ACHIEVING SUSTAINED IMPROVEMENTS IN PROFITABILITY IN BEEF ENTERPRISES AND REGIONS IN SOUTH AFRICA AND AUSTRALIA

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Abstract

Contemporary Research and Development (R&D) projects are increasingly concerned with setting outcome targets such as measurable improvements in enterprise profit, industry growth, environmental health or resource use efficiency. This paper describes the application and ongoing development of a 'Sustainable Improvement and Innovation' (SI&I) model for designing and managing medium to longer term R&D projects to achieve and sustain outcomes, improvements and innovations in agricultural enterprises, industries and regions. The model is applied in two Beef Profit Partnerships (BPP) projects, one by emerging farmers in two provinces in South Africa, and the other by commercial beef producers in Australia. The South African project was funded by the Australian Centre for International Agricultural Research over five years; the Australian project is funded by the Cooperative Research Centre for Beef Genetic Technologies and is in the second of seven years. The primary objective of both projects is to accelerate the rate of adoption of new technologies and to measure and monitor the productivity and profitability outcomes in farming systems and in the broader region. Another objective is to undertake adoption science research on this process and to measure and monitor partnership and capacity building outcomes. Through the use of the model in the South African BPP project, measurable improvements in profit per beef enterprise, each year, in the participating communities and regions have been achieved, and these improvements have been sustained across an increasing number of cattle enterprises and communities. Further, the SI&I process implemented as an integral part of the BPP project has been demonstrated to lead to measurable, positive economic outcomes, even over a relatively short period. The SI&I model is presented in detail, the results from the South African application are reported, and the value of the model and its methods for extending the approach to Australia and elsewhere are discussed. Conclusions are made about the application of the SI&I model in R&D projects focused on high rates and scales of impact.

Keywords: R&D projects; outcomes; continuous improvement; continuous innovation; partnerships; systems

Introduction

Rural Research and Development (R&D) projects are being criticised for poor achievement of outcomes, rates and scales of impacts, and ongoing improvement and innovation during and after the end of projects[1]. R&D investors often settle for outputs like the development of new knowledge, technical products, information packages, publications, or a new or improved practice that, if used or adopted, could provide outcomes/benefits. They fall short of setting outcome targets such as measurable improvements in regional enterprise and industry profit, environmental health or resource use efficiency.

This paper reports on the application and development of a Sustainable Improvement and Innovation (SI&I) model to achieve and sustain outcomes, improvements and innovations (at a regional scale) in 3-5 year project timeframes. The SI&I model is an integral part of the Beef Profit Partnerships (BPP) project that has been implemented in South Africa and Australia.

In this paper, the SI&I model is presented in detail, the results from the South African application are reported, and the value of the model and its methods for extending the approach to Australia and elsewhere are discussed. Conclusions are made about the application of the SI&I model in R&D projects focused on high rates and scales of impact.

The Sustainable Improvement and Innovation Model

There is a growing literature that advocates the design and development of a human/social system to achieve and sustain improvements and innovations at a regional and/or national scale. System-based approaches to project management have been advocated for a long time. Such approaches:

help to identify, understand and work with those elements essential to achieving target outcomes, and the key relationships and interdependencies between these components;

help to better visualise, understand and develop a shared mental-model of the whole system; and

