



## **Innovation: current thinking of the Research Into Use (RIU) programme**

### **Executive Summary**

This paper summarises current RIU thinking on how innovation occurs and what interventions are most effective in promoting the greater use of research-based knowledge in innovation in the renewable natural resource sectors in developing countries. It provides a simple narrative to help both partners and programme staff to understand what the RIU programme means by an innovation systems 'perspective'. The paper identifies seven priorities which appear necessary to support innovation in the contexts in which RIU is working. This document will be regularly revisited by the programme to enable the learning from the 'operationalisation of the innovation system approach' to be included.

### **Introduction**

The Research Into Use (RIU) programme aims to improve access to knowledge and technology that can improve the livelihoods of poor people who depend on natural resources. The RIU has the twin aims of maximizing the poverty reducing impact of previous research on natural resources and, in doing so, to increase our understanding of how knowledge – informal as well as formal – contributes to innovation.

Innovation is at the heart of the RIU programme. There is already a wealth of knowledge available; the challenge is how to stimulate the processes by which that knowledge is put to practical use by or for the benefit of large numbers of people.

This briefing note attempts to build on what has been learnt about innovation throughout the world. It builds particularly on experience in OECD countries but also draws on experiences from various extension programmes, the DFID-funded Renewable Natural Resources Research Strategy and the initial experiences of the RIU programme. The briefing note attempts to summarise elements of effective practice of making better use of research and related funding. RIU is particularly concerned about the impact on poverty of this use.

### ***What is 'Innovation'?***

The word "innovation" is appearing with increasing frequency on the agendas of both governments and international organisations. It is driven by two concerns: that

developing countries are not able to utilise the fruits of the huge stocks of global knowledge that seem to contribute so much to prosperity in industrialised countries; and the growing evidence that focussing investment narrowly on ‘research’, rather than other blockages in the innovation system, has not had the desired impact on growth and poverty reduction.

The starting point for RIU’s perspective is that (a) research-based knowledge can make an important contribution to poverty reduction, even if new knowledge is probably often not the main constraint to poverty reduction; (b) that ‘research’ could be more effectively used to reduce poverty; and (c) that a great deal of what is described as ‘research’ is not relevant to the reduction of poverty, especially among rural people, but could be made more so.

In this context ‘innovation’ is defined as the first significant use of new ideas, new technologies or new ways of doing things in a place or by people where they have not been used before.

At its simplest, innovation increases productivity that enables more goods or services to be produced with less effort or resources, and/or produces better or different goods or services. This means that effective innovation produces competitive or other advantages which result in increased production, incomes, economic growth, and/or poverty reduction. Conventionally *research is said to convert money into knowledge, whereas innovation converts knowledge into money (or products like food or shelter).*

Innovation, in the sense used here, takes place in all countries. Some of it is the result of government intervention, but most occurs in the private sector (on farms and in firms) and much will involve informal mechanisms of communication and support. In this sense, all countries can be said to have an “innovation system”. However the extent of innovation within these systems varies considerably and the key question is how to increase it.

There have been many attempts to describe these innovation systems and to summarise what public and private sector interventions have been most successful in promoting innovation (see Further Reading and on [www.researchintouse.com](http://www.researchintouse.com)).

### **An example from improved beans**

**Research** – collecting and testing varieties of climbing bean that take less space than prostrate varieties traditional to the area.

**Extension** – telling and showing farmers the new varieties.

**Innovation** – the first use of the knowledge to grow the new varieties on a significant scale by farmers; this may also require changes to seed supply, the market chain, etc.

