 provides an example of how such questions might be answered.

##### Checklist for completing Expression of Interest

Have you:

- |  |     |    |
|--|-----|----|
| • Stated the issue to be addressed clearly?                  | Yes | No |
| • Answered questions (a) to (h) for the major benefits?      | Yes | No |
| • Provided justifications for your answers to the questions? | Yes | No |
| • Identified any environmental and social benefits?          | Yes | No |

##### Proposal

Tips and guidelines for completing sections of the proposal form relevant to evaluation are provided below.

### Issue and R&D Approach

Ensure that the relevance of the issue is adequately described; such statements may describe the current situation, why the research is required, and may add to and strengthen the development of the 'without', or counterfactual, scenario in any later evaluation.

### Outputs, Outcomes and Benefits

#### *Outputs*

Outputs are defined as the products (e.g. manuals, equipment, workshops) or knowledge (scientific or other) produced by the R&D investment. In this section please list the knowledge, skills, processes, practices, products or technology that will be derived from the project.

#### *Outcomes*

Outcomes are the use or application of the outputs. Examples include the use of scientific knowledge in further research, the adoption of a technique or tool, or a policy change. Questions that should be used to guide the description of outcomes are provided below. While these questions may initially seem to be framed to applied research, those undertaking strategic or blue sky projects should still seek to answer the questions. However, the likely adopters of their research outputs, for example, might be other ongoing research projects. In this case it should be identified how the outputs from the project seeking funding will benefit those undertaking future research. In other cases the focus could be on the likely outputs and impacts of that future research (although the fact that future research will be required should be clearly indicated).

- a) How will the knowledge (or recommendations or tools) produced by the project be used by those adopting?
- b) Who is the target audience for adoption/use of the project's outputs?
- c) What is the size of this target audience (e.g. in terms of number of growers, number of mills, quantity of production affected)?
- d) What is the likely maximum extent of adoption (e.g. expressed as a % of the target audience)?
- e) How many years might it take from the first year of research for outputs to be first adopted/used?
- f) How many years might it take from the first year of adoption to the maximum level of adoption assumed?
- g) How many years might it take from the time of adoption until the assumed benefit is experienced?
- h) What activities will need to occur for this adoption and benefits to occur within the expected timeframe (e.g. future R&D or commercialisation investment; please provide any indicative cost/timelines if appropriate)?

Appendix 1 provides an example of how such questions might be answered.

#### *Benefits*

Benefits are defined as the effects of the outcomes on industries and society as a whole (also referred to as impacts). Benefits also refer to the values that can be attached to the outcomes and impacts.

Questions that should be used to guide the description of benefits include:

- a) What will be the nature of the benefit to those adopting, or to any secondary beneficiary (and who is that beneficiary if it is not the adopter)?
- b) What will be the unit change in cost or revenue (e.g. yield/ha; \$/t) that would be realised by the beneficiary (in quantifiable terms if possible, including how that number was quantified)

- c) Will the benefits be confined to those adopting the output, or will the benefits flow to some other part of society as well?

Appendix 1 provides an example of how such questions might be answered.

Environmental and social benefits should be described, as well as economic benefits. Examples of environmental and social benefits are described below:

#### Environmental

- Reduced use of chemicals and pesticides (and subsequent benefit to soils and streams)
- Reduced soil erosion
- Improved soil health and structure
- Improved water quality
- Increased water use efficiency
- Increased biodiversity
- Reduced greenhouse gas emissions
- Reduced impact of wastes

#### Social

- Health benefits from reduced use of chemicals
- Health benefits from improved workplace safety
- Health benefits from improvements in food safety and nutrition
- Improved social networks and strategic alliances
- Improved industry capacity and growth in industry knowledge
- Increased regional growth opportunities including employment
- Reduced time spent doing tasks resulting in increased leisure time

It is important when describing such benefits to include reference to the causality between any adoption of an output and the subsequent impact, as well as the scale of the potential impact as influenced by the extent of adoption. It should also be noted that a benefit can be in the form of an 'avoided future impact' as opposed to simply an 'improvement'.

#### Risk Assessment

When considering risk, consider three types of risk:

- a) Risk of intended outputs being achieved
- b) Risk of intended outcomes being achieved (i.e. including adoption)
- c) Other risks associated with the project (e.g. causing environmental harm, risk of losing personnel)

#### Evaluation

##### *Baseline Evaluation*

The baseline evaluation refers to the current status of the issue being addressed. If data is available it should be included here. Questions that may assist with responding to this section include:

- What is the current status of this issue in the industry, with respect to current practices or policies used by the target audience?



- If your proposal is seeking to reduce costs in the industry, or improve productivity, what are the current average costs in the process used in the target market you are addressing? (e.g. harvesting costs, \$/ha; milling costs (\$/tonne).
- What is the size or magnitude of the target market if available (e.g. tonnes or hectares in regions or production systems (or soil types etc) to which the research outputs will apply)?
- What are the current trends regarding change in the activities/processes that may benefit from the research? (e.g. external factors such as policy changes, competing technologies, prices of inputs etc).

Remember to consider the planned environmental and social benefits when considering the baseline evaluation, not just the economic benefits.

Appendix 1 provides an example of how such questions might be answered.

### *Performance Evaluation*

In this section, respondents should indicate specific methods and activities that will take place within the research project to ensure that the researcher can demonstrate the performance of their project with respect to its intended impact, and provide information that may be used in an economic evaluation of the project at some later date. Such activities can also be of use for ongoing monitoring of the project as it proceeds. Examples of appropriate activities might include:

- the inclusion of baseline surveys of target markets, followed by surveys later in the project cycle;
- exit surveys for workshops and field days etc.

It should be noted that any activities specified here should be written into the milestones to ensure they are carried out. In addition, there might be some scope for SRDC to negotiate with individual proposers to include more activities here as part of the contracting stage.

As with the baseline evaluation, remember to consider planned environmental and social benefits when considering the performance evaluation, not just the economic benefits.

More detail on the nature of baseline and exit surveys for workshops is provided below in the Implementation/Reporting section.

#### Checklist for completing Proposal

Have you:

- |   |     |    |
|---|-----|----|
| • Stated the issue to be addressed clearly?                           | Yes | No |
| • Identified the outputs to be delivered                              | Yes | No |
| • Answered questions (a) to (h) for the major outcomes?               | Yes | No |
| • Answered questions (a) to (c) for the major benefits?               | Yes | No |
| • Provided justifications for your answers to the questions?          | Yes | No |
| • Identified any environmental and social benefits?                   | Yes | No |
| • Identified the risks associated with the project?                   | Yes | No |
| • Identified the baseline against which the benefits can be measured? | Yes | No |
| • Identified the ways in which performance will be evaluated?         | Yes | No |

### **Ex-ante cost benefit analysis**

Investments requesting a significant investment from SRDC may be required to be subjected to an ex-ante cost benefit analysis as part of the contracting process. The CBA would be funded and contracted by SRDC, however significant cooperation would be required from the researchers. The purpose of the ex-ante CBA would be to:

- ensure there was a complete and more detailed understanding by decision makers of the program logic associated with the project, and the linkages between the research, outputs, outcomes and benefits,
- identify potential risks in achieving the planned impact, and
- identify important data requirements for the purpose of any ex-post CBA after the completion of the project.

If required, a template for completing a CBA report can be obtained from SRDC.

## **Implementation/Reporting Stage**

### **Milestone Reports**

Under the heading titled **Progress Towards Achieving Expected Outcomes and Benefits** the researcher should focus on revisiting the Outcomes, Benefits and Risk Assessment sections in the Project Agreement and reporting whether there has been any change to industry circumstances or project directions that alter these expectations. Progress towards meeting these planned outcomes and benefits should also be addressed through reference to progress against meeting the activities laid out in the Performance Evaluation section of the Proposal.

When framing your response, you should consider the following questions which were used when framing your response in the proposal stage. Carefully consider whether your answers to any of these questions have changed since the proposal stage, and highlight where there have been changes. Note as with the proposal stage, those undertaking strategic research projects should adapt their answers to these questions.

