Personal and business improvements and innovations: Methodology and mechanisms for successes

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Abstract. This paper presents insights into the creation and achievement of more and higher-scaled improvements and innovations of value to agricultural businesses. It also highlights how action research enhanced the capacity of business managers to improve and innovate. The researchers interacted closely with agricultural business managers presenting and implementing a new improvement and innovation process over 15 months. The analysis and synthesis presented contributes to the methodology of continuous improvement and innovation in three respects. First, it exemplifies how a continuous improvement and innovation process can be designed and applied to achieve outcomes from the outset. Second, it demonstrates how the creation of social infrastructure fosters innovativeness and creativity within a business. Lastly, it provides evidence of the success of sequenced, levelled mechanisms, which enabled R&D partners to develop innovation abilities.

Keywords: Improvement, innovation, process, action research, mechanisms.

Introduction

Australian government policy documents, 'Powering Ideas an Innovation Agenda for the 21st Century' and 'Venturous Australia building strength in innovation', position innovation as the key to our future (Cutler 2008). However, Australia is not innovating at the rate of other developed countries, having slipped from fifth to eighteenth in the World Economic forum's Global Competitiveness Index (Schwab & Porter 2008-2009). Following the work of Buker (2003) we define innovation as 'a process of generating, selecting, and applying a new creative idea that has value for the marketplace, workplace, and/or community'.

The role of innovation in social and economic development was referred to as far back as the 1940's when Schumpeter (1942) emphasised the importance of innovation for business and society. Higgins (1995) later stated that to meet current turbulent environments, innovation throughout a business is essential. Plsek (1997) agreed, reiterating that in our fast-paced world, creative thinking and the production of improved and innovative products and services are essential to future success. More recently, Johnson (2010) offered the same message that innovation is imperative.

The innovation literature suggests the concept of innovation can have a positive influence on agricultural businesses, mainly due to its successful track record in the manufacturing and service industries. However, it acknowledges that agricultural businesses are less likely to innovate or conduct research and development (R&D), perhaps partly because they are typically small family-owned and operated businesses (Walmsely and Tanousis 2008).

Many small and medium-sized businesses fail because they do not recognise the need for change. They are inward-looking and chiefly occupied with current crises, often neglecting emerging storm clouds on the horizon. Even if they engage with others to better understand the wider issues, it is very often with people in the same network and with the same perspectives (Bessant and Tidd 2011).

The goal of this paper is to illustrate a methodology and mechanisms (tools, concepts and principles) to achieve a higher number of improvements and innovations with agricultural businesses for profit, people, and the planet. This methodology arises from the results of R&D conducted with small, family-owned, agricultural businesses in central Queensland.

Improvement and Innovation

Though much is written about improvement and innovation, few authors integrate the two (Kaplan and Norton 1992; Buckler 1996). The focus is usually on continuous improvement (CI) or innovation. However, Clark and Timms (1999) created a model that combines continuous improvement with innovation (CI&I). Their model represents a different way to practice CI and innovation. This CI&I model was built on in the research presented in this paper.

Improvement and innovation can be integrated when R&D is understood as an evolving process. R&D involves adapting to new contexts, like a highly competitive and global marketplace, and is reflected in the way R&D is managed and resourced (Nobelius 2003). Guided by Miller and Morris (1999), the R&D presented in this paper represents what they describe as the fourth and

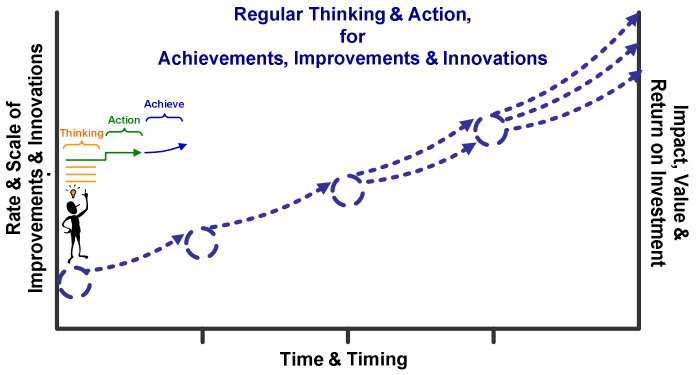
fifth generations of R&D. These generations advocate a high degree of involvement from customers, developers, researchers, and managers, emphasising the need to develop partner capability so they can actively engage with the R&D. R&D is seen as an integrative network focusing on collaboration within a wider system. The fourth and fifth generations of R&D award primacy to the internal creation and achievement of improvement and innovations, rather than the mere dissemination of externally-sourced improvement and innovation.

