Under what circumstances and conditions does adoption of technology result in increased agricultural productivity?

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PROTOCOL

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Contents

1. Background

1.1 Aims and rationale for review

New technology that enables sustainable and profitable production of food and fibre is critical for both food security and economic development, and consequently, the dynamics of technical change in agriculture has been an area of intense research interest since the early part of the 20th century. Research has focused around three inter-related questions:

1. What are the characteristics of farmers who adopt new technology; and how do these characteristics explain the intra-population dynamics of adoption?

2. What are the drivers of technical change?

3. What are the impacts of technology change?

The policy interest in these questions stems from the central place that technology development (agricultural research) and promotion (agricultural extension) have traditionally played in agricultural development. Convincing farmers of the benefits of new technology has been the mainstay of agricultural programmes and projects throughout the developing world.

Over the decades approaches to agricultural research, extension and rural development more broadly have evolved considerably. Strong commodity and productivity orientations within agricultural research were softened to some degree by sequential waves of interest in farming systems (Collinson, 2000), farmer participatory research (Okali *et al.*, 1994) and rural livelihoods (Scoones, 2009); while extension broadened from 'master farmers', demonstrations and 'training and visit (Hulme, 1991), to 'farmer-to-farmer' approaches (Alene and Manyong, 2006) and 'social learning' through farmer field schools (Van den Berg and Jiggins, 2007).

Nevertheless, the preoccupation with technology and technical change has remained constant. Whether framed in terms of modernisation, productivity enhancement, poverty reduction, social protection, environmental protection or adaptation to climate change, technical change is at the heart of most agricultural policy, programmes and projects. From a development perspective the nagging question is why the economic and environmental benefits of new agricultural technology often appear to by-pass poorer farmers – even when they are the 'target' group.

This systematic review seeks to shed light on this question by addressing the link between the use of new agricultural technology and increased productivity. Specifically it focuses on the evidence of how conditions and circumstances in Low and Lower-Middle Income Countries articulate the relationship between technology use and productivity outcomes.

1.2 Definitions and theory of change

Key definitions are given in Box 1. These definitions provide the foundation for the theory of change that underpins this systematic review (Figure 1). This theory posits a dynamic interaction between technology on the one hand and conditions and circumstances on the other. Changing conditions and circumstances (e.g.

increasing land pressure, changing policy, markets or climatic conditions) stimulate the development of particular technologies or whole classes of technology, or make existing technologies more or less relevant or attractive. The use of new technology can in turn change some of these conditions and circumstances.

The conditions and circumstances of interest include environmental (soils, water availability, climate variability etc), institutional (markets, tenure regimes etc) and personal (age, gender, education level etc). Also important are the circumstances in which farmers are exposed to and come to learn about a technology: how to access, employ and draw profit from it. None of these are static although they change at very different rates; they are differentially susceptible to external shocks and to the influence of policy, programmes, projects and farmer agency. As Figure 1 indicates, agricultural technologies are both shaped by and shape these various conditions and circumstances. Feedback effects can be reinforcing for example where expanding adoption of a technology by farmers increases the pool of knowledge on how to gain the most from it. Negative effects can occur from technologies that undermine ecological services, for example where pesticides deplete the natural enemies of crop pests: in some cases farmers have found themselves on a technology "treadmill".

Agricultural technology includes the means and methods of producing crops and livestock (this review is not concerned with post harvest technologies such as storage and processing; nor is it primarily concerned with livestock technologies). For crops, the most common areas of technology development and promotion include new varieties and management regimes (planting date, spacing etc), soil and soil fertility management and weed and pest management. Other important technologies include irrigation and water management. Some technologies are incremental e.g. the substitution of a new variety in an otherwise unchanged production system, while others such as integrated pest management (IPM), agroforestry or the System of Rice Intensification (SRI) involve radical change. Some technologies can be applied at the field or sub-field scale (e.g. varieties and fertiliser) where decisions and associated costs, risks and benefits rest with an individual or household; while others such as certain types of irrigation may only be appropriate and viable at a much larger scale, necessitating different institutions and greater level of organisation and collective action.

Farmers' decisions about whether and how to adopt new technology are conditioned by the dynamic interaction between characteristics of the technology itself and the array of conditions and circumstances. However, this review is <u>not</u> primarily concerned with how the interaction of technology and conditions and circumstances influences the process or speed of adoption (pathway 1 in Figure 1): this is being covered by another systematic review. Rather, our focus is on how that interaction affects what happens <u>as a result</u> of adoption (pathway 2 in Figure 1): the outcome that is the central concern of this review is that an increase in productivity is realised. Adoption is important as the base from which change in productivity is assessed.