- a) How will the knowledge (or recommendations or tools) produced by the project be used by those adopting?
- b) Who is the target audience for adoption/use of the project's outputs?
- c) What is the size of this target audience (e.g. in terms of number of growers, number of mills, quantity of production affected)?
- d) What is the likely maximum extent of adoption (e.g. expressed as a % of the target audience)?
- e) How many years might it take from the first year of research for outputs to be first adopted/used?
- f) How many years might it take from the first year of adoption to the maximum level of adoption assumed?
- g) How many years might it take from the time of adoption until the assumed benefit is experienced?
- h) What activities will need to occur for this adoption and benefits to occur within the expected timeframe (e.g. future R&D or commercialisation investment; please provide any indicative cost/timelines if appropriate)?
- i) What will be the nature of the benefit to those adopting, or to any secondary beneficiary (and who is that beneficiary if it is not the adopter)?

- j) What will be the unit change in cost or revenue (e.g. yield/ha; \$/t) that would be realised by the beneficiary (in quantifiable terms if possible, including how that number was quantified)?
- k) Will the benefits be confined to those adopting the output, or will the benefits flow to some other part of society as well?

Appendix 1 provides an example of how such questions might be answered.

Be sure to comment on environmental and social benefits, as well as economic benefits.

<u>Checklist for completing Milestone Report</u>		
Have you:		
• Identified the outputs that have been delivered	Yes	No
• Updated progress against your intended outcomes and benefits using questions (a) to (k)?	Yes	No
• Provided justifications for your answers to the questions?	Yes	No
• Identified any environmental and social benefits?	Yes	No
• Identified the risks associated with the project?	Yes	No
• Reported on progress with completing the performance evaluation tasks?	Yes	No

### **Workshop and Field Day Surveys**

If any workshops or field days are held with industry participants as part of the project, participants should undertake a brief written survey at the completion of the activity. This survey should at a minimum ask the following questions when appropriate:

1. How useful was the information in providing a stimulus for you to consider any management changes?
  - a. Not useful
  - b. Somewhat useful
  - c. Useful
  - d. Very useful
2. Are you likely to attend further training or seek additional information as a result of today?
  - a. Unlikely
  - b. Likely
  - c. Highly likely
3. On a scale of 1 to 10 estimate the probability that you will make management changes in future (with 1 being unlikely and 10 being very likely)?
4. What are the specific changes you plan to make?
5. If you are a grower, what is the average annual area of sugarcane you grow (in hectares)?

The survey should also ask permission to contact the participant in the future regarding their use of the information delivered at the workshop or field day. The project may be required to complete follow-up telephone or email surveys with participants at specific time intervals after the field day/workshop (e.g.

6 or 12 months). Questions that may be asked as part of these follow-up surveys are below. Note that the word *activity* in italics should be replaced by whatever is appropriate (e.g. workshop, forum, field day):

1. Before you attended this *activity*, why did you decide to attend? What were you looking for?
  - a. New management practices to improve what I am doing now
  - b. New tools to help with my farm management
  - c. Just interested
  - d. All of the above
  - e. None of the above (please identify actual reason)
  
2. Do you consider your needs were met by the *activity*? If no, why not?
  - a. Yes
  - b. To some extent
  - c. No
  
3. As a result of attending the *activity* what are your plans or intentions to manage an aspect of your business differently?
  - a. No plans to implement any change
  - b. Already implemented
  - c. Definitely implement in the next 6 months
  - d. Possibly implement in the next 12 months
  
4. As a result of attending the *activity*, have you undertaken any further training?

The survey could go on to ask questions about specific practices or reasons for and against implementing changes as appropriate.

### **Reviews**

Project reviews may be carried out by SRDC on ongoing projects for a range of reasons. The reviews may focus on a number of issues, but should always include an economic impact analysis. Any economic evaluation carried out as part of a project review should be consistent with the parameters used in other economic evaluations carried out by SRDC (e.g. with respect to discount rate, time period of benefits etc).

### **Final Reports**

The section titled **Expected Outcomes** is where the majority of information of value for evaluation purposes is found. When writing this section, the researcher should focus on revisiting the 'Outcomes, Benefits and Risk Assessment' sections in the Project Agreement and the 'Progress Towards Achieving Expected Outcomes and Benefits' section in the Milestone Reports. This section should report whether the expected outcomes and benefits have been reached. If they have not been reached, progress towards them should be outlined and reasons provided as to why they have not yet been reached, and whether, and when, they may be reached in the future.

When framing a response, consider the following questions which were used when framing the response in the proposal and milestone stages. Note as with the proposal and milestone stages, those undertaking strategic research projects should adapt their answers to these questions to reflect this.

- a) How will/is the knowledge (or recommendations or tools) produced by the project be/being used by those adopting?
- b) Who is the target audience for adoption/use of the project's outputs?
- c) What is the size of this target audience (e.g. in terms of number of growers, number of mills, quantity of production affected)?
- d) What is the likely maximum extent of adoption (e.g. expressed as a % of the target audience)?
- e) How many years might/did it take from the first year of research for outputs to be first adopted/used?
- f) How many years might it take from the first year of adoption to the maximum level of adoption assumed?
- g) How many years might/did it take from the time of adoption until the assumed benefit is experienced?
- h) What activities will need to occur for this adoption and benefits to occur within the expected timeframe (e.g. future R&D or commercialisation investment; please provide any indicative cost/timelines if appropriate)?
- i) What is/will be the nature of the benefit to those adopting, or to any secondary beneficiary (and who is that beneficiary if it is not the adopter)?
- j) What is/will be the unit change in cost or revenue (e.g. yield/ha; \$/t) that would be realised by the beneficiary (in quantifiable terms if possible, including how that number was quantified)
- k) Will the benefits be confined to those adopting the output, or will the benefits flow to some other part of society as well?

Appendix 1 provides an example of how such questions might be answered.

Be sure to comment on environmental and social benefits, as well as economic benefits.

When submitting the final report, researchers should also provide an addendum (not to be published) that identifies appropriate individuals/groups who could be initial points of contact for any later impact evaluation in a few years time. Such individuals or groups are those that have either been involved in the research (e.g. trialling outputs or tools), or are most likely to use the research output.

Researchers may also provide letters from such individuals or groups in support of how they or their organisation have benefitted (or will benefit) from the research.

#### Checklist for completing Final Report

Have you:

- |  |     |    |
|--|-----|----|
| • Identified the outputs that have been delivered  | Yes | No |
| • Updated progress against your intended outcomes and benefits using questions (a) to (k)? | Yes | No |
| • Provided justifications for your answers to the questions?                               | Yes | No |
| • Identified any environmental and social benefits?  | Yes | No |
| • Provided evidence of any potential environmental and social benefits?                    | Yes | No |
| • Identified the risks associated with delivering intended benefits?                       | Yes | No |
| • Reported on progress with completing the performance evaluation tasks?                   | Yes | No |

## **Post-project Stage**

### **Cost-Benefit Analyses**

As part of the evaluation program, SRDC will commission some cost-benefit analyses to be carried out. These CBAs will normally be carried out at a 'cluster' level rather than a 'project' level and carried out after the completion of the project, or in its final year. There will often be cooperation required from researchers in the form of answering questions, supplying some data, or reviewing drafts if their project is a significant component of the CBA. The collection of, and inclusion of appropriate monitoring and evaluation information in the proposal, milestone and final reports will ensure that contact with researchers following the completion of the project can be minimal.

If after the completion of an SRDC project the researchers become aware of any evidence of adoption or impact, they should forward this information through to SRDC so a record can be kept of such information and provided to anyone undertaking any future CBA or case study that involves the project.

If the research organisation or a funder other than SRDC requires a CBA to be undertaken, it would be helpful to consult with SRDC before undertaking the CBA in order to check on compatibility of base assumptions (e.g. discount rate and number of years of benefits to be considered). The basic approach to CBA used by SRDC is described earlier in 'Framework, Definitions and Evaluation Methods' and is consistent with the CRRDC guidelines.

If required, a template for completing a CBA report can be obtained from SRDC.

### **Case Studies**

SRDC may prepare and publish case studies (at the farm or factory level) of successful examples of technology adoption including a demonstration of how the entity has benefited. The benefits may be in the form of economic, environmental or social benefits. Where the benefits are economic in nature, the case studies may be supported by a financial analysis. SRDC would be responsible for preparing the case studies, with assistance from researchers. The data used in the case studies can be used to support assumptions in any ex-post CBA as well as material that can be used in communication and extension activities. Case studies could apply to individual technologies or to adoption of a wide range of changes/practices in a particular area.