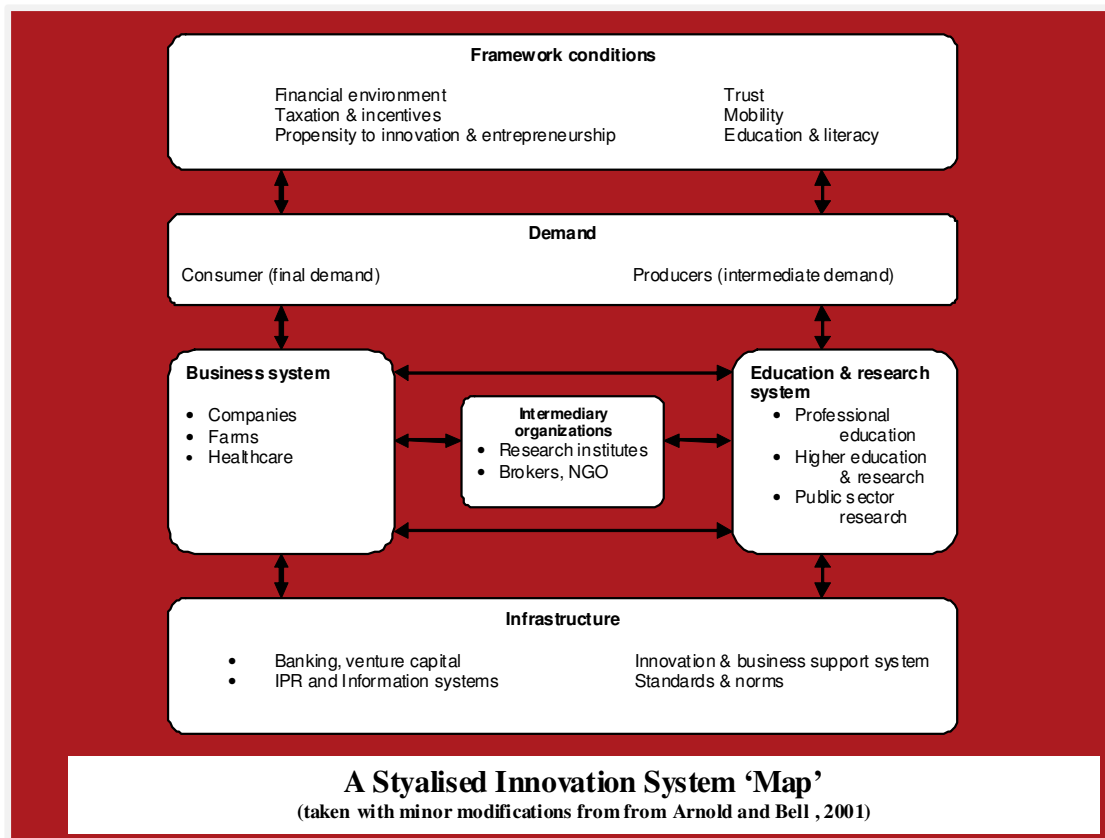
**Scaling-out** – other farmers copying the innovator farmers, perhaps with additional changes to seed supply, market chains etc.

**Scaling-up** – the new varieties being ‘adopted’ and promoted by ‘higher’ levels of Government and other organisations (and hopefully as a consequence ‘scaling-out’ to more farmers).

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The simple innovation system ‘map’ by Arnold and Bell (see figure) has proven to be a particularly effective aid to enable people to gain insight into what is meant by the innovation systems approach (see page 11 for a worked example).

All innovation takes place within a social, economic, and technological “space” in which a number of actors interact within constraints set by “framework conditions” (policies, wealth, custom and practice, regulatory and legal frameworks, culture, taxation and incentives, distribution of political power etc) and “infrastructure” (banking and venture capital, transport, telecoms, innovation and business support, etc). These interactions can usefully be considered as part of a “system” which is complex and evolving through time.



The innovation systems perspective emphasises:

- The importance of **both** the “supply push” of the research community and the “demand pull” of the users of new knowledge. Indeed the successful system requires a constant interaction between the organisations and actors of the left of the diagram – which for simplicity can be called the ‘users’ of knowledge – and those on the right – predominantly the ‘suppliers’ of codified knowledge.
- The importance of ‘intermediary organisations’ in finding out what producers (and their customers) want, and searching through the range of options within the stocks of existing and new knowledge to find what best meets the need. These

tasks of intermediation can in principle be carried out by any of the organisations listed on the diagram, but they tend to be undertaken by consulting organisations, brokers (sometimes known as “technological midwives”), non-government organisations (NGOs) and applied research institutes (when operating in consulting or facilitating mode). Increasingly small and micro enterprise support organisations (those that supply “business development services”) are performing this role in successful economies, often with an element of government subsidy.