Miller and Morris's fourth and fifth generations of R&D helped to form a clear vision, and methodology for this R&D that impelled the partners towards success. The partners found this pathway to be a stimulating and an attractive alternative to 'business as usual'. As reported elsewhere, mobilising industry members to participate in improvement and innovation can lead to significant gains (De Jager et al. 2004). While acknowledging that increased effort or resources may work in some circumstances, more of the same is very limited as a long-term strategy (Langley et al. 2009).

Methodology

Our goal was to use proven business management concepts, practices, and mechanisms to build prosperous agricultural businesses for now and the future. Mechanisms in this research represent structured instruments or systematic means to guide and focus thought and action towards a purpose or outcome. There were three different types of mechanisms employed: tools, concepts and principles. These business instruments enhanced the thinking and action of agricultural business managers, equipping them to actively create, design, and achieve desired change in the form of improvement and innovation. Our R&D helped to design and test a new approach to advance agricultural businesses. Figure 1 is a visual representation of this R&D, illustrating that the creation and achievement of improvement and innovation were achieved through repeated cycles of focused thinking and action. These achievements arose from using a clear set and sequence of mechanisms to achieve greater numbers of, and higher levelled, improvements and innovations – it did not occur by accident.

Figure 1. A visual representation of regular cycles of improvement and innovation for a great number of and higher levelled improvements and innovations



This approach is different from current approaches for six key reasons. First, it starts with an end goal, beginning with the image, picture, or statement of what is to be created (Covey 1989) by the end of a cycle. Second, it is not linear, operating in cycles of learning and change. At the end of each cycle businesses are ahead of where they began. Third, it equips business managers with mechanisms to create and execute targeted changes. Mechanisms represent structured instruments or systematic means to guide and focus thought and action towards a purpose or outcome. Fourth, this approach stimulates creative thinking, ideas, and opportunities for the future - business success is less a question of technology and more a way of thinking, finding, and applying creative solutions within a business (Hidalgo and Albors 2008). Fifth, it focuses on the generation of ideas that are highly relevant for improvement and innovation along with the skills and mechanisms required to execute them. Finally, the approach changes previous thought patterns and asks business managers to be active in thought and action – improvement and innovation come from the thinking and action of business managers. The managers designed, implemented, monitored, and measured the outcomes associated with the improvement and innovation projects on their properties,often working in partnership with researchers, consultants and their community.

Mechanisms, which guided the thinking and action of business managers, were sequenced within the cycles of improvement and innovation. The managers assessed 41 introduced mechanisms over four cycles of improvement and innovation. Twenty-seven (66%) of these were assessed for value and impact. All mechanisms were reported to enhance the thinking and action of managers and resulted in a greater number, and higher level, of improvement and innovation. Our research questions in relation to mechanism use were: 1) Which mechanisms enhanced thinking and action towards improvement and innovation? 2) What critical factors enhanced or constrained, from a systems perspective, the use of mechanisms 3) What key elements and/or pathways within the research system need to be functioning to support the achievement of sustainable improvement and innovation?

Continuous Improvement and Innovation

Following an introduction to its aims, agricultural business managers in central Queensland were invited to become partners in this study if they: were interested in the R&D; understood the key elements of their business; were willing to implement and assess mechanism effectiveness in all dimensions of their life; and were open to learning and sharing the lessons they garnered. Seven to twelve cases were worked with simultaneously over 15 months to gather data and synthesise the lessons learnt to gain a better understanding of improvement and innovation mechanisms. In this R&D, the managers were viewed as partners rather than research subjects – as such, the researcher-manager relationship was interdependent with clear rights, roles, and responsibilities towards a shared purpose. The R&D projects were not completed in a linear way, but progressed in regular and frequent cycles (over 1 day, 7 days, 30 days, 90 days, and 180 days) of CI&I (see Figure 2).

