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Agriculture and private sector

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Agriculture and private sector

Agriculture and growth evidence paper series

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This paper has been subjected to a series peer reviews by DFID staff and external experts, see below:

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DFID evidence papers

DFID uses a range of evidence synthesis approaches to address the challenge of providing decision makers with the evidence that they need to make better choices.

The “Evidence paper” is an expression of the opinion that DFID has of the existing evidence on a given subject.

This paper, written by staff members of DFID, provides a summary of evidence underpinning a range of debates related to Agriculture and the Private Sector.

The authors do not attempt to prescribe policy conclusions, which, for DFID, will appear elsewhere. This is not a policy document, and is not meant to represent DFID's policy position.

Evidence summary – Agriculture and the private sector

- **Direct state interventions in agricultural input and output markets, in particular public control of markets, is likely to produce inefficient and inequitable outcomes** – Theory asserts the state cannot allocate resources as efficiently as well-functioning markets and that state control over production and marketing is prone to elite capture. The secondary literature suggests a degree of consensus that public interventions can crowd out private sector investment but few empirical studies verify this assertion.

- **Private sector investment alone is not enough to stimulate agricultural growth** – Theory and strong empirical evidence indicates both public and private interventions and investments are needed to create sustained agricultural growth. The extent to which the state should provide more than public goods and a conducive policy environment is contested.

- **Effective agricultural growth strategies are likely to require simultaneous and complementary public and private investments that support segments of value chains in an integrated way** – Both theory and a moderate evidence base suggests the right sequencing of public and private sector investment is critical to unlocking the potential of agricultural markets. This approach aims to mitigate both state and market failures by providing checks and incentives for the state and private sector to work together in mutually beneficial and effective partnerships. Whilst there is a clear consensus that complementary public/private investments are needed, the precise mix is governed by different country contexts, regions, crops, smallholder types and regional characteristics, suggesting a suite of policies and programmes.

- **The commercialisation of agriculture provides opportunities for the growth of agro-industries but equitable outcomes for smallholders are not guaranteed –** Both producer organisations and contract farming can facilitate smallholder market access and commercialisation. A strong evidence base suggests smallholder participants in contracting schemes are from the wealthiest strata of rural communities and that the poorest smallholders tend to be excluded. The available empirical evidence suggests contract participants enjoy significantly higher incomes than non-participants but further research is required. Theory and a moderate evidence base support the contention that contract-farming arrangements are usually entered into by large firms which supply export markets and supermarkets in urban centres.

The agriculture and growth evidence paper series

Agriculture is and will continue to be critical to the futures of many developing countries. This may or may not be because agriculture can contribute directly and/or indirectly to economic growth. But it will certainly be critical because poverty is still predominantly a rural phenomenon and this looks set to remain for the next two decades at least.

The agriculture and growth evidence paper series has been developed to cover a range of issues that are of most relevance to DFID staff. The first 5 topics that will be covered by this series are shown below. However, as further issues are identified so further papers will be commissioned.

Agriculture and growth
- *Agricultural growth and the national economy*
- *Agriculture's contribution to economic growth*
- *Agricultural growth and structural transformation*

Food prices and poverty
- *Is there such a thing as an optimum staple food price or food price trend relative to other prices or income?*
- *Food price spikes and poor households*

Agriculture and poverty
- *Agricultural growth and poverty reduction*
- *Agricultural growth vs. growth in other sectors*
- *Value for money of agricultural growth*
- *Contextual influences of agricultural growth and poverty reduction*

Agriculture and the private sector
- *Direct state involvement in agricultural input and output markets.*
- *The role of the public sector in supporting private sector investment*
- *Opportunities for commercialisation of agriculture*

Agriculture and women
- *The impact of agricultural growth on women*
- *The impact of women on agricultural growth*

How to use this paper

The paper is not intended to be a comprehensive overview of all issues relating to agriculture and the private sector. It concentrates on those areas that are of particular focus for DFID policy and strategy.