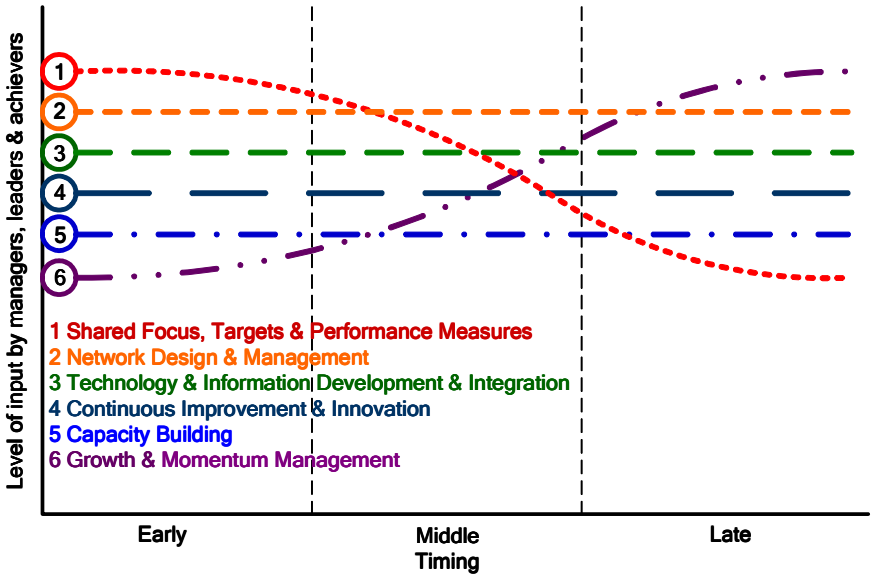
provide a practical, easy to use project management framework for thinking, implementation, regular measurement/assessment, and continuous improvement of project performance.

The application of an outcome-focused, whole-system model could overcome constraints often experienced in R&D projects which produce outputs but fail to achieve outcomes within project timeframes, and could increase the ease and efficiency with which target outcomes are achieved.

Figure 1 shows the six interconnected elements of the SI&I model that have been identified using systems thinking tools. The level of input required in each interconnected element (in each timeframe) is also shown, based on our experience.

[1] There is an extensive reference list that accompanies this material on the background and implementation of the SI&I model. For space reasons references are omitted from this version, but a full version of the paper may be obtained from the corresponding author.

Figure 1: The interconnected elements of the Sustainable Improvement and Innovation (SI&I) model



In the following sections the function and purpose of each element of the SI&I model is described and the key methods and tools used to make each element of the model functional are highlighted.

Element 1 – Shared Outcome Focus, Targets and Performance Measures

A number of authors have emphasised the value of Focus in achieving improvements and innovations. To achieve satisfying results it is important that people set outcome-based targets rather than activity-based goals. When working in partnerships it is crucial that partners have a shared understanding of target outcomes and the key concepts associated with these outcomes.

To sustain improvement and innovation it is essential to make success measurable so that people can see tangible results and be rewarded and motivated from their efforts. Performance measurement drives behaviour and behaviour change, supports the prioritisation of actions and enables comparing and tracking of performance changes and differences. The use of the Critical Success Factors (CSFs) method enables people to identify, action and measure those factors critical to success. The measures of performance must align with the purpose of the measurement, thus the identification of Key Performance Indicators (KPIs) with clear links to CSFs and target outcomes is crucial.

The purpose of Element 1 is to enable project teams, partners and individuals to develop clear target outcomes, CSFs and timely KPIs to focus their thinking and action on achieving and recording results linked to their target outcomes.

A key tool that has been used to make Element 1 functional in agricultural R&D projects is Focusing Frameworks. Focusing Frameworks like the one in Figure 2 enable individuals and partners in projects to:

develop SMARTT focuses for action;

develop a shared understanding of key concepts and terms like profit;

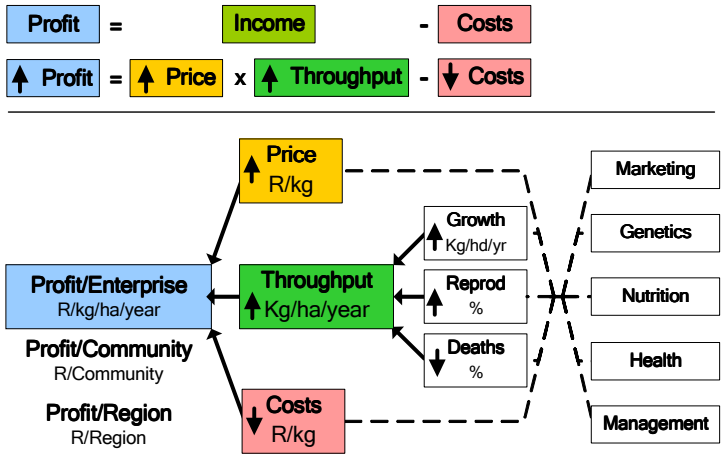
develop target outcomes, CSFs and timely KPIs;

benefit from the thinking and action of individuals and teams using a shared framework tool; and

give focused reports on, and mutual support for, impact on targets. The power of Focusing Frameworks can be enhanced by developing them into Performance Management Frameworks and strategies for project teams and individuals.