Figure 2. Continuous improvement and innovation process

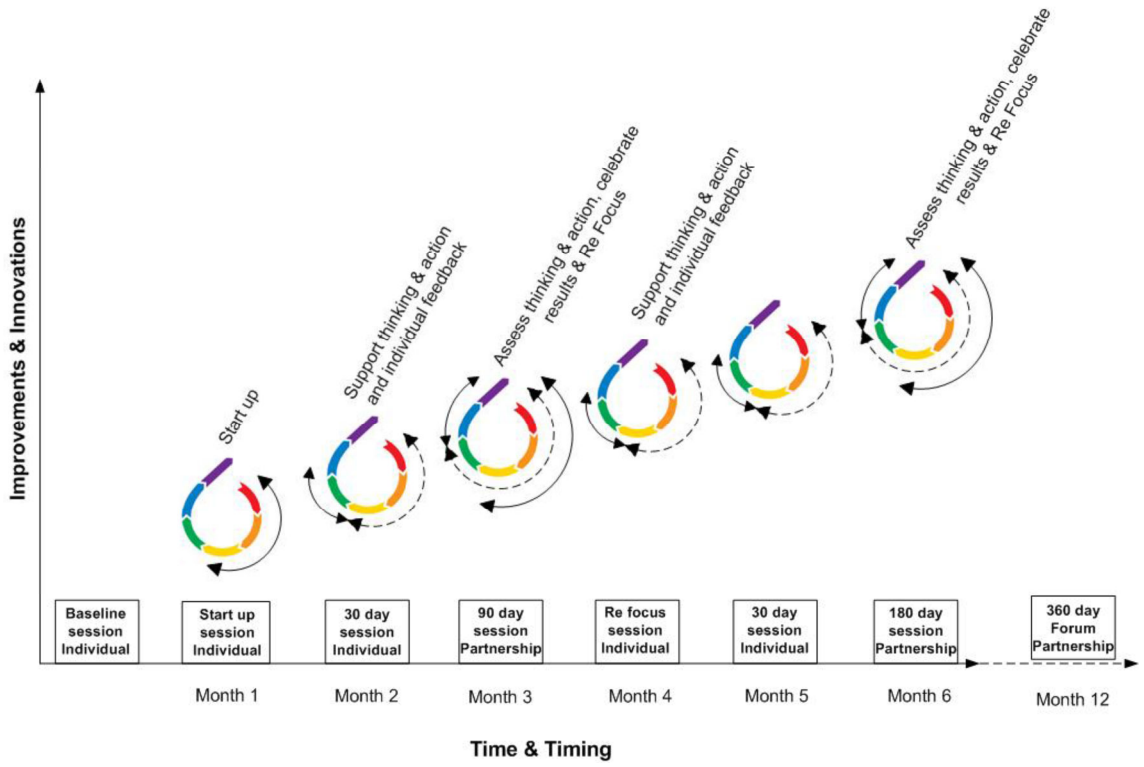
The CI&I process employed is a sequence of seven steps where the outcomes of a step feed into the subsequent step (see Table 1). This process enabled the partners to enhance and apply their knowledge, skills, and thinking to improve their performance and results. Each time the seven steps were completed, a new level of performance was achieved from which further improvement and innovation are possible. Data from each case was analysed and synthesised at the completion of a CI&I cycle, with lessons learnt informing the subsequent cycle. The partners built on their achievements as they moved into the next cycle.

The productivity of the CI&I process is strongly related to the number, frequency, and quality of the cycles that individuals and collectives experienced (see Figure 3). As such, thinking and action needs to occur regularly and frequently. During the study, a CI&I session was facilitated every 30 days, with each session designed to achieve specific outcomes. For example, the first 30-day session (the start-up) was facilitated with individual businesses and moved through the first four steps of the CI&I process. Group sessions (involving several partners) then occurred every three months, with four CI&I cycles completed over 15 months.