The search strategy for the evidence is shown in annex 2. The objective of this search strategy was to identify the range of evidence that is indicative of the body of evidence that underpins the statements that are included throughout this paper. The evidence includes qualitative and quantitative evidence from both peer reviewed and grey sources.

All papers directly referred to within this evidence paper are described and assessed (where appropriate) in accordance with the DFID How to note Assessing the strength of evidence (see annex 3 for a summary of appraisal criteria). These assessments are undertaken by the author and are intended to act as a guide for the reader. While guided by a systematic assessment framework they are subjective and cannot be taken as the definitive assessment of the quality of the research that the evidence is based on. Efforts have been made by the editor to ensure that the methods and approach to the evidence assessment have been consistent across the papers in this series.

The descriptors that are used to articulate this assessment are summarised in the tables below.

Table 1: Descriptors of research type and design

Research type	Research design
Primary and Empirical (P&E)	Experimental (EXP)
	Observational (OBS)
Secondary (S)	Systematic review (SR)
	Other review (OR)
Theoretical or conceptual (TC)	N/A

Table 2: Descriptors of research quality

Study quality	Abbreviation	What might this mean…
High	↑	Demonstrates adherence to principles of appropriateness/rigour, validity and reliability; likely to demonstrate principles of conceptual framing, openness/ transparency and cogency.
Moderate	→	Some deficiencies in appropriateness/rigour, validity and/or reliability, or difficulty in determining these; may or may not demonstrate principles of conceptual framing, openness/transparency and cogency.
Low	↓	Major and/or numerous deficiencies in appropriateness/rigour, validity and reliability; may/may not demonstrate principles of conceptual framing, openness/ transparency and cogency.

The synthesis of evidence and description of the overall “evidence base” are based on combining this grading of strength of the individual pieces with three other characteristics: the size of the total body of evidence assessed; the context/s in which this evidence is set (local, regional or global); and the consistency of the findings produced by the studies constituting the body of evidence.

1. State interventions in agricultural input and output markets

Theoretical and conceptual overview

One body of theoretical and conceptual literature argues that the emergence of a dynamic private sector has been hampered by state bodies continuing to fulfil basic functions in agricultural markets. This has reduced incentives for the private sector to invest in market infrastructure and limited the potential for regional trade. This literature asserts that discretionary and unpredictable trade controls – such as import and export bans and *ad hoc* changes in tariffs – as well as direct state involvement in agricultural input and output markets, through price subsidies and parastatals, are most likely to product inefficient and inequitable outcomes as they distort market signals and incentives.[1]

The main argument is that the public sector cannot allocate resources optimally and state controls over production and marketing activities are prone to elite capture.[2] Based partly on the post-colonial experience in sub-Saharan Africa, this literature asserts that state-controlled trading and financing up until the early 1980s did not stimulate rapid increases in agricultural growth, the operations of marketing boards proved costly and inefficient, and that subsidised inputs and products often did not reach those in most need, often ending up in the hands of medium-large farmers or state-sponsored actors.[3] This body of literature maintains that the market liberalisation process should be completed, supported with complementary investment in public goods and regulatory reform and support to vulnerable groups (World Bank, 2000, [TC]).

A contrasting theoretical literature agrees that state interventions in markets have been inefficient but challenges the conclusion that too little liberalisation has been the only cause of weak growth.[4] This body points to significant state interventions in input and credit markets, combined with price control mechanisms, in many countries that did experience sustained agricultural growth. It argues that high transaction costs combined with weak non-market coordination mechanisms underlie observed failures in some agricultural produce and