- The ‘framework conditions’ and the basic ‘infrastructure’ (shown at the top and bottom of the diagram) have also been seen to be crucial elements of the system. Indeed it is often the ways of working, aspects of culture, the social value placed on innovation and entrepreneurship, and banking “ethos”, that most effectively explain the difference between countries that innovate and those that do not. Weaknesses in the infrastructure often form the major constraint to the effectiveness of much research in developing countries.
- The importance of both “tacit knowledge” and “codified knowledge”. The former is associated with human skills and experience, while the latter is knowledge that is documented, or in some other way systematised (for instance in blue prints, manuals, instructional videos or computer programmes). Innovation usually requires both types of knowledge. Farmers have been shown to contribute importantly to the innovation process with their tacit knowledge of local circumstances and years of farming experience.
- The importance to successful innovation of networks that provide effective communication channels linking the various organisations and individuals that make up the system. Such networks can be both formal and informal. But informal links appear to particularly important, particularly where they foster trust between the various parties, and thereby lower the transaction costs of the interactions. Trust relations result in both parties knowing each other’s needs, knowing the nature and quality of

### **Competitive and collaborative relations within the same innovation network**

In a simple example, dairy farmers and a milk factory are linked in the same value chain. Farmers and the factory may **collaborate** together to introduce an innovation (perhaps simple milk coolers) that improves milk quality. The same farmers and factory may have a **competitive** relationship when negotiating prices for the improved quality.

The farmers may **collaborate** together to try to force an agreed higher price from the factory but **compete** with each other when trying to negotiate individual quotas.

A large number of farmers and factories may **collaborate** together to lobby the government to restrict dairy product imports in order to protect their investment in innovation. The very same groups may **compete** mercilessly when trying to build local market share.

Therefore on different issues the same actors are likely to collaborate or compete – often at the same time. This requires sophisticated interpersonal skills and the ability to form and re-form alliances according to different needs and contexts.

the goods and services on offer, and may even obviate the need for legal contracts and reduce the risk of non-payment. Innovation network relationships are usually both **collaborative and competitive**, with the different actors relating to each others as competitors on some issues (e.g. in relation to market share or technology development) and collaborators on other issues (e.g. in lobbying for improvements to framework conditions). Some members of an 'innovation network' may be more formally linked together to achieve a common purpose – this is referred to as an 'innovation platform'.

Against this simple narrative it is important to stress that effective approaches to encourage innovation will be diverse and will encompass complexity and uncertainty. In developing countries especially, interventions to encourage innovation must guard against imposing unacceptable risks on resource-poor people, for whom failure is likely to result at least in greater hardship, or worse.

RIU is interested not only in 'first use', but also 'scaling-out' and 'scaling-up' (see box for definitions) the use of knowledge for the benefit of poor people. It is not yet clear whether this scaling-up and scaling out requires the same type of interventions as those that encourage the initial innovation. This is an area that RIU will look at further.

### **From Perspective to Action**

Is it possible to summarise the emerging consensus surrounding the essential actions required to support innovation?

Certainly there will be no single blue-print that will fit all situations. The innovation literature demonstrates the powerful effect of 'context'. Furthermore, the ability of an organisation to innovate is dependent on what they have done before ("path dependence". If an organisation does not have the necessary tacit knowledge to innovate it must invest to acquire it, or hire people who bring the necessary knowledge with them. This is unlikely to be easy for an innovation platform. What an innovation platform can do depends on both the tacit knowledge of its members and the codified knowledge they have access to. Since vital bits of both the codified and tacit knowledge may be held by different actors in the platform, the flow of knowledge and the sharing of tasks are likely to be very important.