When Focusing Frameworks become a shared conceptual model they enhance collaborative efforts to achieve targets. Figure 1 shows from our experience that the input required to achieve a shared outcome focus, targets, CSFs and KPIs is relatively high in the early phase of projects but requires less input once the majority of project partners develop a shared understanding. The use of a project glossary has enhanced the achievement of a shared understanding of key concepts and terms like targets, profit, productivity, CSFs and KPIs.

Figure 2: "The Beef Profit Driver Tree"



Element 2 – Network Design and Management

To enable individuals to achieve improvements and innovations collectively requires the establishment of an effective and sustainable social organisation/infrastructure. The concept and principles of partnership help achieve productive collaborations because they promote mutual responsibility-taking and mutual proactive support. Effective partnerships require necessary functions, roles and responsibilities to be fulfilled through the active involvement of the right proportion of partners in the most appropriate infrastructure. The partnership infrastructure considered most appropriate for SI&I are networks of individuals and teams at local and regional levels. It is estimated that an optimum size for a regional network is about 100 members.

But effective regional networks don't just happen! They need design and management. Figure 3 shows a typical regional network design and management concept. Three key groups are:

Achievers i.e. all members of the network;

Leaders i.e. about 15% of network members; and

Managers i.e. about 5% of network members.

The purpose of Element 2 is to enable people interested in achieving target outcomes (Element 1) to build a viable partnership and to work productively as individuals and in teams.

Key methods used to make this element functional in a project are:

explaining and negotiating the benefits, values, key functions and structure required for productive regional improvement and innovation networks;

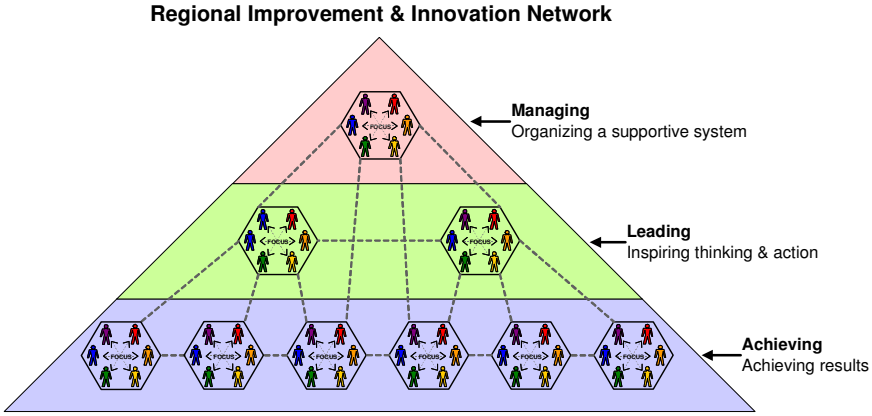
negotiating criteria for involving the right proportion of partners in local teams and regional networks;

ensuring the right proportions of Achievers, Leaders and Managers in regional networks; and

negotiating shared focuses, CSFs, KPIs and *methods* with teams and individuals in regional networks.

Attrition of vital role-players (and teams) in networks is to be expected and succession should be planned for. The role of local, provincial, national industry, government and academic agencies is crucial for network vitality. It is best if local teams and regional networks are interdependent of, not dependent on, one another.

Figure 3: The functions of management, leadership and achievement required for an effective regional improvement and innovation network



Element 3 – Technology and Information Development and Use

In a well-planned and sustainable society, it is not simply the availability of new technologies that fuels economic growth and sustained productivity, but more the wise adoption, adaptation and application of those technologies. To achieve sustainable improvement and innovation, the on-going generation and use of new knowledge, information and technology is required.

The purpose of Element 3 is to enhance the research, development and use of technology and information to achieve target outcomes year by year.