Table 1. CI&I process steps and outcomes

CI&I process steps	Outcomes
Focus	Clear, shared and agreed goal to focus attention on. A vision of a desired outcomes
Explore	Thinking and action about new improvements and innovations, opportunities. The generation of novel ideas and opportunities that address challenges
Select	Increase likelihood of success by analysing and deciding which options to choose and take forward
Design	Focused on goals and designed action
Action	Action kept on track regularly and frequently
Assess	Results and performance tracked and assessed
Create	Creating new ideas, and opportunities for improvements and innovations
Refocus	Clear, shared and agreed goals to focus attention on

Figure 3. Timing of CI&I sessions



The productivity of a CI&I process is also related to the mechanisms chosen at each step. It is outside the scope of this paper to describe the mechanisms used. Gray (2013) describes all mechanisms in full. Some mechanisms were sourced from the literature, while many were designed as part of the CI&I process. To ensure the mechanisms were used in a purposeful way, levelled mechanisms were selected and sequenced for outcomes. Levelled mechanisms are mechanisms at three different thinking and acting levels; practice or operational level, process or tactical level, and system or strategic level. Accordingly, different mechanisms and sequences of mechanisms were required to accomplish different results through the CI&I process. For example, during the first cycle of the CI&I process, the partners used the following sequence of mechanisms: SMARTT focus; Brainstorming; Eight Dimensions tool; 5W's and 1H; Action Reporting and Support Framework; Observation, Question, Idea, Opportunity (OQIO) tool; and Achievement Stacker. Guided by an assessment instrument, the partners were invited to consider the strengths and limitations of each mechanism, and determine whether the mechanism enabled them to achieve their goals.

As a partner in this R&D the lead author coached partners. This involved enabling the partners to use the mechanisms and providing timely support. Working on their own property projects,

partners committed their time and efforts to improvement and innovation in a range of areas relevant to their businesses (see Table 2).

Table 2. Partner projects over three cycles

RP	Project Cycle 1	Project Cycle 2	Project Cycle 3
1	Off farm business	Off farm business	Developing a real estate business
2	Water use efficiency	Developing a focus a month	Project for four system elements
3	Herd density pasture productivity	Increase plant diversity	Egg packing process and pasture plant diversity
4		Science of support	Develop Sustainable CI&I model Personal application of sustainable CI&I
5	Time management	Free range pig business	Free range pigs and infrastructure plan
6	Biological inputs	Free range pig business	Free range pigs and human resource
7	Leucaena and profit	Share trading	
8	Leucaena and profit	Winter pasture crop	
9	Family health		
10	Family health		
11	Supplying local produce	Developing business	Systems model for agriculture
12	Time management	Improved life style	
13	Off farm business		

Results

This paper presents results following the implementation of 41 mechanisms, with particular reference to the following research questions: Which mechanisms enhanced thinking and action towards improvement and innovation? Which of these mechanisms were previously known to managers? What was the assessment of these mechanisms? What was the continued use/adoption of these mechanisms? What improvements and innovations were achieved?

Mechanism assessments

New mechanisms with increasing complexity were introduced during each cycle. These included 26 tool mechanisms; 13 concept mechanisms; and two principle mechanisms (see Table 6).

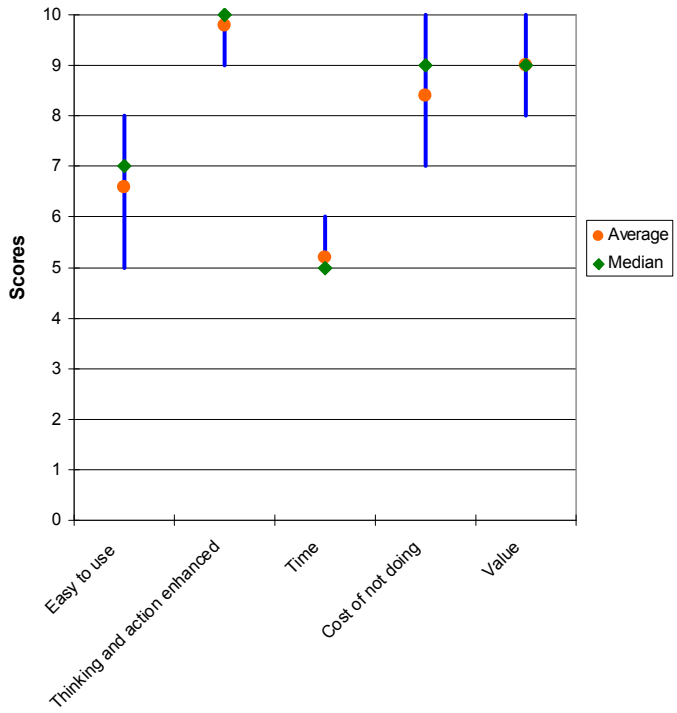
Of the 41 mechanisms, two-thirds (66%) were considered using an assessment instrument. Most assessed were tool mechanisms (81%). The mechanism assessment instrument used was improved throughout the cycles of CI&I, quantitatively and qualitatively. Figure 4 displays the final version.

