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A Framework for Assessing of the Impact of Capacity Building

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A Framework for Assessing of the Impact of Capacity Building

Capacity building is widely recognised as an important component of most research-for-development activities. However despite the fact that around \$15 billion is spent annually on capacity building activities, there has been limited assessment of the economic returns to that investment. In recent years, the Impact Assessment Program of the Australian Centre for International Agricultural Research has turned its attention to quantifying the benefits from capacity-building. This paper sets out a framework for assessing of the impact of capacity building and presents four case studies. It does not purport to be a definitive paper by any means. Rather, it is an account of just one organisations experience. It is hoped that as work on this important area continues, and as new capacity building-to-impact pathways emerge, the analytical framework presented here will continue to be updated.

Dr Deborah Jane Templeton¹

1 Background

The Australian Centre for International Agricultural Research (ACIAR) funds a range of capacity-building activities. The overarching aim of these activities is to increase the research capabilities of the NARES in partner countries by providing individuals involved in ACIAR projects with both discipline-based and broader training opportunities. While much of this is done in conjunction with individual projects through 'learning-by-doing', ACIAR also offers several specialised training activities such as John Allwright Fellowships, small grants for fellowship returnees, John Dillon Memorial Fellowships and cross-program training courses. In addition, ACIAR has strong links with two external training providers through the Australian Youth Ambassadors for Development, which is administered and conducted by AusAID, and the ATSE Crawford Fund Training Courses and Master Classes. Capacity building in agricultural research is clearly a priority for ACIAR, reflecting the widely-held view that there is a strong link between improvements in research capabilities and economic growth and development.

In addition to funding capacity building and training, ACIAR has traditionally placed significant emphasis on assessment of the impact of the research it funds, particularly focusing on quantifying the returns to research investments. Initially quantification of potential impacts were used to support aggregate priority setting and more effective project development, as well as enhancing the Centre's public accountability. As research efforts matured more attention has been focused on quantifying the returns on these investments after the project finished by measuring adoption and impact. The purpose of the *ex post* analysis is to provide a credible after-the-event dimension to ACIAR's broad monitoring and evaluation (M&E) framework.

As part of the evaluations, areas for practical methodology innovations were identified and some advances in impact assessment methods were developed. In recent years, ACIAR's Impact Assessment program turned its attention to address the lack of empirical evidence to support the long-held view that investment in human

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capital (and associated infrastructure) is inherently valuable. That is not to say that earlier impact assessments completely ignored the importance of training but rather that the assessment only went as far as identifying the output (capacity built) or the outcome (use of that capacity), stopping short of quantifying capacity-building impacts.

While the main aim of this paper is to provide an overview of ACIAR's recent focus on separating and quantifying the capacity-building aspects of ACIAR's research activities, it does not purport to be a definitive paper by any means. Rather it is an account of just one organisation's experience. As such, it draws on the ACIAR/ATSE Crawford Fund-commissioned framework developed by the Centre of International Economics (CIE) (Gordon and Chadwick 2007) and capacity-building impact assessments commissioned by ACIAR and undertaken by Brennan and Quade (2004), Gordon and Chadwick (2007), Longmore, Gordon and Bantilan (2007) and Fisher and Gordon (2008). Moreover, it is hoped that as work on this important area continues, and as new capacity building-to-impact pathways emerge, the analytical framework presented here will continue to be updated.