## 4. Information Relating to Project Cycle Evaluation

The purpose of this section is to provide some additional information to SRDC that expands on the information presented for researchers with respect to providing information on outputs, outcomes and benefits in the project cycle.

### Scoping/Funding Stage

#### Expression of Interest

When assessing the expressions of interest, consider how well the recommended questions have been answered with respect to impact.

If any return on investment (ROI) estimate is provided, and the project is funded, ask the researcher to provide any supporting material developed in producing the ROI and keep it on file.

As currently takes place, ensure that all records from assessing the expressions of interest (e.g. attractiveness/feasibility scores) are maintained. Such scores can be used in the future for three purposes. Firstly, the scoring can be used to demonstrate the use of processes that ensure that the project with the greatest impact and chances of success are rigorously selected (for management purposes and hence outside the context of impact evaluation). Secondly, the scoring can be used in a historical context to compare the initial assessment of the project's likely performance against the actual performance and impacts after the project is funded and completed. This can then be used for continuous improvement with respect to the project selection processes. Thirdly, with respect to monitoring and evaluation, the retention of this information can be used to report on marginality through an analysis of whether the actual performance of the marginal projects selected is high, adequate, or whether they should not have been funded (underperforming).

#### Interview after Short-listing

Further information on the potential impacts of the proposed investments can be elicited from the proposers through directed questioning at the interview with respect to potential impact. Questions could specifically be targeted at breaking down any assumptions made to calculate the return on investment if one was provided in the Expression of Interest. An additional area of information that could be sought relates to the likely scenario if the project is not funded, as well as what work is going on in the same field of research. It is likely that any significant information elicited in this interview would be incorporated into the long proposal (project agreement) and recorded in that location. If any further attractiveness/feasibility scoring and deliberations occur at this stage, records should be once again maintained to assist with assessing marginality at a later date.

#### Proposal

The sections to which changes are recommended in the Project Agreement include Outputs and Outcomes; Benefits; Risk Assessment and Evaluation. Guidelines as to how researchers should respond to these sections are provided in Section 3.

It is also recommended that the order in which the sections are presented is changed to an order more in line with the 'logical framework'. The recommended order for the sections is:

- Title of Project, Start and End date, etc

- Objectives
- Research Classification
- Issue and R&D Approach
- Background
- Research Plan (including Communication and Implementation Strategies)
- Outputs and Outcomes
- Benefits
- Risk Assessment
- Evaluation
- Intellectual Property and Restriction
- Researchers
- Other SRDC-Funded Costs
- Budget
- Budget Justification
- Milestones

The recommended changes to the sections are as follows

- Outputs and outcomes to be renamed as outputs, outcomes and benefits
- The existing Benefits section can remain as is, however it may need to be renamed ‘Benefit Types’ so as to avoid confusion with the new Benefits section described above.
- It is recommended that the Risk Assessment should be broken up into three sub-sections.
  - a) Risk of intended outputs being achieved
  - b) Risk of intended outcomes being achieved (i.e. including adoption)
  - c) Other risks associated with the project (e.g. causing environmental harm, risk of losing personnel)
- It is also a possibility that this Risk Assessment be presented as a table, with the rows representing the three questions, and the columns having headings such as: Description of risk, Risk management/mitigation strategy, and a probability estimate of the risk eventuating (expressed as a percentage).

Apart from those changes mentioned above, there may in the future be the need to include a strategic/applied categorisation in the Research Classification section. The definitions of this type of research were supplied in Section 1. This information is important when considering the distribution of research types across the SRDC portfolio to ensure there is an appropriate balance of strategic and applied research being funded by SRDC.

There is the opportunity to build into the Project Agreement any specific data or information collection activities that should be undertaken throughout the life of the project in order to assist with monitoring and evaluating the project. This could include, but not be limited to, exit surveys for any workshop/field days, carrying out a baseline survey etc. The need for such activities could be established on a case by case basis.

### **Ex-ante cost-benefit analysis**

There is the potential to carry out ex-ante cost-benefit analyses on some investments. The different purposes for which these could be carried out include:

- As part of the funding decision when there are difficulties making a decision between a small number of projects. The purpose of such an analysis would be to tease out the logical



framework of the projects and gain an understanding of the risks and potential magnitude of benefits.

- For very large investments, in order to
  - ensure there was a complete and more detailed understanding by decision makers of the program logic associated with the project, and the linkages between the research, outputs, outcomes and benefits,
  - identify potential risks in achieving the planned impact, and
  - identify important data requirements for the purposes of any ex-post CBA after the completion of the project.

For those very large investments, the ex-ante CBA may be built into a scoping stage with a go/no-go point.

Any ex-ante CBAs undertaken by SRDC or researchers should follow the guidelines of the CRRDC <http://www.ruralrdc.com.au/Page/Evaluation+/Methodology.aspx>. A discount rate of 5% should be used.

A template for laying out a CBA report is provided in Appendix 2.

### **Researcher Evaluation Workshops**

Workshops could be used at the contracting stage with successful researchers in order to communicate evaluation requirements clearly so the impact assessment context is understood; if this proceeded it would be important that the information would not be seen as possibly holding them to account but that they understood they were helping SRDC to facilitate and strengthen its impact assessment process.

## **Implementation/Reporting Stage**

### **Milestone reports**

Ensure that researchers are responding appropriately to the section on progress against outcomes and benefits, and are answering the provided sub-questions with respect to each of the major intended outcomes and benefits (including environmental and social benefits). The questions are:

- a) How will the knowledge (or recommendations or tools) produced by the project be used by those adopting?
- b) Who is the target audience for adoption/use of the project's outputs?
- c) What is the size of this target audience (e.g. in terms of number of growers, number of mills, quantity of production affected)?
- d) What is the likely maximum extent of adoption (e.g. expressed as a % of the target audience)?
- e) How many years might it take from the first year of research for outputs to be first adopted/used?
- f) How many years might it take from the first year of adoption to the maximum level of adoption assumed?
- g) How many years might it take from the time of adoption until the assumed benefit is experienced?
- h) What activities will need to occur for this adoption and benefits to occur within the expected timeframe (e.g. future R&D or commercialisation investment; please provide any indicative cost/timelines if appropriate)?

- i) What will be the nature of the benefit to those adopting, or to any secondary beneficiary (and who is that beneficiary if it is not the adopter)?
- j) What will be the unit change in cost or revenue (e.g. yield/ha; \$/t) that would be realised by the beneficiary (in quantifiable terms if possible, including how that number was quantified)
- k) Will the benefits be confined to those adopting the output, or will the benefits flow to some other part of society as well?

Ensure that researchers are carrying out any data collection and surveys agreed upon in the research agreements.

### **Workshop and Field Day Surveys**

If researchers hold any workshops or field days with industry participants as part of their project, they should have participants undertake a brief written survey at the completion of the activity. This survey should at a minimum ask the following questions where appropriate:

1. How useful was the information in providing a stimulus for you to consider any management changes?
  - a. Not useful
  - b. Somewhat useful
  - c. Useful
  - d. Very useful
2. Are you likely to attend further training or seek additional information as a result of today?
  - a. Unlikely
  - b. Likely
  - c. Highly likely
3. On a scale of 1 to 10 estimate the probability that you will make management changes in future (with 1 being unlikely and 10 being very likely)?
4. What are the specific changes you plan to make?
5. If you are a grower, what is the average annual area of sugarcane you grow (in hectares)?

The survey should also ask permission to contact the participant in the future regarding their use of the information delivered at the workshop or field day. The project may be required to complete follow-up telephone or email surveys with participants at specific time intervals after the field day/workshop (e.g. 6 or 12 months). Questions that may be asked as part of these follow-up surveys are below. Note that the word *activity* in italics should be replaced by whatever is appropriate (e.g. workshop, forum, field day):

1. Before you attended this *activity*, why did you decide to attend? What were you looking for?
  - a. New management practices to improve what I am doing now
  - b. New tools to help with my farm management
  - c. Just interested
  - d. All of the above
  - e. None of the above (please identify actual reason)

2. Do you consider your needs were met by the *activity*? If no, why not
  - a. Yes
  - b. To some extent
  - c. No
  
3. As a result of attending the *activity* what are your plans or intentions to manage an aspect of your business differently?
  - a. No plans to implement any change
  - b. Already implemented
  - c. Definitely implement in the next 6 months
  - d. Possibly implement in the next 12 months
  
4. As a result of attending the *activity*, have you undertaken any further training?

The survey could go on to ask questions about specific practices or reasons for and against implementing changes as appropriate.