Figure 4. Mechanism assessment instrument

Name	**Type/level**	**Scores (Low = 1; High = 10)**				
		Ease of use	Stimulated thinking and action	Time to complete	Cost of not using	Value
Use again: **Yes** **No** **Appraisal of mechanism** (Use with other mechanisms, sequence of mechanisms, achieves what outcome(s), individual or group use, improvements, stage within improvement and innovation process)						

The results of each assessment were plotted into a graph, one of which is presented in Figure 5.

Figure 5. Assessments of the Observation, Question, Idea, Opportunity (OQIO) tool, cycle 3



Question 1 Which mechanisms enhanced thinking and action towards improvements and innovations?

As part of the assessment instrument the partners were asked to score out of 10 how much the mechanisms stimulated their thinking and action. Table 3 displays the resulting scores.

Table 3. Enhanced thinking and action scores for cycle 3 and 4

Mechanism	Enhanced thinking and action score		
	Mean	Median	Range
System Design and management	9.8	10.0	9-10
Use of mechanisms	9.0	10.0	8-10
Levels of thinking and action	9.5	9.5	9-10
Front End	9.0	9.0	9
Outcome achievement	9.0	9.0	8-10
OQIO receiving	8.6	9.0	7-10
Presentation Outline	8.0	9.0	6-10
Support	8.0	8.5	5-10
OQIO giving	8.0	8.5	6-10
SWOT	8.0	8.5	6-9
Keep momentum	8.0	8.0	6-10
Process Design and management	7.0	7.5	5-9
Action Design	7.0	7.5	4-10
Impact and influence	7.5	7.5	5-10
Action Reporting and Support	7.0	7.0	6-9

Overall the partners reported that all mechanisms through all four CI&I cycles enhanced their thinking and action to varying degrees. For many partners, this was their first opportunity to use mechanisms like these in a sequential way for success.

Question 1a Which of these mechanisms are known to Australian agricultural businesses?

All types (tool, concept and principle) of mechanism were tested. Of the 27 mechanisms trialled and assessed, partners were only familiar with seven. Of the 21 tool mechanisms, they were only familiar with three tool mechanisms. Two of the three tool mechanisms, Brainstorming and SWOT Analysis, were known by all partners, while the third, 5Ws&1H was known to only 18% of partners.

Question 1b What was the assessment of these mechanisms?

Table 4 displays the ranking given to all assessed mechanisms across the four cycles. Of the mechanisms that received a ranking of three and above, nine were tool mechanisms, three were concepts and two were principles. The majority of mechanisms fell within a ranking four and above. It is also apparent that partners did not find some mechanisms useful.

Table 4. Ranking of mechanisms across the four cycles

Mechanism	Ranking	Cycle practiced
Brainstorming, OQIO, Levels of thinking and action, Use of mechanisms for new and better thinking and action, Keep momentum, OQIO receiving	1	1, 2, 3, 4
SMARTT Focus, Action Design, Outcome achievement, Presentation outline	2	1, 2, 3, 4
OQIO, Focusing Frameworks, Support, OQIO giving	3	1, 2, 3, 4
5Ws & 1H, Action Monitoring and Support Framework, System Design and Management, Action Design	4	1, 3, 4
Collaborative OQIO, OQIO, Process Design and Management, SWOT Analysis	5	1, 2, 3, 4
CI&I process, Action Monitoring and Support	6	1, 2, 4
Achievement stacker, Concept Fan, Impact and Influence	7	1, 2, 4
Action Reporting, Collaborative OQIO,	8	1, 2
8-Dimension, Impact and Influence	9	2
Random Entry	10	2
Reporting Outline	11	2
Achievement Stacker	12	2

The mechanisms that received the most positive assessments were Brainstorming; OQIO; Levels of Thinking and Action; Mechanism Use for New and Better Thinking and Action; and Keep Momentum. However, some mechanisms were not considered to be personally useful.