Methods need to be used to ensure that specific items of information and technology are identified and linked to end-user needs and feedback i.e. using the principles of "market in" rather than "product out". Focusing Frameworks (Figure 2), and benefit/cost analysis tools like gross margins or whole-farm financial analyses enable the potential impact of information and technologies on targets, CSFs and KPIs to be identified, assessed and prioritised for development and use.

The development of information and technology needs to be a dynamic process closely integrated with the end-user needs and input. Timely feedback is vital to overcome constraints to the adoption of technologies - this is enabled by strong integration with Element 4.

Element 4 – Continuous Improvement and Innovation

Through experience of useful activity and memories, individuals form a store of useful knowledge. In this way organisms improve their *methods*. This continual refinement and improvement is called growth: "a self renewing process through action upon the environment". To achieve impact and accumulated (enterprise and industry) growth on a large scale it is necessary that individuals, and teams and networks use effective and efficient shared processes.

The purpose of Element 4 is to enable all project partners to develop and use a shared process to focus on targets and CSFs, benchmark and measure KPIs, take focused action, seek feedback and support, and achieve high rates of improvement and growth.

A key methodology is the Continuous Improvement and Innovation (CI&I) process. To be of value in a partnership targets, CSFs and KPIs need to be meaningful and easily shared so that they can be used to identify and promote methods that achieve success i.e. Evidence-based Practice. KPIs need to give early and meaningful indication if actions are achieving impact, or not. The timing of CI&I activities at 30, 90, 180 and 360-days has been found to be useful to achieve motivating progress, supportive feedback, the creation of new ideas and opportunities, high rates of improvements per year, and to manage the dynamics of enterprises and networks.

The process of CI&I is not taught at school and it is not currently commonly used in many rural communities and industries. Building the capacity of leaders of regional teams and networks to achieve continuous improvements and innovations in beef enterprises and communities now and in the future is one of the more difficult tasks of implementing the SI&I model.

Element 5 – Capacity building

All the partners in SI&I projects and networks need to be equipped with the necessary capacity to fulfil their functions and roles, and for sustainability, communities need to be equipped to design their own systems and processes – not have these done *to* or *for* them.

The purpose of Element 5 is to equip BPP partners with the knowledge, tools, technologies, skills and support at appropriate times to achieve sustained improvement in profit per beef enterprise, per year, in a growing number of enterprises, communities and regions.

Key methods are the use of skills training in appropriate tools, coupled to immediate practise and support, CI&I (Element 4), and Evidence-based Practice. R&D of improved methods for achieving rewarding results regularly also contributes to capacity. Skill's training is often separately designed for Achieving sustained improvement of profit, Leading regional teams and networks, and Managing regional networks (Figure 3).

Training needs to be planned to meet estimated rates of project/network participant/personnel attrition, due to resignations and progressions that create gaps in the capacity of partnerships. It also needs to be linked to the practice of CI&I and Evidence-based Practice, and to be timely and progressive, not repetitive. The level of investment in capacity building is often a potential weak point in a project.

Element 6 – Growth and Momentum Management

Growth is the accumulated impact over a period of time i.e. the sum over 5 years of the product of the number of improvements and the impact of each of those improvements. Momentum is the level of impetus that sustains growth. Momentum and growth need to be achieved with efficiency to achieve Return on Investment. In dynamic environments it is reasonable to suggest that a never-ending series of initiatives aimed at a constant readjustment and realignment is necessary.

The purpose of Element 6 is to achieve impact and accumulated impact per region though effective, efficient and sustainable systems.

Key methods include:

regular and frequent face-to face meetings of network partners (Element 4) to achieve results, and share results, give feedback and promote proven and successful methods, receive feedback and create opportunities;

regular and frequent communications to achieve awareness, understanding, quality relationships, marketing of results and "proof-of-concept" and "proof-of-profit" to specific target audiences; and

regular assessment and management of the whole-of-system model for vitality.

From our experience the input required to achieve growth and momentum is relatively low in the early phase of projects but requires more input later on with the aim of achieving the targeted state of sustainability by the end of the project.

