

Research Into Use: Linking Scientists and Users in Innovation Systems

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Abstract

The DFID Research Into Use programme focuses on two main questions- how to most effectively up and out scale existing agricultural research successes to enhance impact at the smallholder level, but also how use of an innovation systems approach can increase understanding about the wider context and institutional change necessary for pro-poor innovation in the natural resources sector. This paper outlines our vision of essential components necessary for operationalising an innovation systems approach on the ground within the agricultural sector. A key conclusion of this paper is that within agricultural innovation systems, farmers² should not be viewed as 'first' but 'first amongst equals'. Innovation stems from the dynamics and interplay between a whole spectrum of stakeholders and their respective skills and experience including private sector, researchers, policymakers as well as farmers. However, there is still a need to strengthen the capacity of research users to interact with research suppliers in order for agricultural innovation systems to function effectively. Greater emphasis needs to be given to strengthening the voices of weaker actors including farmer representatives within the innovation system so that all voices can be given equal weight in decision-making.

Introduction to the Research Into Use (RIU) programme

The Research Into Use programme (RIU) was commissioned in 2006ⁱ as the first programme to be developed under the UK Department for International Development's (DFID's) new Strategy for Research on Sustainable Agriculture (SRSA). The Strategy emphasizes the need to improve the access of poor people to knowledge and technology, through both public- and private-sector institutions. It also formalizes DFID's commitment to enhancing the resilience of farming households to external shocks such as drought or disease, which can plunge already vulnerable households into deeper poverty.

The RIU programme was commissioned to build upon DFID's previous considerable investment in the Renewable Natural Resources Research Strategy (RNRRS) which funded over 1600 research projects (an approximate investment of £250 million) on crops, livestock, fisheries, forestry and natural resource management between 1995 and 2006. The ten research programmes under the RNRRS were designed to generate new knowledge and to promote its uptake and application. They addressed the knowledge needs of poor people whose lives were dependent upon natural resources production systems in semi-arid areas, high potential areas, hillsides, tropical moist forests; and at the forest/agriculture, land/water and peri-urban interfaces. The breadth of the Strategy reflected the wide variety of environments in which poor people live and the multiple routes by which research can have an impact on poverty. Over the lifetime of the strategy, greater

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² The term 'farmer' is understood in its widest sense to include other natural resource users such as pastoralists, fisherfolk and forest users.

emphasis was placed on integration of natural and social science research including participatory methodologies, demand-based and livelihood approaches and a move from more basic research to the applied end was instigated.

Whilst the RNRRS had many high-profile successes at pilot level, it was recognized that much of this research still has a great deal of unfulfilled potential to impact on poverty reduction and economic growth at a wider scale. The RIU programme therefore aims to draw upon the rich legacy of technologies, policies and processes developed under the RNRRS in order to achieve the twin objectives of both

- maximising the livelihood-improving impact of existing natural resources research outputs of the RNRRS through up and outscaling successes, particularly those previously funded by DFID
- and in so doing, to capture lessons and increase our understanding about how the promotion and widespread use of natural resources research outputs can contribute to poverty reduction and to economic growth.

Whilst the RNRRS provides a rich dataset from which to draw, it is also acknowledged that natural resources research from other sources is also likely to add value to the work of the RIU. Crucially, it will not set up stand-alone projects, but instead seek partnerships with existing initiatives wherever possible in order to harmonise aid architecture and encourage institutionalisation of learning experiences. To maximise its learning potential, the RIU programme will also be implemented in a range of socio-political and agro-ecological contexts throughout Sub-Saharan Africa and South/South-East Asia.

The challenges of scaling up and out

So what are the reasons behind the wide-scale lack of uptake and use of research products by the rural poor? In the 1980s it was frequently asserted that the causes of non-adoption lay in the technology itself – which was held to be unsuited to the needs of small-scale risk-averse farmers. Sometimes this was true; but this is certainly not always the case. As Raitzer emphasises, conventional modes of knowledge production or the so-called ‘linear’ research model through which researchers produce new knowledge and then transfer it to those who need it, have in some cases, proven to be practical and successful despite traditionally risk-averse communities. In more recent decades, farmer participatory research has attempted to introduce greater interaction and feedback between farmers and researchers but widespread uptake of research outputs has still not occurred. As Lundy and Gottret point out, the problem is ‘that this still does not provide a continuous learning and innovation process, able to cope with growing complexity and rapid change’.