[1] (Jayne *et al*, 2002 [S; OR]), (Jayne *et al* 2010 [P&E; OBS →]), (Poulton *et al* 2012 [S; OR]), (Reardon, 2012 [P&E; OBS→]), (Dorward *et al*, 2005 [S; OR]), (Spielman *et al*, 2010 [S; OR]), (Xu *et al* [P&E; OBS ↑]) (World Bank, 2000, [TC])
[2] (Jayne *et al*, 2002 [S; OR]), (Jayne *et al* 2010 [P&E; OBS →]), (Poulton *et al* 2012 [S; OR])
[3] (Reardon, 2012 [P&E; OBS→]), (Dorward *et al*, 2005 [S; OR])
[4] (Dorward *et al*, 2005 [S; OR]), (Dorward *et al*, 2004a [S, OR]), (Jayne *et al*, 2002 [S; OR])

service markets.[5] Based on this explanation of market failures, creating a conducive policy environment and the provision of public goods alone are necessary but insufficient conditions for investment and growth in some markets and some form of non-market coordination or intervention is necessary to raise investments and transaction volumes to the threshold necessary for a market-based growth path (see section on 'The role of the public sector in supporting private sector involvement' for further discussion).

Empirical evidence

Secondary literature indicates some consensus around the notions that direct state involvement is likely to produce inefficient outcomes, but there are few empirical studies that verify this assertion. Of the 8 studies reviewed,[6] only 2 drew from cross-country comparisons.[7] Within the 9 studies, only 4 papers were of medium/high quality.[8]

The outcomes from this body of research are:

Theoretical studies tend to concur that state direct intervention produces sub-optimal outcomes, but only a subset of these theoretical studies have supporting primary empirical evidence. The majority of studies that draw this conclusion are based on secondary data and analysis.

Drawing from case studies of agricultural market liberalisation in Ethiopia, Kenya, Malawi, Zambia and Zimbabwe, Jayne *et al* (2002 [S; OR]) maintain that during the 1980s and 1990s policy unpredictability led to the crowding out of private sector involvement and slowed a supply-side response, whilst state interventions favoured political constituencies. Many of these countries did not implement market reforms, others subsequently reversed reforms or implemented them in a way that discouraged private sector investment. For example, in Zimbabwe price controls remained in place, in Zambia government continued to subsidize fertiliser undercutting private sector distribution systems, in Ethiopia members of the ruling party controlled who should receive fertiliser, and in Kenya and Malawi state-owned marketing boards were actively engaged in supporting producer prices and delivering free starter input packs. Based on this evidence, it is argued that countries in Eastern and Southern Africa which abolished marketing boards and shed interventions fared better than those who have only implemented *de jure* reform.

Using nationwide household survey data, Xu *et al* (2009 [P&E; OBS ↑]) study the impact of fertiliser subsidies in Zambia using a double hurdle model to estimate overall fertiliser use in

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[5] Agricultural investments are contingent on simultaneous, complementary investments by other actors along the value chain. 'Coordination risks', the risk of investing in one component of a supply chain when other actors may not make complementary investments, and 'risks of opportunism', the risk of another actor exploiting their local monopoly may be so high that at least one set of actors in the supply chain is unwilling or unable to make the necessary minimum investment or to offersufficiently attractive terms for the transaction. The whole market thus becomes locked in a 'low-level equilibrium trap' (Dorward *et al*, 2005 [S; OR]), (Dorward *et al*, 2004a [S, OR]).

[6] (Jayne *et al*, 2002 [S; OR]), (Jayne *et al* 2010 [P&E; OBS →]), (Poulton *et al* 2012 [S; OR]), (Reardon, 2012 [P&E; OBS→]), (Dorward *et al*, 2005 [S; OR]), (Spielman *et al*, 2010 [S; OR]), (Xu *et al* [P&E; OBS ↑])
(World Bank, 2000, [TC])

[7] (Jayne *et al*, 2002 [S; OR]), (Mason *et al*, 2013, [P&E; OBS ↑])

[8] (Reardon, 2012 [P&E; OBS→]) (Xu *et al* [P&E; OBS ↑]), (Jayne *et al* 2010 [P&E; OBS →])

dual markets where government subsidies and private retailers co-exist. The evidence suggests government programs targeted relatively wealthy farmers and male-headed households with larger landholdings. Recipient households are also more likely to be in areas of higher private-sector activity, thus depressing commercial demand and reducing the overall use of fertilisers.