SRDC should also undertake such surveys when they are involved in holding workshops or field days not tied to a specific project.

### **Reviews**

SRDC would reserve the right to implement a formal process of subjecting a number of projects to review each year. The projects to be reviewed could be selected by some criteria, or could be randomly selected. A CBA consistent with the guidelines used for the CRRDC process should form a part of each review.

### **Final Reports**

As with the milestone reports, ensure that the section reporting on outcomes has been completed appropriately, and that the sub-questions with respect to each of the major intended outcomes and benefits (including environmental and social benefits) have been answered. The questions are:

- a) How will the knowledge (or recommendations or tools) produced by the project be used by those adopting?
- b) Who is the target audience for adoption/use of the project's outputs?
- c) What is the size of this target audience (e.g. in terms of number of growers, number of mills, quantity of production affected)?
- d) What is the likely maximum extent of adoption (e.g. expressed as a % of the target audience)?
- e) How many years might it take from the first year of research for outputs to be first adopted/used?
- f) How many years might it take from the first year of adoption to the maximum level of adoption assumed?
- g) How many years might it take from the time of adoption until the assumed benefit is experienced?
- h) What activities will need to occur for this adoption and benefits to occur within the expected timeframe (e.g. future R&D or commercialisation investment; please provide any indicative cost/timelines if appropriate)?
- i) What will be the nature of the benefit to those adopting, or to any secondary beneficiary (and who is that beneficiary if it is not the adopter)?

- j) What will be the unit change in cost or revenue (e.g. yield/ha; \$/t) that would be realised by the beneficiary (in quantifiable terms if possible, including how that number was quantified)
- k) Will the benefits be confined to those adopting the output, or will the benefits flow to some other part of society as well?

Ensure that researchers have carried out any data collection and surveys agreed upon in the research agreements.

Where appropriate, have researchers provide beneficiary statements assessing qualitatively the contribution and likely impact of the project. Such statements would accompany final reports and be required before the last financial payment is made.

Ensure final reports contain information on organisations and personnel (not just researchers, but also industry personnel) who could be contacted a few years after completion of the project as a starting point for updating information on outcomes and benefits.

## **Post project stage**

### **Cost-benefit analyses of clusters**

A cost benefit analysis (CBA) activity is currently required under the agreed process of the Council of Rural Research and Development Corporations (CRRDC). The process for clustering a Corporation's portfolio, for randomly selecting clusters for analysis, and the guidelines for carrying out the actual analyses are contained in the report linked to the webpage of the CRRDC (<http://www.ruralrdc.com.au/Page/Evaluation+/Methodology.aspx>). In summary, the process includes clustering the portfolio of projects completed in a given period by common outcomes, and then randomly selecting a number of these clusters for analysis each year, until over a three year period a statistically significant sample of cluster evaluations (CBAs) has been carried out. RDCs have been asked to submit their clusters in order that a random selection can take place for clusters to be analysed in the 2010/11 financial year. As noted earlier, there is the opportunity for SRDC's clusters to be reshaped at this stage to better align with reporting against the R&D plan.

The CBAs should be carried out in a manner that is consistent with the CRRDC guidelines document (e.g. 5% real discount rate etc). Explanations and definitions of key processes and terms associated with CBA are provided in Section 1.

It should be ensured that cluster CBA evaluations include the identification, categorisation, and frequency of occurrence of environmental and social benefits, even if such benefits are not valued. A table useful for categorising benefits in a triple bottom line context, as well as identifying key beneficiaries (e.g. public versus private) is provided below. Ensure that when cluster CBA evaluations are claiming an environmental or social impact in the final report, that the claim is supported by evidence of causal linkages.

Table 2: Categories of Benefits from the Investment

Levy Paying Industry (Sugar)	Spillovers	
	Other Industries (primary and other industries)	Public
<u>Economic Benefits</u>		
•	•	•
<u>Environmental Benefits</u>		
•	•	•
<u>Social Benefits</u>		
•	•	•

SRDC is currently continuing to use the cluster definitions used over the past three years, and just update the projects included in each cluster to reflect an updated time period. In the future, an option that could be considered and that could lead to improved information for annual reporting and for the subsequent review of the current Five Year Plan in 2012 would be to modify the existing clusters to align with the existing Arenas and the seven 'Sub-arenas'. An initial scoping of these clusters with regard to common outcomes suggests that some of the Sub-arenas would need to be subdivided into the areas of 'Key deliverables' in order to maintain reasonably homogenous outcomes. This would mean the number of clusters would lie within the range of 7 to 26. The final cluster numbers would depend also on the number of completed projects within each potential cluster.

A template for laying out a CBA report is provided in Appendix 2.

### Case Studies

SRDC may prepare and publish case studies (at the farm, factory or regional level) of successful examples of technology or policy adoption, including a demonstration of how the industry (or the community) has benefited. The benefits may be in the form of economic, environmental or social benefits. Where the benefits are economic in nature, the case studies may be supported by a financial analysis. The data used in the case studies can be used to support assumptions in any ex-post cluster CBA as well as material that can be used in communication and extension activities. Case studies could apply to individual technologies or to adoption of a wide range of changes/practices emanating from a number of different R&D investments.

Examples of the types of information that should be sought when preparing the case studies in order to ensure information on attribution to SRDC and impact is gathered include:

- Farm size and basic information about the enterprise (who is involved, anything other than sugarcane grown etc)
- Involvement in SRDC activities (e.g. specific projects, workshops, other educational groups)
- Types of technology taken up, and when taken up
- What stimulated interest and adoption?
- Were any other technologies required before you could adopt, or any modifications required to the farm, any outside help with adoption etc?
- Subjective assessment of benefits (anecdotal, informal)

- Any objective assessment of benefits (actual data on changes in costs/productivity/income etc)
- Would you do anything differently next time, any risks that need mitigating etc?
- Any unintended consequences?
- Any other technologies taken up as a consequence?
- Any friends/neighbours taking up the technology?
- What needs to be done in the future (by the farm, mill, industry or research)?

The case studies could be used to facilitate an SRDC concept of an annually updated SRDC top 10 investments list. The top 10 investments need not change every year but at any point in time SRDC would be able to communicate SRDC's 10 most significant achievements since inception by reading this list.

## 5. Activities for SRDC Outside of the Project Cycle

### Organise evaluation material for Annual Report

- Information from a number of the activities already identified will need to be incorporated into the Annual Report including common outcomes, reporting against priorities, CBA results, survey data etc.
- Maintain classifications against National and Rural R&D Priorities as is currently presented. However, in addition, reintroduce the categorisation by research type of all projects to allow trends over time to be illustrated. The proportion of strategic research can be a factor that may influence the extent of market failure in industry R&D funding. While strategic projects are more likely to fall into the Emerging Technologies/People Development Arenas, and applied projects in the Regional Futures Arena, this may not always be the case. The four categories as defined by ABS and presented in Section 1 are:
  - Applied Research: Original work undertaken primarily to acquire new knowledge with a specific application in view. It is undertaken either to determine possible uses for the findings of basic research or to determine new ways of achieving some specific and predetermined objectives (ABS website).
  - Experimental Development: Systematic work, using existing knowledge gained from research or practical experience, which is directed to producing new materials, products, devices, policies, behaviours or outlooks; to installing new processes, systems and services; or to improving substantially those already produced or installed (ABS website).
  - Pure basic research: Experimental and theoretical work undertaken to acquire new knowledge without looking for long term benefits other than the advancement of knowledge (ABS website).
  - Strategic basic research: Experimental and theoretical work undertaken to acquire new knowledge in specified broad areas in the expectation of practical discoveries. It provides the broad base of knowledge necessary for the solution of recognised practical problems (ABS website).

### Carry out review of R&D Plan

- In the final year of each five year R&D Plan, SRDC should carry out a review of the Corporation's achievements and performance against that Plan. The content of the review would be largely serviced by the data collection and collation activities recommended elsewhere in this report. Much of this material will have been reported in each Annual Report. This includes the summary of outcomes by Key Deliverable and Arena, reporting against the National and Rural R&D Priorities, and reporting progress in delivering environmental and social outcomes specifically.