**Not only is there no blue-print, but organisations and entrepreneurs cannot know at the outset all of what they need to do to innovate.** This means that innovators must continuously learn. Organisations and individuals need to test continuously the environment within which they operate by adopting an iterative process in which they embark on a course of action and they modify it in the light of experience. This learning is not a passive process, but one that requires purposive action and investment in the necessary time and resources.

The capacity to use information and learn is important at both an individual and organisational level. A certain technical capacity is needed in order to be able to understand what information is needed, the meaning of the information and how to act on it. Although consultants and information sources, like the internet, can help enormously, there is often a need for in-house or individual absorptive capacity. Technology transfer, particularly when adaptation to the local environment is

required, needs a level of local capacity to be successful and self-sustaining. This capacity needs to be built over time and usually requires a combination of formal training and skills acquisition through experience. For organisations, the ability to attract and retain staff with the required capacity is very important.

In addition to organisational learning, there is a need for 'institutional changes', understood here to mean changing the mechanisms, rules and customs by which people and organisations interact with each other (i.e. the 'rules of the game'). Innovation requires both organisational and institutional change. Institutional change may result from analysis and conscious efforts to change the rules of the game (including policies, rules and regulations), but it can also include the behavioural changes that occur spontaneously as people try to solve problems and learn from their experience how to work in different ways.

## **Six priorities**

Despite the diversity of approaches and contextual variation six key areas of intervention appear to increase the probability of successful innovation. These will be tried and evaluated during the RIU programme. They are:

1. Undertaking a diagnosis of the system to determine where the constraints or bottlenecks lie, which can be most easily removed, and the location of the most vibrant and dynamic actors which can be supported to innovate. This enables those parts of the system where intervention is most feasible and most likely to result in successful innovation to be identified, with the 'system' being defined by the nature of the problem being addressed. The analysis needs to involve an iterative process that moves lightly between local, national and international levels - the analysis is holistic but the proposed intervention may be focussed.
2. Facilitating innovation involves investing in much more than just 'research'. It is likely to involve intervening to improve the policy environment, building capacities to innovate, and encouraging a wider and more diverse range of actors necessary for innovation to interact with each other more effectively and probably build trust-relations between them. This institutional change is likely to include building social capital between the various actors and may require building links between public sector suppliers of research-based knowledge and the private sector users of such new knowledge. Innovation linkages may be 'vertical' (linking producers to markets and input suppliers in value chains) and/or 'horizontal' (linking producers or other actors together as in farmer associations or chambers of commerce).
3. Enabling the potential users of new knowledge to articulate their needs more effectively, and to translate these needs into 'effective demand' – that is to strengthen the demand side of the innovation systems map by amplifying the users' "voice" and increasing their purchasing power to buy the tacit and codified knowledge that they need. Within the RIU this is often referred to as strengthening 'knowledge markets'. This may also require increasing the political power of users of new knowledge (whether they are in firms or on farms) relative to the suppliers of new knowledge in the innovation system.

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4. Strengthening those organisations and individuals who perform the “intermediary functions” that enable the suppliers of new knowledge to interact iteratively with the users of such new knowledge. These functions are often supplied by public and private extension agents, consultants, business development service providers, and the suppliers of micro and other finance. In terms of the innovation systems map this means improving the links between the “supply push” of research-based new knowledge and the “demand pull” for that new knowledge.
5. Increasing the incentives and reducing the disincentives that motivate people and organisations which do, should or could play a role in innovation. Usually this will mean ensuring that all actors required for successful innovation gain adequate financial reward (but it can involve incentives and disincentives associated with status, promotion, and so on). Generally the most successful innovation processes will be financially self sustaining, but judicious use of “smart subsidies” (those that make markets rather than destroy them) are likely to be necessary for pump priming.
6. Actively “learning by doing” to adapt interventions in the light of increasing experience.

But when all is said and done and all the support is in place, innovation still seems to require people with the essential spark of creativity, risk-taking and tenacity to dare to do things differently.