Based on nationally representative household-level data from Malawi and Zambia, Mason *et al* (2013 [P&E; OBS ↑]) find that households in areas where the ruling party won the last presidential election acquired significantly more subsidised inputs than other households. The result of their studies indicate that households with larger landholdings received significantly more subsidised fertiliser in Malawi and slightly more subsidised seed in Zambia. The authors also observed that each additional kilogram of subsidised maize seed acquired by a household reduced its commercial improved maize seed purchases by 0.58 kg in Malawi and 0.49 kg in Zambia on average. This supports the view that subsidies for improved maize seed crowded out commercial seed purchases by smallholders and that some of the subsidized inputs are targeted to households that would otherwise buy the inputs at market prices.

More recently, assessment of the distribution of fertiliser vouchers in sub-Saharan Africa echo previous concerns with elite capture and politicisation. For example, Pan and Christiansen (2011, [P&E; OBS]) found weak decentralised targeting in Tanzania with poor households in outlying areas most affected, whilst Banful (2011, [P&E; OBS]) found evidence of the politicisation of voucher targeting in Ghana. Moreover, reflecting Xu *et al*'s study (2009 [P&E; OBS]), Mason *et al* (2011; P&E; OBS) found that the gains from Zambia's fertiliser subsidy were mostly enjoyed by smallholders with larger landholdings.

2. The role of the public sector in supporting private sector involvement

Theoretical and conceptual overview

The view that the private sector alone cannot boost agricultural growth is supported in multiple conceptual and empirical studies.[9] Indeed, the overwhelming consensus is that both public and private investments are needed to create sustained agricultural sector growth. However, across the literature the desired levels of state involvement moves along a spectrum ranging from light touch and enabling to proactive and coordinating. The majority would seem to acknowledge the importance of country context when assessing the level of state involvement that is required.

Examples of the arguments at different points along this spectrum are:
Creation of a conducive policy environment and the provision of public goods.[10] Governments should create a conducive policy environment and invest in rural public goods, in particular physical infrastructure (rural roads, electricity, irrigation) and research and extension services.[11] The state's role in providing macroeconomic stability, an effective legal framework (contract enforcement, land tenure systems), streamlined business regulations, and tax and customs policies are thought to be critical to encourage large-scale private sector investments and to expand markets and trade.[12]

Moving further along the spectrum, a body of literature makes the case for the ***state to also play an active market coordination role to overcome market failures and facilitate private investment in thin markets***.[13] This view is more sceptical of the extent to which liberalisation has delivered efficient and effective mechanisms of market exchange in poor rural areas.[14] It is argued that the private sector response to market liberalisation has been

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[9] (Dorward *et al*, 2005 [S; OR]), (Dorward *et al*, 2004a [S, OR →]), (Dorward *et al*, 2004b [S; OR]), (Poulton *et al*, 2006 [S; OR →]), (Jayne *et al*, 2010 [P&E; OBS →]), (Reardon, 2012 [P&E; OBS→]), (Diop *et al*, 2005 [P&E; OBS →]), (Narrod *et al*, 2009 [S; OR]), (Spielman *et al*, 2007 [P&E; OBS →]), (Berdegue *et al*, 2008 [P&E; OBS]) (Fan *et al*, 2003 [S; OR]), (Pingali *et al*, 2005 [S; OR]), (Poulton *et al* 2012 [S; OR]), (Spielman *et al*, 2010 [S; OR]), (Moseley, 2010 [P&E;OBS ↓]), (Chamberlin & Jayne, 2013 [P&E; OBS →]), (Langyintuo *et al*, 2010 [P&E; OBS →])

[10] (Fan *et al*, 2003 [S; OR]), (Pingali *et al*, 2005 [S; OR])