Whether productivity increases or not, other benefits in relation e.g. to health, the environment or risk management may be also realised. These benefits may be valued and sought after in their own right – competing with productivity – or, probably more commonly, are seen as important in conjunction with it. For example, farmers may favour a technology option that promises a reasonable but not the largest yield advantage if they feel it helps them avoid market or environmental risks. In collectively managed technologies, equity in the

distribution of productivity gains and not only their mean level may be an objective.

Central to our review is the understanding that traditions of research can be distinguished by their characteristic but evolving theories of change linking processes of technology generation, adoption, spread and use. Recognizing these traditions is important because they are likely to privilege different suites of circumstances and conditions in explaining the outcomes of technology adoption. These traditions are described in the following section.

Box 1: Key definitions

Agriculture: crop and livestock raising activities and the management of natural resources and inputs necessary to sustain them.

Farmers: people whose livelihoods depend to some degree on agriculture and who pursue it primarily with their own and/or their family's labour.

Technology: the means and methods of producing goods and services, including methods of organization as well as physical technique. **New technology** is 'new' to a particular place or group of farmers, or represents a 'new' use of technology that is already in use within a particular place or amongst a group of farmers .

Adoption: the integration of a new technology into existing practice; usually proceeded by a period of 'trying' and some degree of adaptation. **Dis-adoption** refers the process of reversion to the pre-existing technology following a relatively short period of adoption.

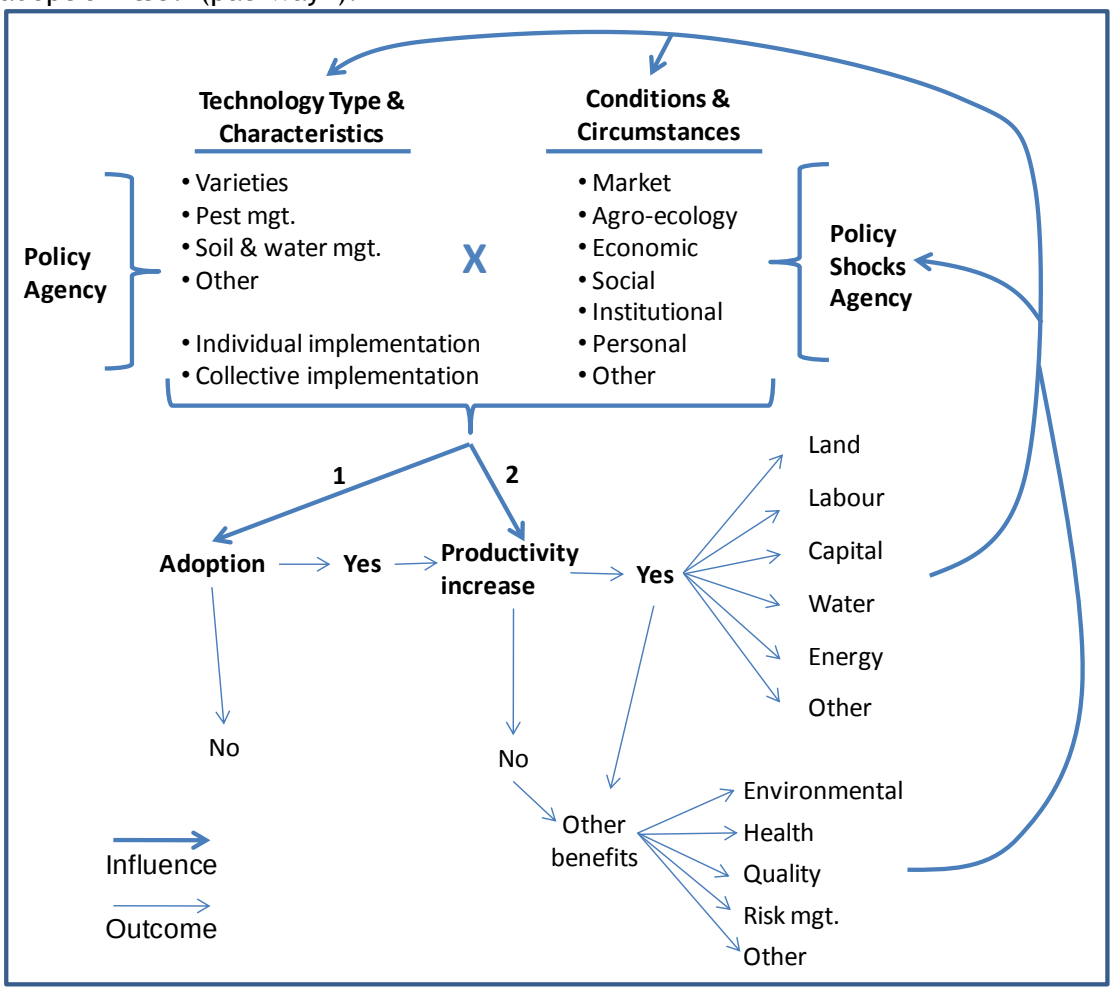
Condition: a prerequisite, something that must be present if something else is to occur.