The South African BPP Project

The South African Beef Profit Partnerships (BPP) project was initiated in 2000 by the Australian Centre for International Agricultural Research in partnership with the Agricultural Research Council and the Limpopo and North West provincial governments in South Africa. The project was scheduled to end in June 2006, but has been extended one year. The BPP project is targeting improved profits for emerging farmers, who own 40% of the beef cattle breeding herds in South Africa but generate only 5% of cattle sector returns. The income from these enterprises is very low (Tapson 1990).

The BPP project was designed to achieve target outcomes from the outset and to sustain outcomes post project. The specific target outcome of the BPP project was: "to achieve sustained improvement in profit per beef enterprise, per year, in a growing number of enterprises, communities and regions, in two provinces in northern and north western South Africa".

Fifteen farmer teams commenced in the BPP project in 2001 and the number had risen to 24 by 2005. These farmer teams routinely measured a number of price, cost and herd productivity KPIs based on the model set out in Figure 2. Following specialised training and capacity building workshops, a subset of the farmer teams also routinely calculated and recorded gross margins for their beef enterprises.

For the analysis reported here, the relevant price, cost and herd productivity KPIs were averaged or summed as required across the number of farmer teams reporting each year. These data are given in Table 1. As well, a number of KPIs for each element of the SI&I model described above were developed and routinely assessed by the project management team. These are discussed in detail in Clark *et al*. (2005b), Timms *et al*. (2005) and Nengovhela *et al*. (2007).

Table 1: Impact on beef profit CSFs and KPIs year by year in the BPP project (R = Rand)

KPI	2001	2002	2003	2004	2005
Price – Ave R/kg	4.56	8.5	7.13	7.23	8.8
Growth – Ave weight (kg) of calves sold		188	210	205	194
Reproduction Rate - Ave % calves/100 cows mated	43	51	53	62.6	64
Health - Ave pre-weaning mortality %	-	-	8	3.7	9.32
Throughput – Number sold/year	-	23	187	219	389

Based on the recorded data from the farmer teams, the BPP project increased revenue to the emerging farmers involved in the BPP farmer teams by more than 1.25 million Rand over the period 2001-2005 (Madzivhandila *et al*. 2007). These additional revenues represent between 216 R per farmer team in 2001 to 26,769 R per farmer team in 2005. The average across these five years is 14,358 R per farmer team.

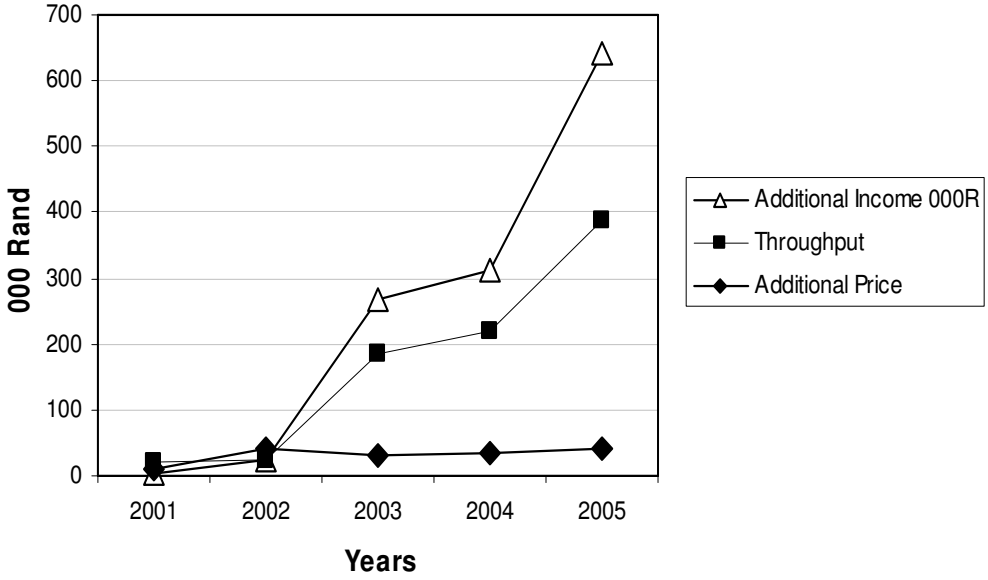
Tapson (1990) suggested that prior to the BPP project, an emerging farmer with 25 breeding cows would be able to generate a gross income of only 1,050 R per year from those cattle. From the data in Table 1 we can suggest that Tapson's farmer would have received an annual income of around 20,000 R if he had been a participant in the BPP project.