2 Assessment Framework for Evaluating Capacity Building

2.1 Separating capacity-building impacts

At ACIAR, capacity building is often embedded in R&D projects². As such, capacity-building inputs and activities not only result in capacity-building outputs (in the form of new knowledge, skills and management capabilities), but also contribute to the realisation of other output targets, such as new germplasm, crop management techniques or policy recommendations. Moreover, the capacity improvements generated within one project can be used in subsequent research projects to generate further research deliverables. Indeed, in some instances the investment in capacity building can be the means to significant impact, even when the original project failed to develop the planned technology. An example of this is the initial ACIAR-funded research on sorghum in India that sought to develop new, more productive varieties of the crop. While the germplasm was not developed, the knowledge transferred and biotechnology skills gained through the original project underpinned the later development by local researchers of a new hybrid variety which was widely adopted, yielding a positive return on the original ACIAR investment (Longmore et al. 2007). In other cases, capacity building can contribute to the sustainability of the research-induced change. For example, Fisher and Gordon (2008) extended the impact assessment of an ACIAR-funded project on breeding and feeding pigs in Australia and Vietnam (Tisdell and Wilson 2001). This extension took the form of separating and measuring the returns to the capacity-building activities undertaken in Vietnam. Fisher and Gordon (2008) concluded that without careful selection and maintenance of the higher yielding breeding stock, it is unlikely that the benefits accruing to the project would have been sustained. Hence, it was determined that capacity building was necessary, even if not sufficient, for the maintenance of the improved genetics and resulted in a longer flow of benefits than would have otherwise been the case.

In addition to contributing to the development of technical outputs, human capacity building can directly benefit both the newly trained individuals and the organisation

² ACIAR projects also invest in research infrastructure, which can facilitate future R&D. In making an assessment, infrastructure investments are treated in the same way as training and other human capacity building.

that they work for. The benefits to 'trainees'³ is the most direct link between capacity building and impact. The main benefits to trainees include improvements in confidence, competence, promotion and higher income. Gordon and Chadwick (2007, p. 30) state that as a rule of thumb, 'a worker's lifetime income is higher, on average, by around 10% for each additional year spent in formal education.'

At the organisational level, the efficiency of the organisation can be enhanced through the trainees' capacity-induced changes in practice and behaviour. This is reflected in increased efficiency in the provision of services or outputs; innovations in the type of services or outputs delivered and in the delivery process; in new and better R&D effectiveness and increased influence in the policy arena. As a general rule of thumb, workers tend to accrue around half of the productivity improvement from training, the other half being captured by the firm (Gordon and Chadwick 2007).

The ultimate beneficiaries, apart from the individuals who receive financial and intrinsic benefits from the training, are the final users of the outputs of the research and extension organisations. This is because the community-level impact of investing in capacity building arises from the technical outputs developed within the project or follow-on research and/or through the improvements at the organisational level that flow from use of the enhanced capacity. For NARES, these are largely farmers, and the communities in which they live. As a result, while organisational benefits can be large relative to the investment in training, they are small compared with the returns to the innovations produced if there is significant adoption of these innovations by the final users.

In sum, the benefits of capacity building can flow to the trained individual, other workers in the organisation, the organisation as a whole and communities. The community-level impact of the capacity built arises from the outputs generated (and adopted) when this capacity is used. This leads to two matters that require extra effort in assessing the impact of capacity-building investments. First, there are extra steps in mapping the capacity-building inputs and activities to capacity built, through capacity used to the outputs that lead to changes in policy, practice and products that ultimately lead to community-level impacts. Second, attribution tends to be more difficult because capacity built is combined with other inputs to produce the adoptive outputs that ultimately lead to the higher-order outcomes and impacts.

2.2 Mapping the pathway from capacity building to impacts

Given that the pathway from capacity built to impact is complex and can be diffuse, it is not surprising that Gordon and Chadwick (2007) found that in the main, the earlier capacity-building and training assessments did not quantify the benefits fully, largely because of the methodological difficulties associated with establishing a direct link between capacity built to research outputs to impact, making attribution a key challenge. To address this issue, Gordon and Chadwick (2007) developed a framework to explicitly map and substantiate the linkages between capacity building and the intended or realised benefits, thereby making possible the attribution of benefits to specific capacity-building investments. This framework is presented below with some adjustments/modifications.