During the first cycle, the partners awarded low value scores to the mechanisms. The second cycle generated responses that were relatively more positive, with mechanism assessments varying from moderately low to high. By the third cycle, the partners were excited by the introduced mechanisms, awarding high scores for all, bar one of the mechanisms. They also became more aware of cycles and sequential mechanisms, sequential thinking, and action. During the fourth cycle, the partners became fatigued by mechanism assessment. Nevertheless, they remained committed to supporting each other in the use of mechanisms within the CI&I process, and recognised value in the R&D approach. Partners were willing and able to continue using those mechanisms they were most confident with.

The partners largely engaged with the OQIO tool and SMARTT focus, continuing to use these over time. The most popular tools were Action Monitoring and Support, as well as System Design and Management, followed by Action Design, Brainstorming, Keep Momentum, Levels of Thinking and Action, Outcome Achievement, Process Design and Management, and Support.

Question 1c What was the continued use/adoption of these mechanisms

Each partner had opportunity to develop their own personal toolkit to further their thinking and action within their own context. This represents a point of difference from generic approaches the partners had become accustomed to. As a tailored toolkit, the partners indicated their intention to continue using the mechanisms. Toolkit creation plus partners' response to whether they would use the mechanism being assessed again provided the evidence of adoption (Table 5). A significant numbers of mechanisms would be used again.

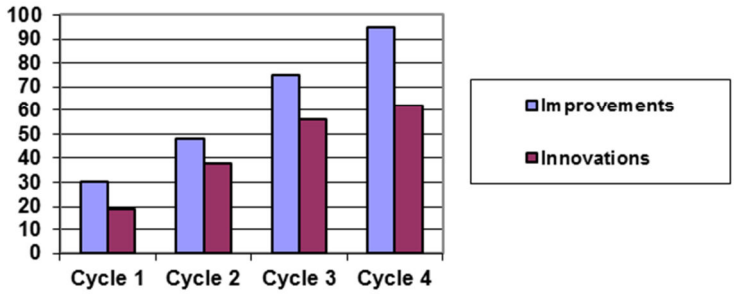
Table 5. Mechanisms that will be used again by partners

Mechanism	% of partners that will use mechanism again
Brainstorming, Focusing Frameworks, Impact and Influence, Action Design, OQI, Collaborative OQIO, System Design and Management, Process Design and Management, Levels of thinking and action, Mechanisms use for new and better thinking and action, Outcome Achievement, Keep Momentum, Support	100
SMARTT Focus, Action Reporting and Support Framework, OQIO	92
Action Monitoring and Support Framework	86
Random Entry, Achievement Stacker	78
5Ws & 1H	75
Concept Fan	71
8-Dimensions, Collaborative OQIO, Reporting Outline	67

Improvements and innovations achieved

Through the course of the four cycles, the partners became increasingly competent in their use of mechanisms, achieving 95 improvements and 62 innovations over 15 months (see Figure 6). This demonstrates partner capacity to introduce, cultivate, and sustain improvement and innovation. Additionally, they now had a means to measure success.

Figure 6. Number of improvements and innovations



Discussion

This paper demonstrates how agricultural business managers became competent mechanisms users, and in doing so, achieved a greater number and higher levell of improvements and innovations than previously possible. As such, it was not necessarily the number of mechanisms used that was important, but rather, the competent use of these mechanisms. Competent use is demonstrated by the (combined) application and sequencing of mechanisms effectively, efficiently, and creatively. The mechanisms essentially differed by: (1) their use by an individual or a group; (2) the pre-work required; (3) their ease of use; (4) the required level of thinking and action; (5) the time required to use the mechanism; and (6) the level of benefit.