### Provide report on environmental and social outcomes

- SRDC to maintain a watch on the CRRDC's progress on developing an approach to reporting environmental and social outcomes. If an approach is finalised in the future, consideration should be given to altering proposal and reporting forms as appropriate to ensure that information provided by researchers would be consistent with any final approach.
- SRDC staff to become familiar with information on land management practices in the Great Barrier Reef Catchments as being monitored by ABS and maintain a watching brief to assess if improvements or additional data should be requested (and possibly paid for). A watching brief on any other relevant data collection and reporting activities that arise should also be maintained (e.g. soil and water data from the Burdekin region)

**Provide information or report according to the Rural R&D Council requirements**

- Maintain a watching brief on any reporting requirements for the Council after their evaluation framework is developed.

**Provide information or report to National Sugar RD&E Framework**

- Maintain a watching brief on any reporting requirements against the framework after its development.

**Communications**

- Communication documents should where possible, take advantage of reporting information on expected outcomes in the form of both the potential benefit to the individual adopter of a project output, but also the industry outcome via the existing and likely future adoption. Case studies, cost-benefit analyses and results of surveys are all useful in this regard. The SRDC newsletter could also be used to survey industry members from time-to-time.



## 6. Information Relating to a Possible Data Compendium for the Sugarcane Industry

### External Sources of Data

Various external sources of sugarcane industry data can contribute to assessments of impacts of SRDC investments as well as being useful in planning future investment and R&D priority setting. The following sections provide a brief description of some of the sources identified. The purpose of describing these sources is to demonstrate the wide set of data required in assessing impacts, identifying weaknesses in available data and suggesting where SRDC may make further contributions for data improvement. The following is not intended to be a comprehensive review but merely to illustrate the availability of external and consistent data sets over time.

#### Australian Bureau of Statistics (ABS)

ABS conducts an agricultural census every five years. The last census was carried out in 2006. There are annual sample surveys carried out in inter-censal years. The frame population is all establishments with an Estimated Value of Agricultural Operations (EVAO) of \$5,000 or more. Data are available at Statistical Division (SD) and Statistical Local Area (SLA) levels. With respect to the sugarcane industry, the data intended to be collected in the 2010/11 census includes:

- Sugarcane - cut for crushing during 2010 season - area (ha)
- Sugarcane - cut for crushing during 2010 season - production (t)
- Sugarcane - cut for plants during 2010 season - area (ha)
- Sugarcane - cut for plants during 2010 season - production (t)
- Sugarcane - standover from 2010 season - area (ha)
- Sugarcane - newly planted in 2010 for harvest in a following season - area (ha)

The data also provides information on a number of other issues, and in the past the census has included questions on irrigation, fertiliser usage, soil conditioners, fallow land, land preparation, fencing, tree plantings and salinity. This data is not cross-referenced to industry however, and is only provided by SD and SLA. Some industries pay for supplementary collections to be run in conjunction with the agricultural census.

ABS is also a source of information on demographic, employment and other socio-economic data by SD and SLA, and could be of use for identifying socio-economic status of particular sugarcane regions.

ABS has carried out a survey of Land Management Practices in Great Barrier Reef Catchments, and the report on this survey was published in December 2009. The primary purpose of this survey was to provide benchmark data on a range of land management practices for each catchment. The practices surveyed included:

- the area of land used mainly for agricultural production
- the land area over which herbicides were used
- tonnes of fertiliser applied
- the percentage of the catchment where at least 40% groundcover in riparian areas has been maintained.

In most cases this data is provided for the catchment as a whole; however there are instances where examples of results for the sugarcane industry specifically are provided. This information is one

component in the evidence framework that will be used to assess progress towards long-term improvement in reef condition. It complements other information on land management practices collected from industry, research organisations and regional bodies, along with bio-physical data on water quality. The survey is likely to be repeated at some time in the future, to allow the measurement of changes in management practices over time.

#### **Australian Bureau of Agricultural and Resource Economics (ABARE)**

ABARE carry out farm surveys of the sugarcane industry. The latest report identified is entitled "Financial performance of Australian sugar cane producers, 2005-06 to 2007-08". The report contains information on such variables as farm areas, production, cash receipts, cash costs, prices received, and gross margins. Some information is represented by farm size classes and by region of production. Some farm practice data is also reported.

#### **CANEGROWERS**

The Annual Report of CANEGROWERS reports statistics as a guide to show how the sugarcane industry is performing in the existing social, environmental and economic climate. Statistics by year and by mill area available include production (tonnes of sugarcane, tonnes of sugar, CCS, area harvested) as well as industry prices realised and world sugar production and consumption figures. CANEGROWERS also produce public environment reports incorporating SmartCane, best management practices (BMP) and uptake statistics of BMPs by the industry (a kind of scorecard approach).

#### **Australian Cane Farmers Association (ACFA)**

<http://www.acfa.com.au/>

Only general information on sugarcane farming is available from the Association.

#### **Australian Sugar Milling Council**

<http://www.asmc.com.au/content/>

Only general information on the sugarcane milling industry is available from the milling industry website. Presumably other data are available through the members log in facility.

#### **BSES Limited**

BSES supports QCANESelect™ which is a database that contains all variety information and allows production and productivity reporting by regions. While this can currently be accessed without a registration charge, a new proposal will come into effect soon that data extracted from QCANESelect™ cannot be used for commercial purposes. CANEGROWERS now publishes some of the mill area data that BSES previously reported. The Annual Report of BSES contains no relevant information for evaluation purposes.

#### **CSIRO/Universities**

Key research providers such as CSIRO and universities do not hold any industry data sets that are available publicly. It is likely however that there are individual models and data sets used within individual projects that could be of value to SRDC for evaluation and priority setting purposes. These could include the models developed as part of the value chain work with respect to harvest and transport integration.

These research providers may also hold natural resource management data for Queensland catchments that is not specific to the sugarcane industry, but that could still be of value (e.g. water quality, soil quality etc).

### **Queensland Department of Employment, Economic Development and Innovation (DEEDI)**

DEEDI is the government department in Queensland responsible for primary industries, and therefore the sugarcane industry. Information on the industry readily available from DEEDI includes:

- The Farm Economic Analysis Tool (FEAT) which is a CD available free of charge to sugarcane growers that was developed to help growers assess the profitability of changes to their farming system. It is a spreadsheet designed specifically for the sugarcane industry. It is simple to use and does not rely on extensive financial records.
- DEEDI produces a 'Prospects' report for primary industries. The report provides gross value of production forecasts for each of Queensland's major primary industry commodities (including sugar), as well as forecasts for first-round processing activities. The main edition of 'Prospects' contains initial forecasts for the financial year and is published in September. These forecasts are then updated during the year. Changes to the initial forecasts are reported in the subsequent December and March editions of 'Prospects update', with the final forecasts for the financial year provided in the June edition.

There is other general information (but no statistical data) provided on a range of issues relevant to the sugarcane industry including land, water and biodiversity issues.

### **NSW Industry and Investment (Primary industries)**

There are no statistical data sources provided regarding sugarcane. Most information provided by the Department is associated with soil management (particularly acid sulphate soils, salinity, and biochar), weeds and feeding sugarcane products to livestock.

### **Individual milling companies**

The websites of individual milling companies report limited industry data. Some have an overview of the average capacity of their mills, and normally also provide a history of the mill and the milling region, but with little data.

Some milling companies do provide their annual reports on the website, and these do have some data on the specific mill regions. For example, the Annual Reports for Mackay Sugar Cooperative Association Limited report five years of data for Operating Revenue, Operating Profit, Cane processed (tonnes), Sugar produced (tonnes) and Sugar price (\$/tonne). The Proserpine Cooperative Sugar Milling Association provides weekly reports during the crushing season on the tonnes harvested by variety and reports the average CCS for each variety. Weekly information on the sugar price is also reported. The Maryborough and Mulgrave Sugar Mills report detailed statistics of cane harvested and average CCS over time for the mill area. Tully Sugar reports a variety of average production statistics. The NSW Sugar Milling Cooperative reports crushing statistics each week during the crushing season, however the current week is the only data shown and no archive over the whole season seems available.