Developing an impact pathway provides a practical approach for documenting consequences along that pathway as it provides a means of mapping the cause-and-

³ Referrers to all individuals who have received on the job training, attended training workshops undertaken university studies or obtained post doctoral training (e.g., through ACIAR's small grants for fellowship returnees and the John Dillon Memorial Fellowships.)

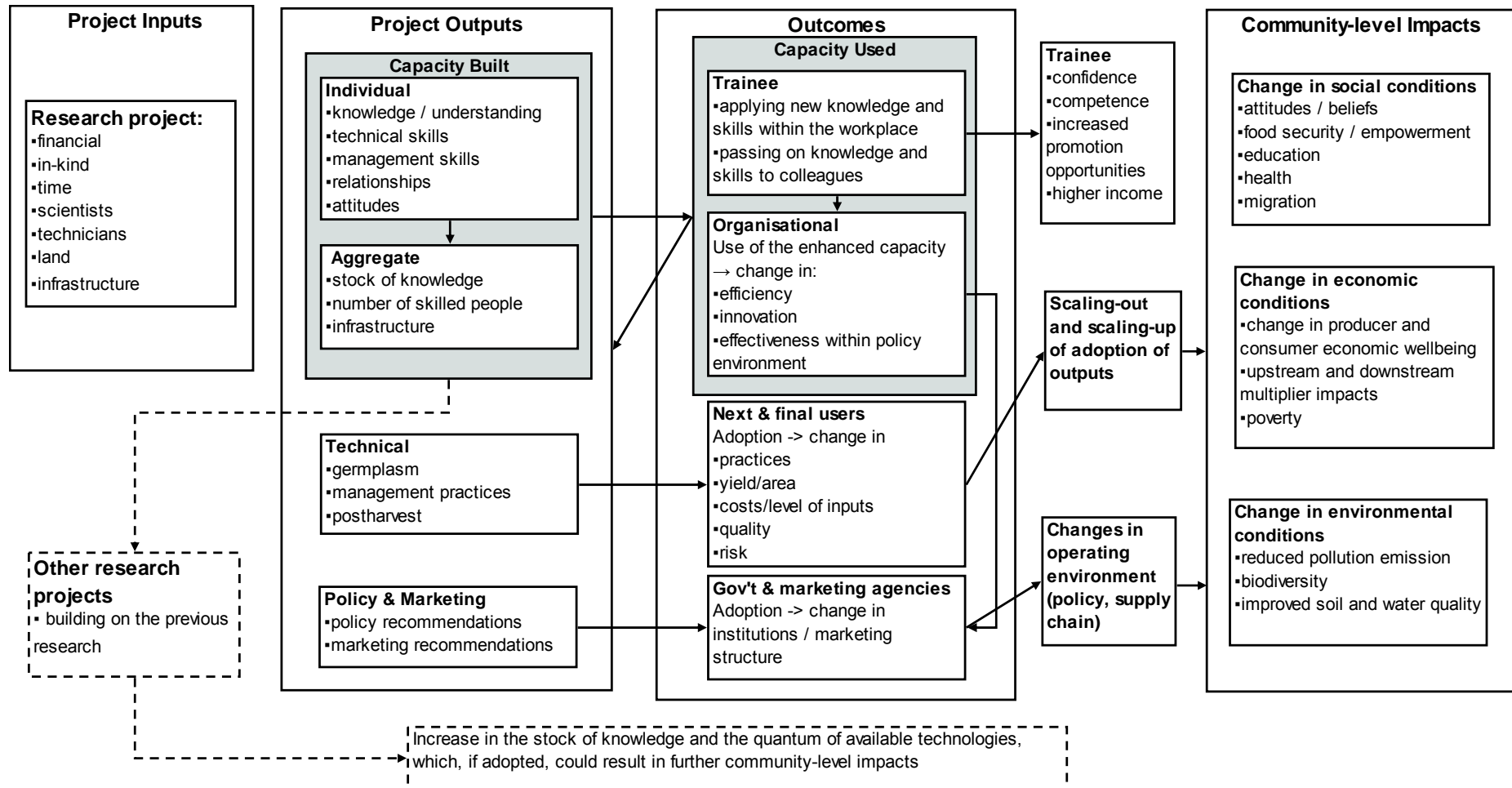
effect linkages along the impact pathway. These links maybe direct or indirect, strong or weak, and certain or highly uncertain, all of which should be assessed. Generally, the stronger, more direct and more certain the link between capacity-building and final impact, the easier it is to apportion a share of total impacts to the investment in capacity building. An example is the impact assessment of ACIAR's pigeonpea improvement projects in India (Gordon and Chadwick 2007, pp 62-86). The project comprised of technical investments (breeding material) and capacity-building investments (training courses, on-the-job training and a postdoctoral fellowship). The direct and strong link between the 3-year postdoctoral fellowship and the development of improved (short duration) pigeonpea varieties led to the conclusion that capacity building played a major role in the success of the projects.