Prior to this study, the partners were largely unfamiliar with the mechanisms. They were not accustomed to this new way of conceiving, and progressing towards improvement and innovation. As such, their initial assessment of mechanisms that challenged them was typically poor. Despite this, they became increasingly aware of the benefits afforded by this new approach and valued the opportunity to learn with others. This suggests agricultural business managers are likely to benefit from continued support as they work through the CI&I stages.

Although the CI&I process presented in this paper can be applied in a mechanical, stepwise way, its beauty and power are found in the way it integrates thought and behaviour. Corresponding with the view that creative minds help to generate improvement and innovation (Plsek 2003), the partners in this study valued the opportunity to progress through a shared process designed for success. Although each partner's situation was unique, their concerted thoughts and behaviours helped to give rise to viable improvements and innovations. Furthermore, given the extended timeframe of this study, and the number of partners involved,

the findings suggest the approach has the elasticity required to accommodate the dynamic nature of change and innovation.

Conclusion

The aim of this study was to strengthen the nexus between improvement, innovation, and agricultural business managers. Towards this aim, the authors examined current and new mechanisms that enhance thinking and action, and ultimately give rise to greater improvement and innovation. Findings from this study indicate that mechanisms that were sequenced, levelled, and interlinked enhanced the managers' thinking and action, enabling them to attain real-world outcomes.

This finding has four key implications for agricultural business owners. First, it is important to design, redesign, measure, and manage improvement and innovation projects in partnership with others. The managers in this study achieved their goals by collaborating with researchers, other managers, and the community. Second, if improvement and innovation projects are to succeed, they require regular and frequent measurement and management. Third, improvement and innovation can be facilitated by clear mechanisms. Fourth, when conceiving an improvement and innovation project, it can be helpful to identify and work towards the desired outcome.

Improvement and innovation require creative effort. To facilitate this, this paper presents practical and proven mechanisms. Once managers have made the decision to be proactive and make targeted changes, these mechanisms can bolster the likelihood of success in all dimensions of their lives.

Acknowledgements

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Thank you to Terry Sloan and Ann Dadich who added depth and took the contribution of this work to another level. I especially thank Richard Clark for without his set of values, vision, steadfastness, and intellect this research and development would have not happened.

Ethical clearance issues

Approval to conduct this study was granted by the University of Western Sydney Human Research Ethics Committee.

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Table 6. Mechanism assessed

Mechanism	Type	Assessed
1. CI&I process	Tool	Yes
2. SMARTT focus	Tool	Yes
3. Brainstorming	Tool	Yes
4. 8-dimensions	Tool	Yes
5. 5Ws&1H	Tool	Yes
6. Action reporting and support framework	Tool	Yes
7. Observations, questions, ideas and opportunities (OQIO)	Tool	Yes
8. Achievement stacker	Tool	Yes
9. Collaborative OQIO	Tool	Yes
10. Outcome achievement	Concept	Yes
11. Short, medium, long term	Concept	Yes
12. Support	Concept	Yes
13. Feedback and feed-forward	Concept	
14. Head heart and hand	Concept	
15. Partnership	Concept	
16. Tool Selection Guide	Tool	
17. Focusing framework	Tool	Yes
18. Impact and influence	Tool	Yes
19. Action design	Tool	Yes
20. Personal performance checks	Tool	Yes
21. Stop doing	Tool	Yes
22. Specialist questioning	Tool	
23. Reporting outline	Tool	Yes
24. Concept fan	Tool	Yes
25. Random entry	Tool	Yes
26. Focused thinking and action	Concept	
27. Levels of thinking and action	Concept	Yes
28. Higher rate and scale of improvements and innovations	Concept	
29. Tool selection	Concept	
30. CSFs, KPIs, KPs	Concept	
31. Reporting for Support	Concept	
32. Creation and synthesis	Concept	
33. System design and management	Tool	Yes
34. Process design and management	Tool	Yes
35. Inverse thinking	Tool	
36. Front end	Tool	Yes
37. Team action design	Tool	
38. CSFs and KPIs levels framework	Tool	
39. SWOT analysis	Tool	Yes
40. Mechanism use for new and better thinking	Principle	Yes
41. Keep momentum	Principle	Yes