Instead, the barrier to widespread adoption lies partly in the difficulties of scaling up – that is, multiplying successes so that thousands of producers, rather than the lucky few, can benefit whilst also recognising a possible maximum threshold potential before negative impacts are felt, as well as the wider potential winners and losers of interventions. Scaling up can be successful in terms of take-up, but disastrous for farmers in terms of gluts, low market prices etc. Though money matters, these difficulties are not merely financial; they are also social, economic, environmental, technical, political and administrative. It is increasingly recognized that getting the policy and institutional environment right is just as important as the technology mix itself in stimulating uptake, innovation and hence development. In other words, along-side the challenge of physical or ‘horizontal’ scaling up – the drive to extend technology to new areas and to more people – is that of so-called ‘vertical’ scaling up – the bid to win hearts and minds to achieve long term institutional change.

Implicit within this thinking is the need to acknowledge farmers’ own capacities for research and innovation as well as the importance of local context. Both ‘codified’ knowledgeⁱⁱ largely in the formal research domain and ‘tacit’ knowledgeⁱⁱⁱ stemming largely from personal experiences amongst researchers, farmers and other actors have a value. Traditional agricultural knowledge transfer is mostly oral, occurring through personal contact within the local community. Although often powerful and persuasive, it is unlikely to be sufficient to achieve widespread impact. Furthermore, validation of knowledge must work in both directions and sound science and understanding of market conditions must be at the root of any scaling up initiative if credibility, trust and efficacy are to be maintained.

Instead, one must begin to think about a shift from technology transfer, even incorporating farmer involvement, to collaborative science and innovation systems incorporating 'more responsive technologies and practices and more resilient and robust systems'³. 'Farmer First' remains an advocacy message which is highly powerful in its simplicity, but the reality is that whilst farmers remain key stakeholders, they do not have all the answers and the spark behind innovation in up and out scaling often lies in their interactions with other stakeholders in the system and the respective knowledge, skills and demands which each party brings to the table.

The Innovation Systems framework

There is no doubt that the challenges and processes associated with scaling up successes are hugely complex. It is precisely for this reason that the RIU programme has explicitly adopted an innovation systems approach to its activities, recognising that this is a framework which embraces complexity and diversity and indeed, views these as necessary systemic conditions for effective stimulation of innovation including widespread and sustainable use of research outputs. Whilst innovation systems thinking as applied to the agricultural sector is still in its relative infancy, the RIU is currently drawing upon much of the work of Andrew Barnett, Erik Arnold, Martin Bell, Andy Hall, Norman Clark and others to inform and develop its thinking (see references).

There is an important distinction to be made between *Innovation*, defined by Arnold and Bell as 'the **use** of new ideas, new technologies or new ways of doing things in a place or by people in a way it has not been used before' and *Invention* which is seen as 'the creation of new knowledge'. Arnold and Bell further state that 'experience over many years shows that working with and re-working the stock of knowledge is the dominant activity in innovation'. Innovation often involves local creative imitation and adaptation of existing knowledge rather than the development of something radically new. It is usually achieved through many small improvements (e.g. in production technologies, processing, and institutions) rather than through large sweeping changes and it involves greater ownership of the process by research users themselves.

Successful innovation requires not just appropriate research outputs but attention to the totality of the entire research, development and extension spectrum- a supportive policy and institutional environment, credit and technical support, healthy markets, functioning infrastructure and the social relations in which these activities take place.

An innovation system is therefore often defined as a network of organisations and individuals involved in generating, modifying, and using new knowledge, alongside the institutions, organisations and policies that condition their behaviour and performance. Social, political, legal, organisational and institutional factors will all inform this behaviour and hence concepts such as incentives, power relations, political economy and drivers of change are likely to be of key importance to any systems analysis.

An Innovation System is also likely to involve a far wider range of key actors – not only the users of the knowledge (farmers, consumers, artisans, labourers and traders) and the producers of new knowledge (usually but not exclusively researchers) but also a host of intermediary organisations including extension workers, information brokers such as journalists, private sector enterprises in the supply chain, credit agencies, policymakers, traders and consumers. Integration of local knowledge is essential as innovations take place all the time across all societies without formal research systems, but end users including farmers are simply one of the essential actors needed to get research into use and to stimulate innovation. We therefore need to deepen our understanding of 'farmer first' principles of farmer leadership to acknowledge the need to include a far wider range of voices within the debate.

Improving the flow of knowledge between these key actors in an innovation system is critical in getting 'research into use' and far greater emphasis is necessary on the importance of formal and informal networks, coalitions and partnerships as well as the need for more effective communication channels among the organizations and individuals that make up the system and produce and use knowledge if research-derived knowledge is to have large-scale impact.