Circumstance: a factor that influences or modifies an event; a circumstance is more variable or transient than a condition.

Productivity: output per unit of input. In agriculture, output is most commonly measured as weight of harvested crop produced; the most common inputs of interest are land (hectares) and labour (hours), although capital, water and energy may also be of interest.

Figure 1: Conceptual framework / theory of change

The study's concern is with the consequences of adoption and the conditions and circumstances that influence them (pathway 2), not with the influences on adoption itself (pathway1).



1.3 Contending traditions in the study of technology change

The literature on the dynamics of technology change in agriculture is dominated by a handful of identifiable and evolving traditions. Recognizing the existence of these traditions is critical because research that follows one or the other starts with different understandings of farmers' aims and objectives; defines technology and adoption differently; measures different outcomes; and emphasizes different constellations of conditions and circumstances.

The most prominent of the traditions are the sociological 'diffusion of innovations' tradition (DIT) associated with E. M. Rogers, which seeks to explain adoption behaviour in relation to personal characteristics and endowments (Rogers, 2003); the 'economic' tradition (ET) which focuses on the role of changing factor prices in 'inducing' innovation and on productivity and income outcomes (Koppel, 1994); and the 'local innovation' tradition (LIT) which adds a focus on agency, social learning and development and adaptation of technology with and by farmers (Chambers *et al.*, 1989).

It is important to note that these traditions do not represent mutually exclusive or competing theories of technical change within agriculture. Indeed they share many concerns and concepts, and can in principle work quite well together: the Economic tradition seeking to explain the factors that stimulate farmers to respond, and the Diffusion of Innovations tradition seeking to explain how they respond, and why some respond more quickly than others. In other words, the traditions are about differences in emphasis and perspective. However, it is in the nature of traditions that researchers more frequently refer to and build on the concepts and questions that define a tradition than to those characteristic of others. The extent to which researchers in fact engage with the concerns of other traditions, whether cross-tradition engagement is increasing and whether from this a fuller understanding of the consequences of adoption is emerging are central to this review's objective.

Table 2 outlines key features of the principle traditions: how they choose to assess adoption and its outcomes and the conditions and circumstances they privilege. We will use this table to map individual studies to traditions. Both the delineation of traditions and the characterization of their features will be refined through the review process. It is clear that concerns within these traditions have changed over time: for example, textual analysis reveals that the concept of dis-adoption has grown in prominence in the agricultural literature in recent years but barely figured there before 1995.

We have been unable to identify any previous systematic reviews of productivity outcomes resulting from the adoption of agricultural technology either globally or by region. There is a vast literature that touches on the conditions and circumstances associated with the adoption of individual technologies in specific settings (for relevant reviewes see, Feder *et al.*, 1985; Feder and Umali, 1993). There are also reviews of the impacts, including productivity-related ones, of agricultural research undertaken by particular institutions. Raitzer and Kelley (2008) carried out a meta-analysis of the costs and benefits of investments in technologies, primarily cereal varieties and biological pest control, developed by CGIAR centres. However because their analysis is at an aggregated geographic level it provides little insight into the conditions and circumstances in which productivity gains are realized. Distribution of benefits among poorer and women farmers could not be assessed. In a broad but not systematic review, Doss (2006) critically appraised the literature on agricultural technology adoption and productivity outcomes, drawing a number of conclusions notably on how studies could be designed to yield more pertinent insights for policy.