Another advantage of mapping the pathway to impact is that it encourages consideration of external factors, such as other related research and/or capacity-building activities, which may have also contributed to observed changes at the individual, organisational and community level. This approach also guides consideration of the contextual environment (social, economic, political, and operational) within which the project and/or capacity-building activities were undertaken.

To illustrate, Figure 1 presents a stylized impact pathway for capacity building in agricultural R&D projects. It is based on the pathway presented in Gordon and Chadwick (2007, p. 44), Davis et al (2008, p.76) and the authors experience in developing pathways for CGIAR projects (see for example, Walker et al 2008). However, it should be noted that the categories and examples given are not exhaustive. Figure 1 is meant as a generic guide only; obviously the content and structure of any impact pathway will depend on the problem at hand.

A number of observations are implicit in Figure 1. The impact pathway involves several intermediary steps and can have multiple outputs, outcomes and impacts. The capacity built often contributes towards the realisation of the project technical and/or policy/marketing-orientated outputs. It is also likely that capacity built will not only feed into the project in question, but also into other projects, further building on the stock of knowledge and the quantum of technologies available for dissemination to, and use by, the final users. Where this is the case, and a link between the capacity built in one project and the impact of another project can be established, then some of the benefits from the other project could be attributed to the original project. Finally, while there is a direct link between capacity built and the impact on the trainee, at the community-level impact occurs through the up- and out-scaling of the technologies and/or policy or market recommendations.

Figure 1: Capacity building-to-impact pathway



2.3 Determining indicators and measures to verify change

Having set out the analytical pathway from capacity built to capacity used to impact, the next step is to determine the performance measurement indicators⁴ (PMI) and key evaluation questions⁵ (KEQ) which, if answered, will result in the purpose of the impact assessment being met. In terms of capacity building-to-impact pathway, PMIs and KEQs should be set for every level from inputs to outputs (including capacity built) to outcomes (including capacity used) to measures of change at higher levels, such as the number of farmers adopting the technical outputs of the project and the resultant changes in producer and consumer economic or social wellbeing, and/or environmental conditions.

Turning to capacity indicators, Gordon and Chadwick (2007) provide some generic examples of indicators for capacity inputs, capacity built (outputs) and capacity used (outcomes). Capacity input indicators include number and type of training provided, number of attendees, the quality of the content and delivery of the training.

Capacity built indicators include the number or proportion of trainees passing a post-course competency test to measure the increase in skills, knowledge and capabilities of the trainees. If this direct measure of capacity built is not available, then proxy indicators such as relevance of the training and trainee satisfaction could be used. Indicators of capacity built at the organisational level include changes in the quantum stock of knowledge, attitudes or understanding.