Based on the recorded gross margin data from the subset of farmer teams, the BPP project increased profits to these teams by 198,610 R over the period 2002-2005. This translates into an average improvement in gross margin due to the BPP project of 9,617 R per selected farmer team per year.

Therefore, the BPP project has been able to achieve measurable improvements in profit per beef enterprise, each year, in the participating communities and regions. Overall, at least half and potentially up to 66% of the additional revenue estimated to be attributable to the BPP project would be expected to be retained as additional profits to the participating farmer teams. Thus each Rand spent on improvements in cattle production and marketing has resulted in at least a two Rand return to farmers.

These improvements have been sustained across an increasing number of cattle enterprises and communities (Figure 4). The rising trend of additional revenue due to the BPP project is seen to be a function of the increasing number of heavier calves sold by an increasing number of participating farmers (the number of improvements), and the higher per kilogram price received for these calves (the impact per improvement).

Figure 4: Accumulated Income



Finally, the SI&I process implemented as an integral part of the BPP project has been demonstrated to lead to measurable, positive economic outcomes, even over a relatively short period.

The Australian BPP Project

The Sustainable Beef Profit Partnerships (also BPP) Project of the Cooperative Research Centre for Beef Genetic Technologies (Beef CRC) is designed to work in partnerships with beef businesses, value chains and the broader Australian beef industry to accelerate improvements, innovations and adoption and assist in meeting the overall Beef CRC target outcome of $179 million extra profit per year by 2012.

The BPP Project has specified the following short-term focus, which all groups are encouraged to adopt**:** **"**To achieve an additional 5 per cent improvement in annual business growth among Beef Profit Partners within two years", and the following target outcomes:

Rapid and measurable improvements in productivity, profit and growth;

Supportive network of rewarding partnerships, contributing to accelerated industry growth; and

Partners equipped to achieve sustainable improvement and innovation.

Some 50 BPP groups are being set up across the various beef production environments in Australia and New Zealand. Most of these will be commercial cattle producers, up to 5 will be full supply chains. Each group will have access to a trained facilitator and specialist economic and other technical support as required. Each facilitator and many producer partners have undertaken or will undertake CI&I training.

Three particular aspects of this project are noteworthy. First, following the outstanding success of the South African project, the use of a clear shared process of CI&I is advocated to enhance the rate of improvements and innovations. Each partnership is encouraged to adopt CI&I principles and practices to achieve improvements, innovations and adoption, and so assist in meeting the project focus and outcomes, and to measure and report their successes and failures.

Second, again based on the experiences in South Africa, a system-wide approach was developed to coordinate and manage the various CI&I partnerships, the linkages between them and their linkages with the broader beef industry, to assist in implementing efficient and effective mechanisms that will achieve the target outcomes.

Third, as part of implementing this system approach, the BPP project has designed and is managing a number of formal strategies (Figure 5):

Capacity, capability and competency - To ensure partners and industry are equipped and supported to achieve and accelerate improvements and innovations for sustainable impact on business profit and industry growth;

Communication, promotion and marketing - To ensure all partners have a shared vision of the project, and that the partnership network and industry are adequately informed of the project achievements, and share and promote improvements and innovations;

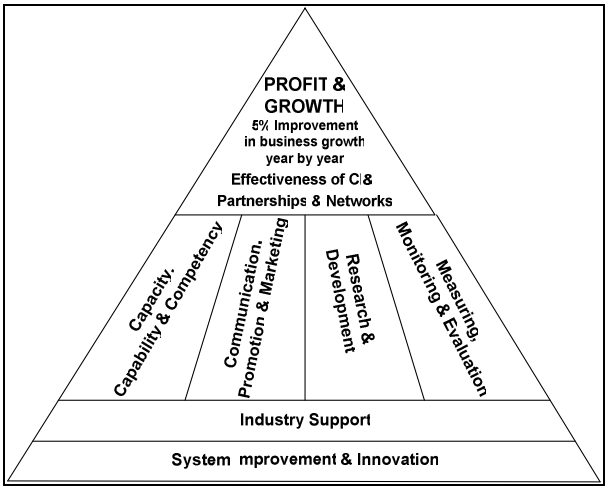
Research and development - To improve, discover and create more effective and efficient mechanisms to achieve accelerated improvement and innovation;