Table 1: Key features of the principal traditions

		Tradition	
	Economic	**Diffusion**	**Local Innovation**
Major emphasis	What drives technical change?	What are the personal characteristics and endowments that allow people respond to these drivers more or less quickly? How does the adoption process unfold?	How do agency, social processes and networks affect the dynamics of technical change?
Adoption – treated as:	A dichotomous choice; less commonly a linear sequence of decisions (whether to adopt, where to employ it, how much of it to use).	An essentially linear process, affected by individuals' relative advantage; degrees & stages of testing, adaptation, use & dis-adoption are recognized	A complex process with different degrees & stages of testing, adaptation, use & dis-adoption; farmer agency and knowledge/skill are emphasized
Exposure – emphasis on:	Access to relevant information	Access to relevant information and networks	The context & process of exposure & the importance of social learning
Farmers – emphasis on:	Individual characteristics & circumstances	Individual characteristics & circumstances	Groups & social networks; women's role highlighted
Wider context – emphasis on	Policy, price & institutional contexts	The nature and effectiveness of diffusion channels	The enabling/dis-enabling environment for farmers' testing/ experimenting, adaptation and spread
Consequences of adoption – emphasis on	Generally technology-specific, single outcomes, productivity-related. Negative outcomes seldom considered	Generally technology-specific, sometimes multiple outcomes, productivity + others. Negative outcomes sometimes considered	Technology often in relation to farm/ livelihood systems; multiple outcomes – productivity + other concerns – common. Negative outcomes sometimes considered

1.4 Objectives of review

The primary question addressed by this review is:

Under what circumstances and conditions does adoption of technology result in increased agricultural productivity?

We will address this question in relation to:

- The most common agricultural technologies: new varieties and management regimes (planting date, spacing etc), soil and soil fertility management and weed and pest management; irrigation and water management
- Crops (with only a secondary focus on livestock)
- Production (as opposed to post-production) technology
- Low and Lower-Middle Income economies (as defined by the World Bank)[1]

The primary question can be broken down into four subsidiary questions:

1. *What outcomes result from the adoption of different types of technology?*
2. *What are the relationships between these different outcomes?*
3. *How are these different outcomes valued by farmers?*
4. *What conditions and circumstances affect which outcomes result from adoption of different types of technology?*

[1] http://data.worldbank.org/about/country-classifications/country-and-lending-groups#Low_income

2. Methods

2.1 User Involvement and Policy Relevance

This review is directed to an audience of policy-makers and practitioners in the agricultural research area and to development studies academics. The review has two main policy objectives:

- Providing policy makers and practitioners a more realistic understanding of the outcomes that can be expected from technological change as well as of the opportunities to shape the innovation environment so as to favour a productive agriculture supporting broad-based livelihoods
- Informing the academic community on key gaps in evidence and on the evolution of theory and its drivers in this field.

Policy advisors from DFID will be involved in refining the objectives of the review and will peer review its main outputs. Other policy-makers and practitioners will be reached via contacts in agricultural policy networks, in particular the IDS-coordinated, DFID-supported Future Agriculture Consortium[2] and through participation in training courses, seminars and conferences.

The findings will be disseminated in full report form as well as in shorter, more accessible policy briefings. These will highlight the key findings, conclusions and recommendations to policy-makers. We will also contribute to academic debates by preparing a paper for publication in a peer reviewed article.

2.2 Identifying and describing studies

We will approach the primary and secondary questions identified above through a realist review (Pawson *et al.*, 2005; Jagosh *et al.*, 2011), adapting elements of the meta-narrative approach of Greenhalgh et al. (2005). We will employ the initial delineation of traditions – Diffusion of Innovation, Economic and Local Innovation – to identify and categorise the theory informing each study that is reviewed, refining the categories and their features in light of the emerging evidence, as discussed below.

Inclusion criteria

We will include in our review studies that:

- Deal with family farmers – those whose livelihood derives primarily from agriculture which they pursue mostly with their own and family labour;

- Concern Low and Lower Middle Income countries;

- Assess outcomes farmers achieve from adoption of the major agricultural production technology types:
    - Crop varieties and their management regimes (e.g. planting date, spacing);
    - Soil, soil fertility, pest and disease management;
    - Water and irrigation management – implemented by individuals or groups;

[2] http://www.future-agricultures.org/

  - Our primary focus is on agricultural technologies involving the major food crops of low and lower middle income countries: maize, rice, wheat, millet, sorghum cassava, banana and bean (i.e. we will search for these specifically);
  - We focus secondarily on technologies involving other crops and livestock and their management (i.e. while not searching for these specifically, we will include studies involving them that are identified in the searches);
  - The crops we specify by name represent 95% of the area devoted to cereals in LDCs, 59% of the roots and tubers area, 62% of the fruit area and 42% of the pulses area. They are, moreover, crops for which there are active and significant research programs oriented to small farmers (the focus of our review). Among the crops not specified are some regionally important pulses (e.g. cowpea and pigeonpea) and roots and tubers (e.g. potatoes).