Indicators of capacity used are designed to establish whether or not there has been a practice change at either the individual trainee or organisational level as a result of the training. KEQs could include:

- What knowledge and skills from the training do you apply regularly in your duties?
- What aspects of the training (knowledge, skills, networks etc) do you pass on to others?
- What are the main benefits to you personally from the training?
- What factors (if any) have hindered you from using your skills and knowledge gained from the training on return?
- What are the main benefits of the training to the organisation, particularly in terms of efficiency, innovation and effectiveness in the policy environment?
- What technical outputs or policy and/or marketing recommendations have been developed as a result of the training?

Following from this, indicators for impact can be established to reveal the difference enhanced capacity has made to the wellbeing of the trainee, and the value the organisation places on the training. For example, increased income after training is a direct and quantifiable indicator that the organisation has recognised, is benefiting from, and is willing to reward the trainee's newly acquired skills and knowledge. However, while changes in income and promotion can be good indicators of the

⁴ A performance indicator is a simple statistic recorded over time. Performance indicators are useful in that they can provide simple quantitative information that can be easily aggregated.

⁵ Key evaluation questions are carefully crafted and focused questions that provide explanations of why something occurs, what worked for whom, and so on.

benefits to an individual from training, care must be taken to be aware of 'selection error' to avoid overestimating the promotion and income benefits of capacity building. As it is often that individuals chosen to attend capacity-building activities are those most able and likely to succeed professionally, the counterfactual scenario could be that they would have been promoted (even if at a slower rate) without the training⁶.

In the agricultural R&D world, benefits beyond those accruing directly to the individual in terms of income or confidence, or to the organisation in terms of its efficiency and effectiveness, usually rely on a practice change by farmers (or others along the value chain) or a change in the context in which they operate. As such the indicators at the impact level are similar to those used in technical-orientated or policy-orientated research impact assessments. Economic indicators include yield, production costs, prices, market access; off-farm income; social indicators include per cent of population below the poverty line, days of illness, number of active community consultation groups; environmental indicators include air/soil/water quality, biodiversity, area of habitat protected (Gordon and Chadwick 2007, p 59.)

2.4 Data requirements

The selected PMIs and KEQs should guide the data collection and analysis methods rather than reverse. Even after determining the data needs and appropriate evaluation methods, the final choice will depend on factors such as cost, time resources, and the skills or experience of the analyst. In addition, the data required to allow a direct measure of an indicator may not always be available.

In the case of capacity-building impact assessments, additional data will be required to determine the relevance and use of capacity-building activities and to substantiate the linkages between the training provided and the intended or observed outcomes and impacts. The ACIAR publication entitled 'Guidelines for assessing the impacts of ACIAR's research activities' (Davis et al 2008) provides questions adapted from tracer surveys previously undertaken by the ATSE Crawford Fund and ACIAR. The questions relate to the training and learning-by doing activities that formed part of the ACIAR project. While qualitative in essence, surveys can help to substantiate that the measured benefits are, at least in part, attributable to the training. This approach was used to determine the link between a 3-week ATSE Crawford Fund training course on GIS and the measured benefits of ACIAR-funded project on system-wide irrigation water management in Vietnam. Other qualitative methods that can be used to substantiate the links between capacity-building activities and outcomes and impact include case studies, most significant change/story approach and interviews. Triangulation (obtaining information from three sources) can add credibility to the data obtained and, hence, to the inferences drawn from that data.

However, even after determining the link between capacity building and outcomes and impact, a further difficulty lies in determining the level of attribution, as capacity-building activities are rarely undertaken in isolation – and it may not be possible, given time and resources, to account for all activities incorporated in the project. For example the capacity-building impact assessment of the ACIAR pigeonpea projects was limited to one particular capacity-building activity – the three year postdoctoral – because of the lack of information on the other capacity-building activities and limited resources. Gordon and Chadwick (2007) provide some insights into approaches to quantifying attribution, recognising that it may be based on a degree of subjectivity.

⁶ As with all impact assessments, determining the counterfactual is essential in assessing the impact of investments in capacity building.