### **Queensland Sugar Limited (QSL)**

<http://www.queenslandsugar.com/>

Apart from future prices for the current year and four years ahead, little price and volume data for sugar sale is available publicly from QSL. Presumably other data are available through the supplier customers' log-in facility.

## **The Australian Sugar Year Book**

The Australian Sugar Year Book has extensive historical data for the sugarcane industry and is published annually in hard copy by Rural Press.

## **Special SRDC data collection and analysis initiatives**

After a project is completed, there is no process for ongoing collection of more data and information, despite the fact that this is when most adoption and change will occur as a result of the project investment. Such information currently is often only compiled as part of impact analyses undertaken as part of the RDC Council initiative (e.g. adoption of new soybean varieties in the current evaluation set).

Some consideration could be given to developing industry-wide information that is related to specific sets of projects. A useful example of this would be the use of rotation crops (particularly soybean) by the industry. In the recent impact analysis for the rotation crops cluster, information on regional areas, varieties grown, crop purpose (green manure versus grain crops and markets for grain crops) was required but little data was available. It could not be expected that principal investigators of projects could assemble all of the data required as some projects were regional/variety specific. However, specific monitoring of such useful data that serviced a common set of projected outcomes could be considered and this possibility is addressed in the activities described in the next two paragraphs.

SRDC initiatives could be undertaken for assembling data outside the project cycle and in addition to existing external data sources. These could be special projects that build and extend the external sources of data already discussed. For example, ABARE survey data could no doubt be strengthened by paying for the insertion of additional questions in the farm survey or convincing ABS to change data collections or paying for surveys on specific topics that were considered of interest.

Alternatively, such initiatives could be completely new targeting specific needs as outlined in the previous example identified concerning rotation crops. Industry surveys targeting specific issues or regions could be undertaken in conjunction with other research funders/providers and with industry groups such as CANEGROWERS, ACFA and ASMC.

Other smaller pieces of data collection could be undertaken to service individual projects, or groups of projects. Examples include exit surveys for workshops and field days, baseline practice surveys etc.

Another potential activity would be to compile a data compendium for the sugarcane industry with effort focused on data that is commonly used in evaluation.

Any initiative that assembled industry data could be assembled by the industry itself (e.g. Canegrowers), but is likely to be relevant also to evaluation of R&D. Canegrowers already produce public environment reports, best management practices and uptake statistics of best management practices (BMPs) used by the industry. Assembling evidence to link changes in BMPs and uptake of BMPs to SRDC investments is an important challenge to evaluation.

## **Summary of recommendations with respect to industry data**

1. SRDC staff could become familiar with ABS statistics and ABARE farm surveys relevant to the sugarcane industry, and maintain a watching brief to assess if improvements or additional data should be requested (and presumably paid for).

2. Consider special surveys to compile information on farm practices for contemporary technologies along selected parts of the sugarcane value chain. Such an initiative would need to be integrated with the needs of CANEGROWERS.
3. Consider partnering with other research funders/providers or industry organisations in order to fund industry surveys if required.
4. Develop a data compendium (that is a listing of data sources; not an actual database) of industry socioeconomic data to assist with evaluation of R&D. Such industry socioeconomic data can be useful not only in project evaluation, but also useful for researchers in carrying out ex-ante evaluations that may be included in proposals, useful in understanding industry performance, ascertaining productivity changes, productivity reporting and interpreting the value of R&D as a driver of industry performance.
5. The data compendium would identify each major source of sugarcane industry data, and list the metadata for the data that is available from that source. It would then have an index by 'area of interest' (e.g. harvesting, production etc) to direct the reader to the appropriate sources of data.
6. The compendium could have several categorisations, for example:
  - a. Along the value chain – production, harvesting, processing and marketing
  - b. Environmental and social data (contextual, management practices, resource condition)
  - c. Factory and regional data
  - d. Time series data (asking a standard set of questions across regular timeframes to assess trends)
7. The compendium could be updated every two years or so, for example, and only reputable data sources would be used. A decision would need to be made as to how widely it was distributed (SRDC use only, or to include industry, researchers etc).
8. Industry models that have previously been developed by a range of researchers and organisations might be useful as sources of data for evaluation, as well as producing evaluation results in some circumstances. SRDC could assess the industry models that have been developed under various projects (e.g. harvesting and transport optimisation) to assess their underlying data content, and their suitability, availability and accessibility for purposes of evaluation of other investments.
9. A list of key data types envisaged for the compendium may look like the following:
  - Sugarcane areas harvested by year by region and by mill area
  - Sugarcane production by year by region and by mill area
  - Sugarcane yields by year by region and by mill area
  - Sugar content of cane by year by region and by mill area
  - Value of sugar (gross return to mills)
  - Cost of sugar transport to port
  - Cost of sugarcane milling
  - Cost of sugarcane transport to mill
  - Cost of harvesting

- Cost of growing sugarcane
- Grower demographics (location, size, business structure, farm products e.g. sugarcane only or cane/beef, age, education level, etc)
- Information on electricity generation, mulch, ethanol and molasses might also feature in the compendium.

## Appendix 1: Examples of logical framework and how to answer outcomes/benefits questions

An example of an SRDC project taken through these questions, and through the definition of outputs, outcomes and benefits is provided. The project is:

BSS261 Measurement and feedback systems for improving market signals for harvesting (2003 to 2005)

The **objectives** were:

- To improve understanding of market signals and facilitate changes in industry performance through:
  - Determining the critical success factors for valuing harvesting services using three locations, Burdekin, Mackay and Maryborough as models.
  - Determining and evaluating payment systems that address these critical success factors and maximise industry returns.
  - Facilitating the adoption of payment systems that encourage best practice and maximise returns to all parties.
  - Evaluating changes in practices resulting from the adoption of arrangements incorporating improved market signals.
  - Identifying pathways to adopt new payment methods beyond the pilot areas to other industry locations.

The **outputs** were:

- A number of harvesting groups (three at Maryborough, five at Mackay and four from Burdekin) were given assistance to develop and trial new payment systems.
- A large amount of data and information was collected through surveys, focus groups, logbooks, recording equipment on harvesters and Near Infra Red (NIR) technology located at the mills. This information was sought to assist with understanding what currently influences harvesting efficiency.
- Six alternative cane harvesting payment systems were evaluated and modified to ensure they promoted equitable, simple and effective measures to increase returns across the value chain. The payment systems were introduced to additional innovative groups in years 2 and 3 of the project for further development, implementation and review.
- The final report included results and learnings from the participative groups and pilot evaluations, and made recommendations for suggested pathways of adoption.
- The study concluded that the payment methods that provide the best market signals are those based on an hourly rate, and that the methods most likely to be adopted in the short term are those based on base rate plus fuel (BR+F).
- The study found that the new payment systems should be successful in changing attitudes and accelerating the adoption of Harvesting Best Practice (HBP).
- The study demonstrated the value of using NIR technology for cane quality aspects.

The **outcomes** were:

- In 2005, the Maryborough groups had stayed with their 'plus fuel' system and one of the Mackay groups had moved to a 'plus fuel' system. Two of the Mackay groups had stayed with a flat rate, but varied the rate between farms or varied the rate for long hauls (which sends market signals).
- There was anecdotal evidence from harvester operators throughout Queensland that there was a perceived need to change harvesting payment to more accurately reflect the true costs.

- The adoption of alternative payment systems was expected to vary considerably across regions and be influenced by a number of factors including awareness of harvesting best practice (HBP).
- At July 2010, the payment system virtually across the whole industry has changed to base rate +fuel.

The **benefits** were:

- The major benefit of alternative harvesting payment systems is improved market signals to adopt HBP.
- In turn HBP has a number of benefits including:
  - less extraneous matter, resulting in improved sugar quality, less sucrose lost and reduced cost to mills caused by dirt;
  - reduced overall harvesting costs for industry due to improved planting designs/layouts; and
  - reduced cane loss and therefore increased sugar production, through optimal extractor speeds and pour rates.
- It has previously been estimated that adopting HBP can collectively provide an extra \$50 -\$100/ha or more to the industry (net combination of all three benefits above) (estimate as at June 2010).