## **Key interventions associated with the innovation systems approach**

1. **Undertake a diagnosis of the “system”** - in which support to innovation is intended in order to determine those parts of the system where intervention is most feasible and most likely to result in successful innovation. The analysis is holistic but the proposed intervention may be focussed.
2. **Facilitate an interaction between a diverse range of actors** – who are necessary for successful innovation, to build trust-relations between them and to strengthen their capacities to innovate.
3. **Strengthen the “demand side” of the innovation system** - by amplifying the “voice” of the potential users of new knowledge and increasing their ability to acquire the tacit and codified knowledge that they need to innovate. This includes supporting the emergence of sustainable knowledge and services markets in the agricultural and natural resources sectors.
4. **Strengthening those organisations and individuals who perform the “intermediary functions”** – linking both the “supply push” of research-based new knowledge and the “demand pull” for that new knowledge and enabling them to interact iteratively.
5. **Increase the incentives and reducing the disincentives** - that motivate people and organisations which do, should or could play a role in innovation.
6. **Invest in learning processes** - that enable organisations within the innovation system to learn from experience and improve their performance over time.

## **Issues which RIU intends to investigate further**

1. Questions about how the Innovations Systems Approach deals with externalities – particularly the environment and sustainability.
2. Questions about information versus knowledge transfer, including more understanding of knowledge markets and behavioural aspects to learning.
3. The balance between the ‘bright idea’ approach to innovation and the participative/facilitated approach.
4. More understanding on the relationship and intervention strategies to address tacit and codified knowledge.
5. Similarities and differences between the type of interventions that support ‘innovation’ and those that support ‘scaling-up’ and ‘scaling-out’.
6. Review at some stage of the RIU hypothesis.

## **Some definitions used by RIU**

### **Innovation**

The first significant use of new ideas, new technologies or new ways of doing things in a place or by people where they have not been used before. An innovation enables more goods or services to be produced with less effort or resources and/or produces better or different goods or services.

### **Innovation System**

The context in which a number of actors interact in order to innovate, this is affected by social, cultural, political, economic, physical and technological environment. Such a system is complex and evolves through time.

### **Innovation Platform**

A network of partners working on a common theme and using research knowledge in ways it hasn't been used before to generate improved goods and services for the benefit of the poor.<sup>1</sup>

OR

'A network of partners working on a common theme in order to use new knowledge [research-based knowledge] in ways or in places that it hasn't been used before to generate improved goods and services for their mutual benefit

### **Scaling-out**

The 'horizontal' spread of knowledge and uptake of technologies, processes and practices (e.g. to farmers or businesses at a similar level).

### **Scaling-up**

Influencing decision makers at a 'higher' level to develop policies which provide a more enabling environment for 'scaling-out' [significantly increase the understanding of how the promotion and widespread use of particular research-based knowledge can contribute to poverty reduction and economic growth]

### **Knowledge Market**

When demanders of knowledge are able to buy codified or tacit knowledge, or commission research to provide the required knowledge. The demand for knowledge may be strengthened by providing smart subsidies such as vouchers.

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<sup>1</sup> This first element is the formal RIU definition. However it may be that the RIU programme might wish to consider the second definition is closer to the idea of the platforms themselves. Both have been left here for discussion purposes.

**Codified Knowledge**

Knowledge that is recorded and therefore available in a written or other transferable format (e.g. DVD, audio broadcast).