³ Workshop concept note, 'Farmer First Revisited'

Balancing ‘Supply Push’ and ‘Demand Pull’

In the context of RIU, we are applying the innovation systems framework to shift the focus of attention away from the generation of new knowledge to the ways in which existing knowledge is put to practical use by large numbers of people. Specifically, the programme seeks to empower the poor and marginalised or their representatives, so that they can participate in dynamic national innovation systems. Researchers will remain important partners in the RIU, but the main emphasis will shift to strengthening the voice and capacity of direct and indirect users of research results including farmer organisations.

We believe that innovation can be triggered by, for example, the ‘pull’ of market pressures and other incentives or changes in policy or by the “push” of new knowledge from research suppliers. Successful innovation necessitates a combination of both of these push and pull factors, combined with the empowerment of poor people in order to change their lives for the better. However, social exclusion can also be triggered by the same events, so attention to this issue is an important cross-cutting theme within the RIU.

As a recent OCED report states, ‘in developing countries poor farmers and rural households often have very limited capacity to access the information they need and to convert their needs into effective demand for the goods and services provided by the research and extension services. Their inability to utilise new knowledge on improved practices is a binding constraint to enhance productivity and manage natural resources in general’. Therefore strengthening the demand for new knowledge is usually a key component of successful innovation. The RIU approach embraces the importance of both the supply push of research knowledge (increasing awareness) and the demand pull of the users of new knowledge within national and regional innovation systems and seeks to improve the flow of information between the two. It is also necessary to make the distinction between ‘need’ and ‘demand’. It is often difficult to specify needs until options are known and so articulating demand is inevitably a result of continuing iteration between people who know what (at least some of) the options are and the people who have a need.

Specifically, in the longer term, we aim to strengthen the capacity of research users including both farmers and policymakers to articulate and channel their demand for knowledge, technology and complementary resources, to develop the information markets^{iv} that serve them, as well as to explore other innovative ways in which to enhance access to and supply of information including through utilisation of better-informed and incentivised infomediaries^v. We also aim to build the capacity of all partners in the science community, government, private sector and civil society to work together in improved, more productive relationships. Through this, we hope to increase our understanding of how knowledge—informal as well as formal- contributes to both pro-poor and pro-growth agricultural innovation.

From theory to practice in RIU

Much of the literature on Innovation Systems exists at theoretical levels in the context of science policy in developed countries. Attempts to practically operationalise the framework on the ground within the agricultural sector and in developing countries is a relatively recent phenomenon and is still very much at the experimental stage. In its implementation phase between July 2007 and June 2011, the RIU is working towards practical application of the IS framework to link scientists to users through a variety of mechanisms and through three core outputs. These are:

- Significant use of RNRRS and other natural resources research outputs for the benefit (direct/indirect) of poor men and women in diverse contexts
- Research-into-use evidence generated with evaluation partners
- Policy processes enabled and the global community informed by research-into-use principles, lessons and discourse.

In order to achieve these three outputs, the following seven separate activity areas (components) are being implemented. These tackle different entrypoints in the supply-demand interface of getting research into use and to up and outscale natural resources research successes. They aim to balance stimulating more immediate uptake and impact of RNRRS research outputs, with longer-term

initiatives working towards institutional change and increasing our understanding of processes of pro-poor innovation within the renewable natural resources research sector.