The questions aimed at eliciting details on **potential outcomes and benefits** in the various expression of interest, proposal, and reporting stages may have been answered in the following way:

- a) How will the knowledge (or recommendations or tools) produced by the project be used by those adopting?
  - The recommendations will be considered by mill regions when developing harvesting payment systems
- b) Who is the target audience for adoption/use of the project's outputs?
  - Mill regions initially in the Mackay and Maryborough regions, with potential for adoption by all mill regions.
- c) What is the size of this target audience (e.g. in terms of number of growers, number of mills, quantity of production affected)?
  - The five year average area of cane harvested in Queensland until June 2008 was 372,002 ha (Canegrowers Annual Reports 2006 to 2009; note data is also available by mill region and could be supplied for Mackay and Maryborough only)
- d) What is the likely maximum extent of adoption (e.g. expressed as a % of the target audience)?
  - It is anticipated that 12.5% of the total cane area in Queensland will adopt HBP (but not all of this adoption will be attributable to this project).
- e) How many years might it take from the first year of research for outputs to be first adopted/used?
  - Adopted during final year of project by initial mill regions involved in project
- f) How many years might it take from the first year of adoption to the maximum level of adoption assumed?
  - 10 years until the 12.5% adoption is reached
- g) How many years might it take from the time of adoption until the assumed benefit is experienced?
  - 1 to 2 years (from the time of adoption until cost reductions and yield benefits are actually experienced)
- h) What activities will need to occur for this adoption and benefits to occur within the expected timeframe?
  - The mill region will need to negotiate and agree on an appropriate payment system that is efficient and provides appropriate market signals. There is no further R&D required.



- i) What will be the nature of the benefit to those adopting, or to any secondary beneficiary?
  - There will be appropriate market signals to growers and harvesters that will lead to the adoption of harvesting best practice, and subsequent reductions in costs, reductions in cane loss and improvements in sugar quality. The adopters of any changes to the payment system will be the mill region as a whole, and the adopters of harvesting best practice will be the farmers and the harvesters. The beneficiaries will largely be the farmers and harvesters.
- j) What will be the unit change in cost or revenue (e.g. yield/ha; \$/t) that would be realised by the beneficiary (in quantifiable terms if possible, including how that number was quantified)
  - The benefit has been estimated at between \$50 and \$150/ha from a combination of these benefits (*it is recognised providing such a dollar figure is not always possible however if an attempt is made the figure should be justified in some way, perhaps by presenting it is a % of the current baseline cost etc*)
- k) Will the benefits be confined to those adopting the output, or will the benefits flow to some other part of society as well?
  - The benefits will flow to growers in the mill regions that adopt the changed payment system

The research proposal (Section 3) also calls for information on the baseline situation of the issue being addressed by the proposed research (baseline evaluation). Examples for how such questions could be answered for the above example are provided below.

- What is the current status of this issue in the industry, with respect to current practices or policies used by the target audience?
  - Current payment systems should be briefly described, and any regions already on the way to changing such systems should be identified. In addition, if an increase in adoption of harvesting best practice is identified as a significant outcome, then any available information on the existing adoption rate of a number of these key practices should be provided if available. If such information is not available, this should be indicated and any plans for obtaining or monitoring adoption of such practices should be identified (by yourself or others).
- If your proposal is seeking to reduce costs in the industry, or improve productivity, what are the current average costs in the process used in the target market you are addressing? (e.g. harvesting costs, \$/ha; milling costs (\$/tonne).
  - Information should be sought and provided on existing payment systems in the target regions, and on existing average harvesting costs in selected target regions. If such information does not exist at the proposal stage, any plans to acquire such information during the life of the project should be indicated.
- What is the size or magnitude of the target market if available (e.g. tonnes or hectares in regions or production systems (or soil types etc) to which the research outputs will apply)?
  - Basic data on the number of hectares and tonnes of cane harvested per annum in key target regions should be identified and provided. If the adoption of the changed cane payment system, or changes to harvesting practices, will be limited to certain enterprise types (e.g. harvesting cooperatives; soil types etc) then the hectares/tonnes that are applicable should also be identified.
- What are the current trends regarding change in the activities/processes that may benefit from the research? (e.g. external factors such as policy changes, competing technologies, prices of inputs etc)

- Identify whether there are any policies or regulations in place that will impede the adoption of a new payment system, or changed harvesting practices. Identify whether there are any other projects/programs aimed at changing payment practices already underway. Also identify other ongoing activities that are also seeking to increase the adoption of harvesting best practice.

Remember to consider the planned environmental and social benefits when considering the baseline evaluation, not just the economic benefits.

## Appendix 2: Template for cost-benefit analyses for SRDC

The following shows the sections, tables and layout that should be used when completing cost-benefit analyses for SRDC. The CRRDC guidelines for economic evaluation should also be consulted when undertaking any cost-benefit analyses for SRDC.

The following template could be used for both ex-post analyses of a cluster of projects, or for an ex-ante analysis of a single project. The number of projects being analysed and the purpose of the analysis will dictate how much detail is included for each project.

### An Economic Analysis of SRDC Investment in.....

#### Background

Provides the background and rationale as to why the investment was made or is required.

#### The Cluster (or the Project)

##### Projects

Table 1 presents the details for each of the projects included in the cluster.

Table 1: Summary of Project Details

Project Number	Project Title	Other Details
		Organisation: <i>e.g. BSES Ltd</i> Period: <i>e.g. July 2007 to June 2010</i> Principal Investigator:
		Organisation: Period: Principal Investigator:
		Organisation: Period: Principal Investigator:

##### Project Objectives

Table 2 presents the objectives for each of the projects included in the cluster.

*If only one project (e.g. for ex-ante analysis) there would be no need to use a table.*

Table 2: Description of Project Objectives

Project Number	Objectives
	•
	•
	•

## Project Investment

Table 3 shows the annual investment by project for SRDC. Table 4 shows the annual investment by project for other investors (e.g. in-kind resources or cash from other funders, research organisations and industry). Table 5 summarises the total annual investment.

Table 3: Investment by Project by SRDC (nominal \$)

Project Number	Year ending June							Total
Total								

Table 4: Investment by Project by Others (nominal \$)

Project Number	Year ending June							Total
Total								

Table 5: Summary of Annual Investment by SRDC and Others (nominal \$)

Year ending June	SRDC	Other	Total
Total			

## Outputs

Table 6 provides a brief summary of the activities and outputs for each of the projects.

*When undertaking a cluster analysis, a summary of the research activities and main outputs (to date and expected) should be presented in dot point form. If only one project is being analysed (e.g. for ex-ante analysis) then there is no need to use a table. The fewer the projects, the more detail that should be presented on each individual project. Outputs are the products (e.g. manuals, equipment, workshops) or knowledge (scientific or other) produced by the R&D investment.*

Table 6: Summary of Project Activities and Outputs

Project	Activities and Outputs
	•
	•
	•

## Outcomes

A brief summary of outcomes by project is provided in Table 7.

*When undertaking a cluster analysis, a summary of the main outcomes should be presented in dot point form. It should be indicated whether the outcomes are actual outcomes or expected outcomes. If only one project is being analysed (e.g. for ex-ante analysis) then there is no need to use a table. The fewer the projects, the more detail that should be presented on each individual project. Outcomes are the use or application of the outputs. Examples include the use of scientific knowledge in further research, the adoption of a technique or tool, or a policy change.*

Table 7: Summary of Project Outcomes

Project	Outcomes
	•
	•
	•

## Benefits

A brief summary of benefits by project is provided in Table 8.

*When undertaking a cluster analysis, a summary of the main benefits (whether economic, environmental or social) should be presented in dot point form. It should be indicated whether the benefits are actual benefits or expected benefits. If only one project is being analysed (e.g. for ex-ante analysis) then there is no need to use a table. The fewer the projects, the more detail that should be presented on each individual project.*

Table 8: Summary of Cluster Benefits

Project	Benefits
	•
	•
	•

Table 9 summarises the major benefit types, and the contribution of each project to that benefit. It also identifies the regions to which the benefits apply.

Where there are many projects in the cluster and they are all contributing to a limited number of common benefits, then the following table should be used to summarise which projects are contributing to which common benefits. The final column can be used to identify in which sugarcane growing regions the benefits are likely to occur.

Table 9: Summary of Contribution of Each Project to Major Benefit Types

Project	Benefit 1	Benefit 2	Benefit 3	etc	etc	Region

#### Summary of Benefits

A summary of the principal types of benefits associated with the outcomes of investment in the cluster of projects is shown in Table 10.