2.5 Determining attribution

Broadly speaking, the approaches to estimating the share of the benefits of a project attributable to a capacity-building activity depend on if the capacity built is considered to be:

- neither necessary nor sufficient, but improves impact
- necessary but not sufficient, or
- sufficient in isolation to have resulted in significant benefits.

Capacity building is neither necessary nor sufficient, but improves outcomes

When it is considered that the outcomes would have been achieved over time even if the capacity-building activity had not been undertaken, or alternative research and capacity-building activities would have achieved the same change in practice or behaviour, one of the following two approaches can be used to attribute benefits to capacity building.

- **Bring-forward approach:**
This approach can be used when the changes would have come about through normal processes, but the investment in capacity building brought forward, by a number of years, the changes and hence the impact. For example, compared with the use of traditional plant breeding methods, training in, and the use of, DNA markers can reduce the time it takes to produce a superior plant variety. Here the focus of measurement is on the time to impact without the capacity-building activities compared to the time with the capacity-building activities.
- **Marginal-gain approach:**
This is similar to the bring-forward approach, but the investment in capacity building raises the quality of the changes, and hence the magnitude of the impact. The focus of measurement is on the effect that higher quality has on the size of the impact. Pest control is an example. While the use of pest-resistant varieties may reduce the need for pesticides, the fear of crop failure may result in farmer intermediaries being reluctant to recommend low to zero pesticide application rates when the pest population pressure is low and/or the pest that are present are not harmful. Training in ecologically-based integrated pest management can increase the likelihood of judicious pesticide use and hence increase the benefits from growing pest resistant varieties.

Capacity building is necessary but not sufficient

Commonly, capacity building is one of many necessary and largely inseparable factors that contribute to the development of adoptive outputs and ultimately impact. In such instances, attribution of benefits to capacity building can be based on proportional costs or relative importance:

- **Cost-share approach:**
Under this approach, the share of the benefits (net of implementation costs) attributed to capacity building is based on the share of total expenditure invested in capacity-building activities. This is appropriate when the activity is necessary but not sufficient to achieve the change in practice or behaviour.

- Relative-importance approach:

This approach apportions the share of benefits on the basis of a subjective assessment (triangulated) of the contribution (percentage) of the capacity-building activity to the outputs achieved. This approach can be used when the training is necessary but not sufficient to achieve all of the outputs, or it was sufficient to achieve part of the technical or policy or marketing outputs that ultimately lead to change at the community level.

Capacity building is sufficient in isolation to have resulted in significant benefits

When capacity building alone is considered to have resulted in significant benefits, the benefits can be fully attributed to the capacity-building activity. Similarly, if the capacity-building activity filled a gap that was critical to achieving the outcome, and without the activity would not otherwise have been filled, the other investments can be regarded as sunk costs.

The returns to capacity building tend to be highest where training or other capacity building is critical to achieving a change. However, care must be taken not to treat other investments as sunk costs when they are also necessary – even if not sufficient - to bring about the change.

3 Results from capacity-building impact assessments of ACIAR projects

A brief summary of ACIAR impact assessments that quantified the return to project-related capacity-building activities are presented here. As can be seen, the work to date supports the view that the returns to investment in human capital are positive and significant.

Genetics of and breeding for rust resistance in wheat in India and Pakistan

The economic benefits of the two related ACIAR-funded projects on the genetics and breeding for rust resistance in wheat were assessed. The main objectives of the projects were to investigate and enhance the sources of rust resistance in wheat in India and Pakistan, and to provide training for Indian and Pakistani rust scientists at the National Wheat Rust Control Program at the University of Sydney. The capacity-building impact assessment estimated the value of the training received in Australia by Indian and Pakistani scientists at \$A2.2 million per year, with India receiving the majority of the benefits. The present value of benefits, calculated over 30 years (A\$57.2 million), is well in excess of the present value of the project costs (\$A3.3 million), giving a benefit–cost ratio for the projects of around 17:1.