1. *Improving access to RNRRS and other research outputs* will occur through operating a competitive **Innovation Challenge Fund** in order to optimise the use of the RNRRS legacy. In-country led partnerships of diverse sets of actors are encouraged to stimulate uptake of potentially useful technologies, policies and processes developed under the RNRRS, increase understanding of information markets and understand policy and institutional constraints to getting research into use. As the RIU is not encouraging stand-alone projects given its short time frame, these will be chosen to add value to existing innovation activities already on the ground. A recent call for concept notes in six DFID priority service agreement countries in South/South-east Asia (Vietnam, Cambodia, Nepal, Pakistan, India and Bangladesh) has just closed and received over 120 applications. Approximately 20 of these have been selected for financial support to develop into full proposals and we anticipate a final selection of 10-12 initiatives will commence activities on the ground by April 2008. A similar call for Africa will be issued early in 2008.
2. *Enhancing demand for RNRRS and other research outputs* is being facilitated through support to establishment of national **Innovation Coalitions**, currently in five African countries (Rwanda, Tanzania, Malawi, Nigeria and Sierra Leone). These build upon systems diagnoses conducted in the inception phase in order to understand the current innovation system or an institutional map, its drivers of change, current limitations, critical points of intervention that may enhance the effectiveness of the system as a whole and the types of interventions that might be most productive in varying contexts and for different groups aims to overcome these. Coalitions of partners currently or potentially involved in RNR innovation activities are being supported to work together to overcome problems or harness opportunities within the system and to achieve longer-term institutional change. National farmer associations are integral actors within such processes. Capacity will also be strengthened amongst such coalitions to facilitate establishment of **Innovation Platforms**^{vi} around particular technologies, policies or processes and to enhance the capacity and voice of potential research users to articulate and channel their demand for access to information, markets, networks and knowledge and to turn information into innovation.
3. *Developing enterprises using commercialisation of RNRRS and other research outputs* will be facilitated through a public-private partnership approach. Within this type of platform, the private sector, via the RIU, would provide prospective small-scale entrepreneurs with venture capital for innovation. An **Innovation for Development (I4D) Fund** operating on private equity fund principles will aim to build up a portfolio of private-sector partnerships in the agricultural sector of the developing world through its investments. A range of partnership models will be established and piloted, initially in East Africa before being scaled out to other regions using lessons from the initial work. These may include classic PPP approaches but also explore licensing deals, marketing or distribution support capacity or the creation of special purpose vehicles (new companies). It is accepted that small-scale entrepreneurs will need assistance in developing their ideas into business plans. To this end, I4D will operate two types of funding mechanism. The first will seek to assist with the initial business plan development – a relatively small level of funding to overcome one of the first hurdles confronting any new venture. The second mechanism is aimed at more established businesses that seek to expand. For both, social entrepreneurship mechanisms similar to the Dragon's Den TV series or the use of 'Business Angels' will be utilised to make the final selection of initiatives to take forward.
4. *Monitoring and evaluation support and synthesis* is crucial within any innovation system to ensure adequate attention is paid to processes of reflection, learning and feedback within all activities. Within the RIU programme, tools such as participatory monitoring and evaluation, formative evaluation, baseline data collection and outcome mapping are seen as essential in order to achieve this. This particular component will provide tailored support and guidance to all components in these areas in order to ensure a consistent and comparable approach to monitoring and evaluation across the programme. Key learning questions for the programme have been identified and it is essential that collated knowledge is regularly fed back and shared within the programme in order to improve programme efficiency and delivery. Monitoring and management at each delivery level will

centre on a **Performance and Learning Framework (PLF)** linked to the RIU logframe. This will include key results, outcome areas and management indicators that will be tracked on a quarterly basis.

5. Collection of rigorous, independent and dispassionate evidence surrounding the potential contribution of natural resources research to poverty reduction and economic growth and whether there is an added value in adopting an innovation systems approach to getting research into use will be essential in our work. **Impact evaluation** activities aim to develop and contribute to a global knowledge baseline of what works where, why and for who in getting research into use, up and outscaling successes and the resultant differential impacts on poor communities and individuals. Impact case studies will be produced on selected RIU-supported initiatives, previous innovation activities funded under the RNRRS and wider innovation experiences primarily in the RNR sector. Examining differential impact and the resultant policy implications for social groups and contexts will be essential within this analysis. A better understanding of how the issues of poverty, gender and social exclusion are considered in innovation systems frameworks will help facilitate a better understanding of how pro-poor innovation policy and practice needs to be developed and supported for those largely dependent upon natural resources for their livelihoods.
6. Sharing and harmonising our work with others to achieve spillovers and economies of scale is essential. **Influencing the agenda** aims to share lessons from our national activities under other components with regional and global partners and to develop strategic partnerships within existing frameworks and initiatives where appropriate. Key principles, early lessons and evidence emerging from RIU activities are being exchanged with other research into use practitioners. They are also being promoted through advocacy activities to national, regional and global policymakers to help raise awareness of the potential contribution of RNR research to poverty reduction and economic growth and to inform development and implementation of pro-poor innovation and research into use policies. Network mapping exercises are seeking to identify local champions or policyshapers be they individuals or networks to help us in this task. We are also seeking to build the advocacy capacity of research users such as actors within the innovation platforms and infomediaries such as farmer associations and agricultural journalists and to enable policymakers and parliamentarians to be able to access research findings in accessible formats to help inform evidence-based policy formulation. South-South learning will be encouraged through an up and out scaling learning alliance and similar partnerships will be sought with existing innovation systems alliances.
7. Improving communication between all actors in the Innovation System and with wider audiences is also essential to share lessons and obtain a clearer understanding of the potential benefits of science for poverty reduction and economic growth. **Communications with global practitioners** aims to fuel a 'knowledge buzz around our work', to develop and maintain a coherent and consistent image ('brand') for the RIU including the RIU website; to manage relationships with the media; commission the production of quality-assured supporting RIU publicity materials for a range of audiences including the general public, and manage RIU participation in conferences and other showcasing events. We aim to improve the quality, context, relevance and management of new and farmer-held information and knowledge, exploring more interactive and dynamic forms of information markets and use of infomediaries and to strengthen the voice of users during innovation processes. The potential of novel communications tools such as the use of ICT's and mobile phones, drama, soap operas, reality TV, wikis, blogs and Farmer Field Schools are being explored to determine whether their use to promote research outputs closes or widens the gap between rich and poor farmers and stimulates pro-poor innovation. Where possible, we will work in partnership with other science communication for development initiatives to speed up mutual learning and impact.