The major benefits should be classified by both their triple bottom line category, and by their beneficiary type.

Table 10: Categories of Benefits from the Investment

Levy Paying Industry	Spillovers	
	Other Industries	Public
<u>Economic Benefits</u>		
<u>Environmental Benefits</u>		
<u>Social Benefits</u>		

#### Public versus Private Benefits

Provide a brief summary of the split of public versus private benefits

#### Distribution of Benefits along the Sugar Supply Chain

Discuss briefly how benefits are distributed along the supply chain

#### Benefits to other Primary Industries

Identify any benefits to other primary industries

#### Benefits Overseas

Identify any benefits to overseas producers or consumers

#### Additionality and Marginality

Briefly discuss the issues of additionality and marginality with respect to the cluster of projects and use Table 11 to summarise the issue of additionality.

Further detail is provided in Table 11.

Table 11: Potential Response to Reduced Public Funding to SRDC

1. What priority were the projects in this cluster when funded?	
2. Would SRDC have funded this cluster if only half of public funding of SRDC had been available?	
3. Would the cluster have been funded if no public funding for SRDC had been available?	

### Match with National Priorities

The Australian Government’s national and rural R&D priorities are reproduced in Table 12.

Table 12: National and Rural R&D Research Priorities 2007-08

Australian Government	
National Research Priorities	Rural Research Priorities
1. An environmentally sustainable Australia	1. Productivity and adding value
2. Promoting and maintaining good health	2. Supply chain and markets
3. Frontier technologies for building and transforming Australian industries	3. Natural resource management
4. Safeguarding Australia	4. Climate variability and climate change
	5. Biosecurity
	<i>Supporting the priorities:</i>
	1. Innovation skills
	2. Technology

*Identify which priorities the cluster or project has met.*

## Quantification of Benefits

The benefits quantified in the analysis are:

- *List the benefits that are quantified*

The benefits not quantified include:

- *List the benefits not quantified, and if appropriate indicate why they have not been quantified*

### Summary of Assumptions

*For each of the benefits to be quantified, describe how they are quantified and the background to each assumption used in the quantification.*

*In general, five year averages from either CANEGROWERS annual report, ABARE, or mill data should be used for assumptions such as cane price, sugar price, cane yields, sugar yields, hectares grown.*

A summary of the key assumptions made is shown in Table 13.

Table 13: Summary of Assumptions

Variable	Assumption	Source

**Results**

All costs and benefits of past years were expressed in dollar terms of the current year using the CPI index. All current year and future year benefits and costs were expressed in dollar terms of the current year. Costs and benefits, all now expressed in constant dollar terms, were discounted to the current year using a real discount rate of 5%. The base run used the best estimates of each variable, notwithstanding a high level of uncertainty for many of the estimates. All analyses ran for the length of the investment period plus 30 years from the last year of investment to the final year of benefits assumed.

Investment criteria were estimated for both total investment and for the SRDC investment alone. Each set of investment criteria were estimated for different periods of benefits. The investment criteria are reported in Tables 14 and 15.

Table 14 shows the investment criteria for total investment for the different periods of benefits. Table 15 shows the investment criteria for SRDC investment alone for the different periods of benefits.

Table 14: Investment Criteria for Total Investment and Total Benefits for Each Benefit Period (discount rate 5%)

Criterion	0 years	5 years	10 years	15 years	20 years	25 years	30 years
Present value of benefits (\$m)							
Present value of costs (\$m)							
Net present value (\$m)							
Benefit–cost ratio							
Internal rate of return (%)							

Table 15: Investment Criteria for SRDC Investment and Benefits to SRDC for Each Benefit Period (discount rate 5%)

Criterion	0 years	5 years	10 years	15 years	20 years	25 years	30 years
Present value of benefits (\$m)							
Present value of costs (\$m)							
Net present value (\$m)							
Benefit–cost ratio							
Internal rate of return (%)							

Table 16 shows the estimates of the relative contribution to total benefits valued in the analysis from each benefit source.

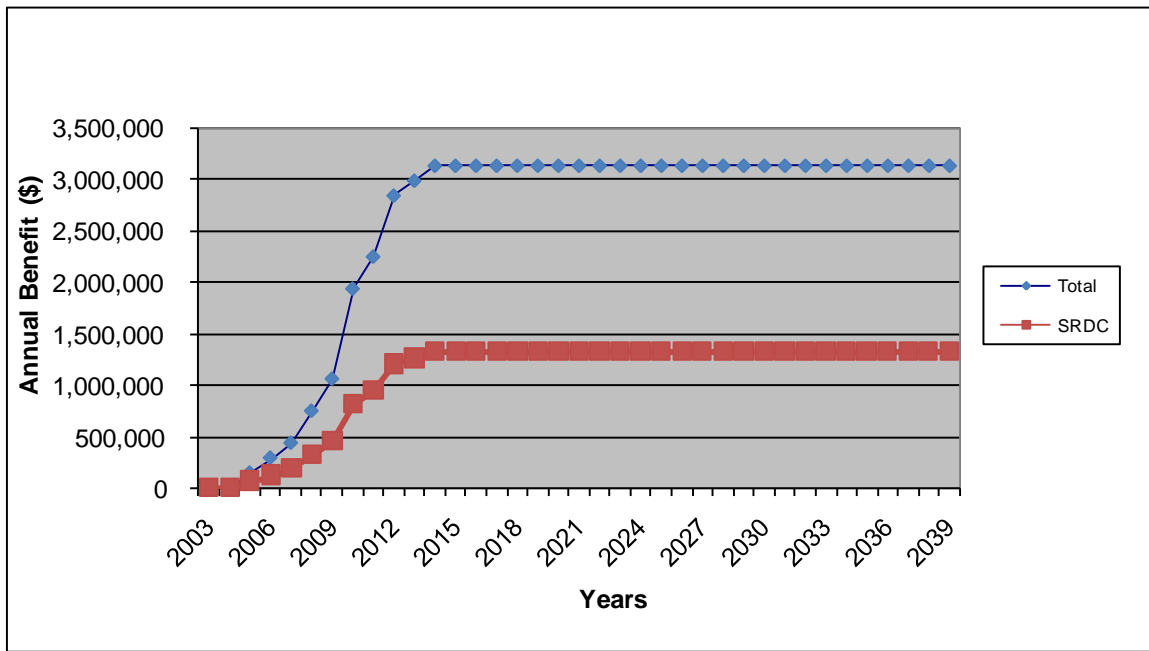


Table 16: Contribution of Source of Benefits to Present Value of Benefits

Source of Benefit	PVB Contribution (\$m)	PVB Contribution (%)
Total		

The annual net benefit undiscounted cash flows for both total investment and SRDC investment for the 30 year period from the year of first investment are shown in Figure 1.

Figure 1: Annual Cash Flow of Benefits  
EXAMPLE ONLY



*Sensitivity Analyses*

Table 17 presents the sensitivity of the results to the discount rate. The sensitivity analysis was performed with benefits taken over the life of the investment plus 30 years from the year of last investment. All other parameters were held at their base values.

Table 17: Sensitivity to Discount Rate  
(30 years)

Criterion	Discount rate		
	0%	5%	10%
Present value of benefits (m\$)			
Present value of costs (m\$)			
Net present value (m\$)			
Benefit cost ratio			

Include sensitivity analyses to other key variables as appropriate.

**Confidence Rating**

The results produced are highly dependent on the assumptions made, many of which are uncertain. There are two factors that warrant recognition. The first factor is the coverage of benefits. Where there are multiple types of benefits it is often not possible to quantify all the benefits that may be linked to the investment. The second factor involves uncertainty regarding the assumptions made, including the linkage between the research and the assumed outcomes.

A confidence rating based on these two factors has been given to the results of the investment analysis (Table 18). The rating categories used are High, Medium and Low, where:

- High: denotes a good coverage of benefits or reasonable confidence in the assumptions made
- Medium: denotes only a reasonable coverage of benefits or some significant uncertainties in assumptions made
- Low: denotes a poor coverage of benefits or many uncertainties in assumptions made

Table 18: Confidence in Analysis of Value Chain Cluster

Coverage of Benefits	Confidence in Assumptions

**Conclusions**

**Acknowledgments**

Name and organisation of those who assisted with providing information and feedback

**References**