- Clearly describe how "adoption" has been defined;

- Assess outcomes in terms of change in productivity of a specified input (e.g. land, water, chemical inputs, labour); some of these studies may also assess non-productivity outcomes (e.g. income, health, risk). How outcomes are assessed is clear and appropriate; and

- Document how specific conditions and/or circumstances influence the outcomes achieved.

Exclusion criteria

Preliminary review of the literature indicates a number of issues that may pose challenges in terms of the generalisability of the review findings. These include:

- **Inappropriate concepts and poor grounding in theory**. While a number of traditions pertaining to the dynamics of technology change in agriculture have been identified, initial review indicates that a significant proportion of published studies do not explicitly engage with any of the theoretical frameworks associated with these different traditions. Further, some papers fail to make clear how key ideas such as adoption, productivity and technology have been conceptualised. On the other hand, as in Table 2 above, in many cases it is possible to associate individual pieces of work with a tradition by reference to how the research is framed, the use of particular language and methods, and the kinds of variables, conditions and circumstances that the research foregrounds.

- **Many different methodological approaches and evidence types**. Studies vary in terms of the number, nature and complexity of the technology studied; the scale of analysis (individual, household, village, region or nation); the time frame (from one to several crop production cycles); the conception and estimation of productivity; the type (quantitative and/or qualitative) and extent of data collected.

- **Lack of contextual detail**. Initial review indicates that many studies may not provide sufficient information to allow meaningful analysis of how conditions and circumstances impact on outcomes following technology adoption.

Studies will be excluded *a priori* if:

1. They are not about or relevant to Low or Lower-Middle Income economies;
2. They are not about or relevant to impacts of adoption of crop or livestock production technology;
3. It is not possible to determine the functional definition of adoption;
4. The technology is not clearly described;
5. No relevant conditions or circumstances are described;
6. It is not evident how productivity is calculated and in relation to which input(s) and output(s);
7. The basis for assessing change in productivity is not clearly spelled out and appropriate;
8. A non-productivity benefit from adoption is claimed but it is not evident how this is assessed.

2.3 Search strategy

Our search strategy will have four components:

1. Systematic search of academic databases
2. Snowballing
3. Consultation with professionals
4. Systemic search of depositories of grey literature

Academic databases

Our search method has been refined through a pilot search and consultation with search experts at the British Library of Development Studies. In the first instance we will search the following databases: AGRIS, CAB Abstracts, JSTOR, Web of Science, Science Direct, GREENFile, African Journals Online, Asia Journal Online, Latin American Journals Online and Econlit.

For the Web of Science we will search the following databases: Science Citation Index Expanded (SCI-EXPANDED); Social Sciences Citation Index (SSCI); Arts & Humanities Citation Index (A&HCI); Conference Proceedings Citation Index- Science (CPCI-S); Conference Proceedings Citation Index - Social Science & Humanities (CPCI-SSH).

We will stipulate no date limit and employ the following English search terms:

First term – agricultural context:

(agricultur* OR crop OR farm or farm*) AND (maize OR rice OR wheat OR cassava OR manioc OR millet OR sorghum OR banana OR bean)

Filter results by technology:

fertiliz* OR fertilis*
pesticid* or herbicid* or insecticid*
cultivar*
biotech* OR GMO OR GMOs OR "genetically modified"
hybrid OR hybrids
agroforestry
IPM OR "integrated pest management"
SRI OR "system of rice intensification"
irrigat* OR "water management"
"organic agricultur*" OR "conservation agriculture"

Filter results by outcome:

impact OR benefit OR productivity OR yield OR income OR health OR welfare OR market OR "food security" OR risk

We will search on "topic" (title, abstract and key words) in Web of Science and ScienceDirect; "abstract" and "title" and "subject" in CAB Abstracts; "abstract" and "title" in AGRIS, JSTOR, GREENFile, Latin American Journals Online and EconLit, and "full text" in African Journals Online and Asia Journals Online.

A second search will be performed using Google Scholar and the following search terms:

(impact OR productivity OR yield) AND (/technology – as above/) AND (agricultur* OR crop)

The crops we include by name represent 95% of the area devoted to cereals in LDCs, 59% of the roots and tubers area, 62% of the fruit area and 42% of the pulses area. They are, moreover, crops for which there are active and significant research programs oriented to small farmers (the focus of our review). This choice is dictated by feasibility concerns: without specifying crops a large number of papers, many irrelevant, are pulled up by the search. The crops specified do not include some regionally important pulses e.g. cowpea and pigeonpea and potatoes among the roots and tubers but studies involving them may have been caught through the abstracts

Snowballing

We will also search bibliographies of key papers as well as the papers that have cited these key papers (a process known as "snowballing") to identify additional academic and grey literature.