Early activities and lessons

These components have been developed from key research findings and policy lessons taken from the early implementation of innovation systems approaches to the agricultural sector, including the previous DFID Crop Post-Harvest programme and the scoping work and analysis of the RIU inception phase.

Some early lessons and remaining challenges emerging from the implementation phase include:

- That within the application of innovation systems thinking, whilst the concept of 'farmer first' is still an important one, farmers are not the only actors of importance and innovation arises from the interaction between multiple actors within an innovation system. Instead, perhaps farmers should be viewed as 'first amongst equals', with each actor bringing skills and competencies and equally valid aspirations to the partnership. Within the RIU, we aim to contribute to wider efforts to empower research users and intermediaries including farmers and farmer associations, but this is in order to redress the current unequal power relations, resources and capacity amongst stakeholders. This relates to the need is to balance supply push and demand pull within the innovation system if the system is to become more equitable, efficient and self-sustaining, rather than due to an explicit and exclusive focus on farmers per se.
- A related challenge is that of instigating demand-based research systems. Whose demand counts in an innovation systems approach where equal weight may potentially be given to multiple sources of demand from numerous actors including policymakers, producer associations etc as well as farmers?
- Are innovation systems approaches equally valid for poorer and more marginalised farmers or only those who are economically active? There is an underlying profit-orientated or market focus within much of the IS literature but are outcomes other than economic empowerment (e.g. enhanced voice, choice, empowerment, social capital, food security or environmental sustainability etc) equally valid? There is also a need to better understand the context of pro-poor innovation including issues of gender and social exclusion.
- Despite the fact that successful innovation processes are highly dependent on local skills and circumstances, it is possible to extract national, regional and international public goods from these to enhance spillover effects and economies of scale but in order to do so, one must invest explicitly in the learning process from the outset.
- Innovation systems are best considered as a unifying framework to guide conceptual thinking rather than as a specific approach or methodology. Furthermore, as Rath and Barnett identify, it is not a panacea and it is likely to be of more practical use if it is combined with insights derived from political economy (drivers of change) which focus on questions of (dis)incentives, whose research priorities are to be met and winners and losers within innovation processes.

Linking scientists and users more effectively in innovation systems remains a far from simple task but an absolutely essential one if better use is to be made of research outputs in the future and the full potential of the agricultural sector to contribute to both economic growth and poverty reduction is to be acknowledged and delivered.

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Biosketch of author

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ⁱ The RIU is managed by Natural Resources International Ltd in the UK, in association with Nkoola Institutional Development Associates (NIDA) Ltd in Uganda, and Michael Flint and the Performance Assessment Resource Centre), also in the UK. After a one year inception phase between July 2006 and June 2007, the RIU programme implementation began in earnest in July 2007. The programme will run until June 2011 and has a total budget of £37.5 million for activities in Sub-Saharan Africa and South/ South-east Asia.

ⁱⁱ Codified knowledge can be expressed in language or symbols and may as such be stored and/or communicated. Such knowledge can be separated from its bearer, stored and shared with other individuals or organisations. It is generally referred to as information (Lundvall & Johnson).

ⁱⁱⁱ Tacit knowledge is linked to its bearer and as such not readily transferable. It is the personal stock of knowledge that enables an individual to select, interpret and develop codified knowledge and to put it to

meaningful use. Only if knowledge-bearers are conscious of their tacit knowledge and willing to share it with others will it be made explicit. (Lundvall & Johnson).

^{iv} This is a real or virtual 'environment' where users and suppliers (or buyers and sellers) of information of relevance to resource-poor NR-dependent communities meet. This is a key component of the RIU innovation systems approach.

^v An abbreviated term for 'information intermediaries'. It includes a large group of organisations and institutions including the media, civil society, public and private extension services, educational and religious establishments, the commercial sector etc who can help broker more effective 'translation' of information between research suppliers and research users.

^{vi} A network of partners, with a common interest in innovating and its associated mutual risks and benefits, working on a common theme and using research knowledge in ways it has not been used before to generate goods and services for the benefit of the poor.