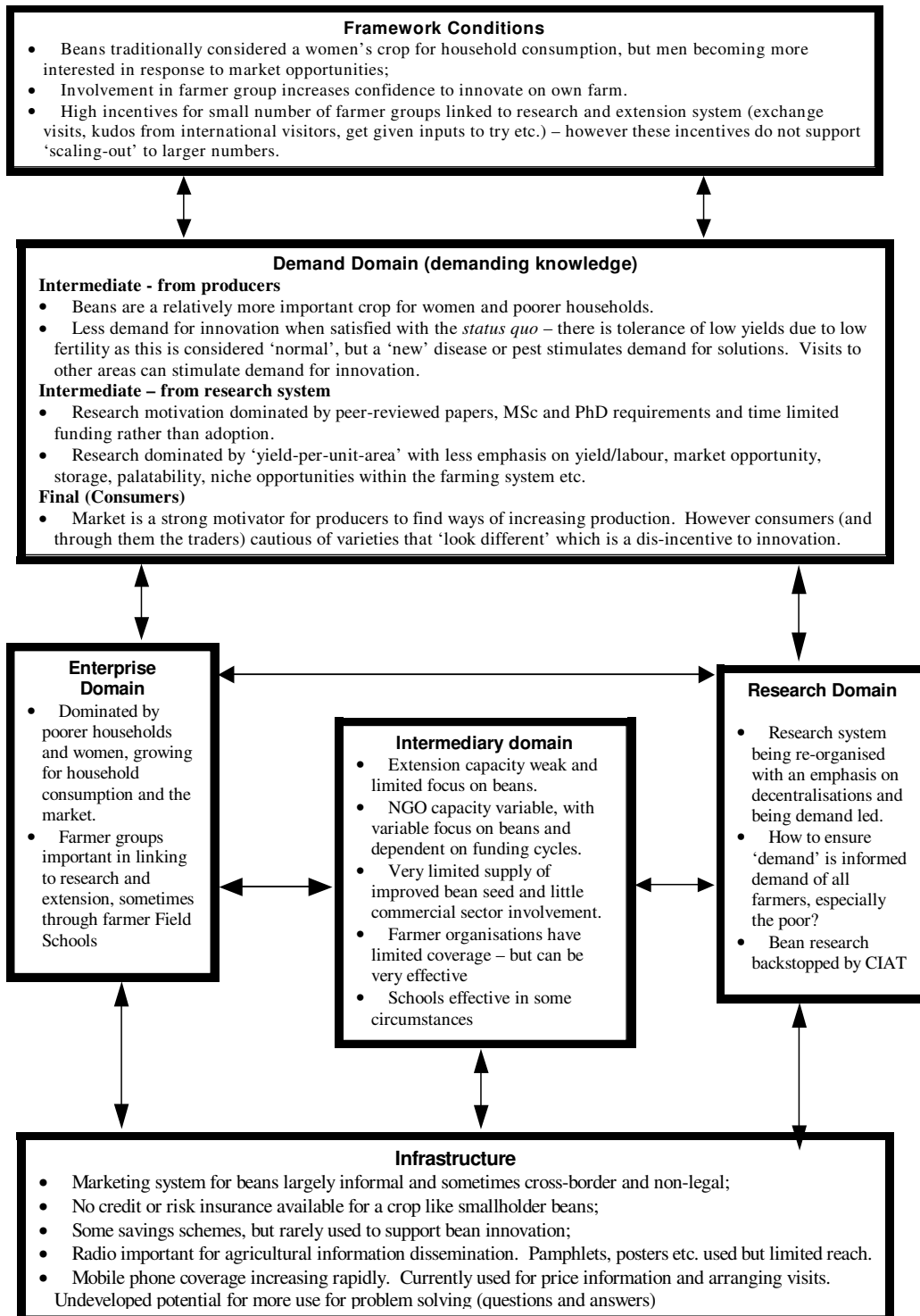
**Tacit Knowledge**

Knowledge derived from experience held in people heads or hands that is skills based and therefore difficult to codify.

**Innovation System Framework**

An analytical framework used to generate hypotheses and insights into the ways a range of possible factors contribute to successful innovation.

## Example of an Innovation sub-system – Improved bean technologies in Tanzania



## References and further reading

The Research Into Use programme website ([www.researchintouse.com](http://www.researchintouse.com)).

The 2008 DFID Research Strategy ([www.dfid.gov.uk/research/newresearch.asp](http://www.dfid.gov.uk/research/newresearch.asp)).

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