Impact assessment of capacity building and training: assessment framework and two case studies (IAS 44)

In this study, a framework for quantifying the impact of capacity building is developed. It is then applied to two quite different case studies demonstrating that, even though complex and difficult, it is possible to estimate and attribute benefits to capacity building. It also shows that these returns can be large. In the case of pigeon pea breeding in India it was found that the net present value (NPV) of the capacity-building aspects of the research was \$67.6 million with a benefit:cost ratio (BCR) of 28:1 and an internal rate of return (IRR) of 23%. This was around half of the total benefits to the research activity. For a smaller water management research activity in Vietnam, the capacity-building contribution was valued at \$82,800 with a benefit-cost ratio of 13:1 and IRR of 28%. In this case, the benefits to the capacity-building component were only about 0.5% of the total benefits to the research.

Assessment of capacity building: overcoming production constraints to sorghum in rainfed environments in India and Australia (IAS48)

A preliminary review of the sorghum project suggested that it did not achieve any of the originally intended outputs. However, a more detailed impact assessment showed that the project revealed some new sorghum plant material that was of considerable benefit to Australia. Furthermore, it was found that while no new varieties were developed in India from the original work, the project enhanced the capacity of the Indian collaborators in some new areas of research techniques. This enhanced capacity facilitated successful application for funding from other sources. The subsequent research activity has led to new varieties which are about to be released. Based on interviews with various people within the research system, the capacity-building impact assessment concludes that it is appropriate to attribute a small share of this impact to the capacity-building activities of the original ACIAR-funded project. The total returns which were attributed to capacity building are found to be significant with a NPV of around \$199 million and a BCR of 100:1.

Breeding and feeding pigs in Vietnam: assessment of capacity building and an update on impacts (IAS 52)

This capacity-building impact assessment updated an earlier IAS (No 17) and estimated that the value of the impacts is significantly higher than that estimated in 2001. This higher estimate was largely due to the inclusion of the effects of capacity building which ensured the improvements achieved in the initial research were maintained and expanded. In addition, it was established that the capacity developed through the original research activity attracted other aid donors leading a further expansion of adoption of improved pig breeding and feeding techniques. Overall the study found that the NPV to all funding is \$1,988.3 million. Of this it was concluded that \$1,105.5 million could be attributed to the original ACIAR and partner funding with the balance to the other funders of subsequent development activities. The rates of return to this ACIAR activity are estimated as a BCR of 257:1 and an IRR of 74 per cent. The impact assessment also separates out the returns to capacity building concluding that \$422.7 million of the total \$1,988.3 million NPV are attributable to the capacity-building activities.

4 Conclusions

The purpose of this paper is to contribute to the literature on capacity-building impact assessments. As such, it provides general advice on the conduct of a capacity-building impact assessment; it does not purport to be a definitive paper on the topic. The emphasis is on the key methodological issues associated with carrying out an assessing the impact of capacity-building activities. The framework presented here should not be interpreted as imposition of 'best' practices, but rather as an example of 'good' practice.

There are a number of main points highlighted in this paper. First, assessing the impact of capacity-building activities is a non-trivial task. Second, an analysts needs to clearly define the capacity-building component of the project being assessed, and the capacity-building changes (at both output and outcome levels) that occurred. Third, explicitly mapping out the components of the path from inputs, capacity built, technical outputs and/or policy or marketing recommendations, outcomes and impact helps to clarify the essential elements of a robust capacity-building impact assessment. Fourth, a comprehensive survey of trainees is essential to unravelling the relevance and subsequent use of the capacity built. Fifth, as attribution is difficult to quantify, assessment often depends on a subjective assessment of the importance of capacity building in terms of its contribution to the timing and size of the impact. Finally, a combination of quantitative and qualitative methods is likely to be needed.

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