Consultation with key professionals

We will consult with key professionals in the field to identify what they consider to be major papers, authors and studies. These will be matched with the results of the academic and grey literature searches and as appropriate subjected to forward

and backward snowballing. Any literature that is identified in this way will be screened and assessed according to the established study criteria.

Search of grey literature depositories

We will work through key professionals, partners of AfricaRica and the Future Agricultures Consortium, utilise IDS knowledge services such as Eldis-Agriculture and systematically search selected collections and databases to identify relevant unpublished studies. Specifically we will search the British Library for Development Studies (BLDS), Google Scholar, IDEAS3, JOLIS4, Dissertations Abstracts Database (includes U.S., Canadian, British and some European dissertations) and key institutional websites, including: IFPRI, World Bank, DFID, USAID and African Development Bank.

2.4 Screening strategy

We will employ a two-stage screening strategy (Figure 2). In the first stage, research assistants will review the title and abstract of each article for its relevance to the main subject of the study. If the article does not meet these basic relevance criteria it will be immediately excluded from the review. These criteria are:

1. That it is about or relevant to the impacts of adoption of crop or livestock production technology

2. That it is about or relevant to Low Income and/or Lower-Middle Income Economies

Each paper included as a result of the first stage screening will be subjected to a second, more detailed screening by a research assistant and one of the reviewers. Here, the objective will be to exclude those papers that do not provide sufficient conceptual clarity, methodological and/or contextual detail. Screening criteria are:

1. Possible to determine the functional definition of adoption

2. The technology is clearly described

3. Relevant conditions or circumstances are described

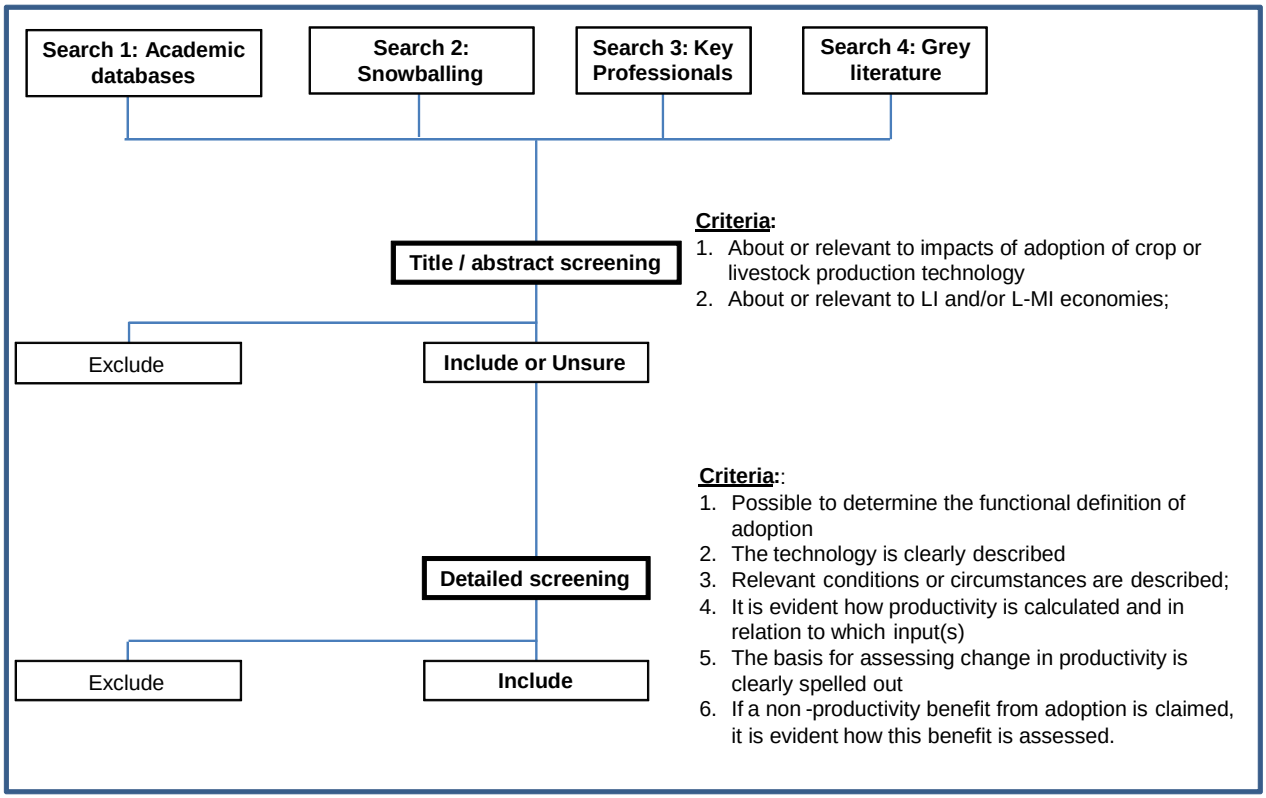
4. It is evident how productivity is calculated and in relation to which input(s