Measuring, monitoring and evaluation - To ensure partners and industry are able to demonstrate achievements and obtain feedback and support to contribute to achieving further improvements and innovations;

Partnership and industry support – To achieve momentum and institutionalisation of the CI&I process during and after the project; and

System management and improvement – To ensure CI&I principles are applied to all elements, strategies, processes, methodology/mechanisms, human infrastructure and the project system as a whole.

Figure 5: Six strategies to ensure effectiveness of CI&I partnerships and networks for beef business profit and growth



The strategy of most interest to this audience is the Measuring, Monitoring and evaluation (MM&E) strategy. Considerable effort has been put into designing and implementing effective and efficient monitoring and recording mechanisms that will assist in achieving the project's three overall target

outcomes. Each of these outcomes has a set of KPIs that can be measured by the producer partners or the group facilitators (Table 2, Appendix 1) (ISNAR 2003).

Further details on the Australian project are available in Griffith *et al*. (2007).

Discussion

In this paper it has not been possible to fully describe either the SI&I process, its successful application in South Africa, or its potential application in Australia. The results so far suggest that the model is a valuable addition to the toolkit of extension practitioners and adoption scientists, and that its methods can be readily applied in either a developing or developed country context where the focus of the project is on rapid rates and/or broad scales of impact.

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Appendix 1: Table 2 Beef Profit Partnerships – Project Performance Measures

Target Outcome 1 - Rapid and measurable improvements in productivity, profit and growth

1	KPIs measured every 180 days	2	Results
1.	**Price - $ / kg**	**3**	
2.	**Throughput - kg / ha**	**4**	
3.	**Costs - $ / kg**	**5**	
4.	**Profit - $ / ha (per product, enterprise or business)**	**6**	
5.	**Relevant on-farm productivity KPIs (e.g. growth rate, reproduction %, death %)**	**7**	
6.	**Profit & productivity improvement in other enterprises**	**8**	

Target Outcome 2 - Supportive network of rewarding partnerships, contributing to accelerated industry growth

9	KPIs measured every 180 days	10	Results
1.	**Number & type of BPP partners**	**11**	**Number of business managers, industry leaders/facilitators, specialists & researchers in the regional BPP network**
2.	**Number & value of BPP focuses and activities**	**12**	**Number & type of BPP meetings. Scores of value (average & range out of 10). What liked & why; what not liked & why**
3.	**Number & value of BPP communications, resources and specialist support**	**13**	**Number & score of value for kits, brochures, newsletters**
4.	**Number and type of improvements & innovations shared**	**14**	**Number of improvements reported**
5.	**Value of BPP groups/teams**	**15**	**% of meeting attendance. Feedback on BPP**
6.	**Value of the BPP network**	**16**	**% of meeting attendance. Feedback on BPP**

Target Outcome 3 – Partners equipped to achieve sustainable improvement and innovation

17	KPIs measured every 180 days	18	Results
1.	**Number of partners who understand and value, the concepts and process of CI&I**	**19**	
2.	**Number and value of CI&I tools used**	**20**	
3.	**Number & description of improvements & innovations implemented**	**21**	**Reports on Action & Monitoring**
4.	**Number of improvement opportunities assessed**	**22**	**Reports on Performance Analysis & Evaluation**
5.	**Improved knowledge & skills of concepts, methods, tools & technologies**	**23**	**Reports on what individuals have learnt & changed that they did not know or do before**
6.	**Number of concepts, methods, tools & technologies created, used &/or improved**	**24**	**Reports on new ways of assessing & managing the concepts like 'throughput', new products etc.**