5. The basis for assessing change in productivity is clearly spelled out

6. If a non-productivity benefit from adoption is claimed it is evident how this benefit is assessed.

[3] http://ideas.repec.org/
[4] http://jolis.worldbankimflib.org/e-nljolis.htm

Figure 2: Screening strategy



We will use the EndNote (X4) software to store and organize bibliographic details of the papers screened and reviewed. The EPPI-Reviewer4 software will be used to store and organise information from the review in a way that will ensure transparency and replicability. The following data will be recorded for each paper:

For papers passing Stage 1 screening:

- Bibliographical reference

Plus, for papers excluded at Stage 2`screening:

- The criterion/a against which it fails

Plus, for papers passing Stage 2 screening:

- Country or region of the study
- Technology studied
- Description of the adoption definition employed
- Productivity and non-productivity outcome(s) studied and description of how assessed
- Conditions and circumstances considered and description of the relationship between them and the studied outcomes.

2.5 Methods of data analysis

The outcome of interest is change in productivity realized by farmers who have adopted a technology. Also of interest are non-productivity benefits realized by adopters, either together with or independent of increased productivity. Studies will be assessed by two reviewers for evidence bearing on these outcomes. The

weight of a study in the synthesis of findings will be determined through an appraisal of its:

- **Relevance** – key will be the detail and clarity with which conditions and circumstances are described and assessed in relation to the outcomes of adoption. Of particular interest are papers that clarify understandings within a tradition and that serve as key references for later work; and

- **Quality**, assessed in terms of the standards of qualitative or quantitative research, depending on the approach used. We will draw on checklists that have been employed in other studies e.g. Munro et al. (2007) for qualitative research and Raitzer and Kelley (2008) for quantitative research. We will pay attention to evidence of bias, a particular risk in light of the frequent lack of arm's length evaluation in this area.

Papers that pass the screening will be assigned to one or the other of the traditions on the basis of the features highlighted in Table 2. We will examine the accumulating papers for tradition-specific key words that may have been missed, using these to refine our search.

Data synthesis and presentation

We will follow an interpretative approach to the synthesis of the findings (Dixon-Woods *et al.*, 2005). Heterogeneity of results will be assessed in relation to the circumstances and conditions influencing adoption and resultant productivity and non-productivity outcomes in relation to different technology types e.g. crop variety vs. soil/water management and individually vs. collectively managed and to adoption by farmers differing in gender, wealth and social exclusion.

We anticipate that presentation will be a structured empirical narrative alongside several mapping and summary tables (presenting descriptive details of each study included in the review). All studies selected will be summarised in some form in the final report, whether in one of the tables or in the narrative synthesis.

The synthesis will be structured according to the subsidiary research questions that fall out of the main review question. Within this structure, evidence from the different traditions relating to each of the subsidiary questions will be analysed within and then compared among the traditions. Summary tables and possibly diagrams will lay out the evidence by technology type, and, if sufficiently dense, by region, stratifying by tradition. Other tables or diagrams will present the trends apparent in how the traditions have understood the important conditions and circumstances shaping the outcomes of technology adoption, thereby highlighting evidence of convergence, divergence or independent development.

Implications and conclusions will derive from discussions among the reviewers and will be refined through dialogue with policy makers, practitioners and researchers. We expect that one important strand will be the reciprocal relationships between policy, the research traditions and the evidence they provide.

2.6 Timeline

	Stage Description	Start Date	End Date	Timetable Description
SR01	Sign contract and agree title with DFID		05/07/2011	Preparatory meeting in review team
SR02	Preparation of protocol	05/07/2011	20/07/2011	Preparation of protocol; initiate contact with EPPI
SR03	Review of protocol by SR coordinating group (allow two months)	20/07/2011	20/09/2011	Submission and peer review of proposal by DFID and EPPI Discussions with DFID and EPPI
SR04	Study search	20/09/2011	20/09/2012	Complete search in CAB Abstracts and track studies referencing key works in the traditions
SR05	Assessment of study relevance	03/09/2012	17/09/2012	Joint assessments using frameworks developed
SR06	Extraction of data	10/09/2012	24/09/2012	Joint assessment of studies for evidence regarding theories underlying main traditions
SR07	Synthesis	17/09/2012	15/10/2012	Assess evidence for/against main theories; contrast limits and strengths in related studies; develop rich interpretation; trace development of traditions and interactions
SR08	Preparation of draft report	08/10/2012	08/12/2012	PI's prepare and exchange drafts, coordinated by lead PI
SR09	Review of draft report by SR coordinating group (allow three months)	08/12/2012	09/02/2013	Submit to EPPI
SR10	Dissemination of draft report	08/12/2012	09/02/2013	Disseminate within networks and other key stakeholders
SR11	Revision of draft report	09/02/2013	05/04/2013	Prepare final report
SR12	Date of publication of final report		08/04/2013	Publish final report

Deliverables submitted to DFID

Deliverable	**Due Date**
Title *	05/07/2011
Draft protocol *	20/07/2011
Draft report *	08/12/2012
Final report *	08/04/2013
Policy brief and short summary *	06/05/2013

3. References

Alene, A.D., Manyong, V.M., 2006. Farmer-to-farmer technology diffusion and yield variation among adopters: the case of improved cowpea in northern Nigeria. Agricultural Economics 35, 203-211.

Chambers, R., Pacey, A., Thrupp, L.A., 1989. Farmer first: farmer innovation and agricultural research. Intermediate Technology Publications Ltd.
Collinson, M.P. (Ed), 2000. A History of Farming Systems Research. CABI, Wallingford.

Dixon-Woods, M., Agarwal, S., Jones, D., Young, B., Sutton, A., 2005. Synthesising qualitative and quantitative evidence: a review of possible methods. Journal of Health Services Research & Policy 10.

Doss, C.R., 2006. Analyzing technology adoption using microstudies: limitations, challenges, and opportunities for improvement. Agricultural Economics 34, 207-219.

Feder, G., Just, R.E., Zilberman, D., 1985. Adoption of agricultural innovations in developing countries: a survey. Economic Development and Cultural Change 33, 255-298.

Feder, G., Umali, D.L., 1993. The adoption of agricultural innovations - a review. Technological Forecasting and Social Change 43, 215-239.

Greenhalgh, T., Robert, G., Macfarlane, F., Bate, P., Kyriakidou, O., R, P., 2005. Storylines of research in diffusion of innovation: a meta-narrative approach to systematic review. Social Science & Medicine 61, 417-430.

Hulme, D., 1991. Agricultural extension services as machines: the impacts of the Training and Visit approach. In: Gustafsen, W., Gustafsen, D. (Eds.), Agricultural Extension: Worldwide Institutional Evolution and Forces for Change. Elsevier, New York.

Jagosh, J., Pluye, P., Macaulay, A.C., Salsberg, J., Henderson, J., Sirett, E., Bush, P.L., Seller, R., Wong, G., Greenhalgh, T., Cargo, M., Herbert, C.P., Seifer, S.D., Green, L.W., 2011. Assessing the outcomes of participatory research: protocol for identifying, selecting, appraising and synthesizing the literature for realist review. Implementation Science 6.

Koppel, B.M. (Ed), 1994. Induced Innovation Theory and International Agricultural Development: A Reassessment The Johns Hopkins University Press, Baltimore.

Munro, S.A., Lewin, S.A., Smith, H.J., Engel, M.E., Fretheim, A., Volmink, J., 2007. Patient adherence to tuberculosis treatment: a systematic review of qualitative research. PLoS Med 4, e238.

Okali, C., Sumberg, J., Farrington, J., 1994. Farmer Participatory Research: Rhetoric and Reality. IT Publications, London.

Pawson, R., Greenhalgh, T., Harvey, G., Walshe, K., 2005. Realist review – a new method of systematic review designed for complex policy interventions. Journal of Health Services Research & Policy 10 Suppl 1, 21-34.

Raitzer, D.A., Kelley, T.G., 2008. Benefit-cost meta-analysis of investment in the International Agricultural Research Centers of the CGIAR. Agricultural Systems 96, 108-123.

Rogers, E.M., 2003. Diffusion of Innovations (5th ed.) Free Press, New York.

Scoones, I., 2009. Livelihoods perspectives and rural development. Journal of Peasant Studies 36, 171-196.

Van den Berg, H., Jiggins, J., 2007. Investing in farmers - The impacts of farmer field schools in relation to integrated pest management. World Development 35, 663-686.

Appendices

Appendix 1.1: Authorship of this review

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