[11] (Jayne *et al*, 2010 [P&E; OBS →]), (Poulton *et al* 2012 [S; OR]), (Reardon, 2012 [P&E; OBS→]), (Spielman *et al*, 2010 [S; OR])

[12] (Poulton *et al*, 2006 [S; OR →]), (Spielman *et al*, 2010 [S; OR]), (Narrod *et al*, 2009 [S; OR]), (Pingali *et al*, 2005 [S; OR])

[13] (Dorward *et al*, 2005 [S; OR]), (Spielman *et al*, 2010 [S; OR]), (Dorward *et al*, 2004b [S; OR])

[14] (Dorward *et al*, 2005 [S; OR]), (Spielman *et al*, 2010 [S; OR])

slow and risk averse. For example, private provision of inputs and finance has been sluggish and patchy, and investment in export crops has been more common than food crops. In addition, uncertainty and high transactions costs are likely to result in the purchase of fewer inputs, uptake of less credit, and the marketing of less produce than indicated by economic fundamentals, creating 'low level equilibrium traps' in rural areas, where bottlenecks at one stage of the supply chain depress incentives for investment at other stages (Dorward et al, 2004a [S, OR →]).

Therefore, to correct market failures, a more strategic role needs to be played by the state, providing incentives for private sector actors to transform value chains (Reardon, 2012 [P&E; OBS→]). It is argued that experiences from Latin America and South Asia demonstrate that the public sector must be proactive in setting priorities but that it must exercise caution to avoid overstepping its capacity, creating distorting incentives, or fostering an environment that favours rent-seeking. For example, it is widely recognised the Green Revolution in India was a state-driven, market-mediated growth process (Djurfeldt et al 2005, [P&E; OBS]). However, whilst short-term subsidies were important for the adoption of new technologies, in the medium- to long-term such policies became inefficient.[15]

Empirical evidence

A literature of 21 studies has been identified that consistently argues for some level of public sector support to agriculture.[16] However, the body of empirical evidence that we have reviewed is of a small size (5 studies) and of moderate quality.[17]

The first 2 studies indicate that **more is required from governments than market liberalisation policies alone.**

Moseley (2010 [P&E;OBS]) used household and market surveys and analysed national-level production data from Gambia, Cote D'Ivoire and Mali for his study on the rice sector. He contends that market liberalisation policies disproportionately favour urban consumers at the expense of rural producers. His findings suggest that credit systems, road networks, and milling/processing capacity are more important than improved seed packages and production expansion to get crops to markets.

Based on an empirical study of over 90 percent of all maize seed providers in Eastern and Southern Africa in 2007, Langyintuo et al (2010 [P&E; OBS →]) argue that major bottlenecks in credit, access to germplasm and restrictions to seed trade deterred greater private sector involvement in seed production and deployment. They argue that policy/regulatory

[15] (Cummings *et al* 2006, [S, OR]), (Fan *et al*, 2008 [P&E; OBS]).

[16] (Dorward *et al*, 2005 [S; OR]), (Dorward *et al*, 2004a [S, OR →]), (Dorward *et al*, 2004b [S; OR]), (Poulton *et al*, 2006 [S; OR →]), (Jayne *et al*, 2010 [P&E; OBS →]), (Reardon, 2012 [P&E; OBS→]), (Diop *et al*, 2005 [P&E; OBS →]), (Narrod *et al*, 2009 [S;OR]), (Spielman *et al*, 2007 [P&E; OBS →]), (Berdegue *et al*, 2008 [P&E; OBS]) (Fan *et al*, 2003 [S; OR]), (Pingali *et al*, 2005 [S; OR]), (Poulton *et al* 2012 [S; OR]), (Spielman *et al*, 2010 [S; OR]), (Moseley, 2010 [P&E;OBS ↓]), (Chamberlin & Jayne, 2013 [P&E; OBS →]), (Langyintuo *et al*, 2010 [P&E; OBS →]) (Fan *et al*, 2003 [S; OR]), (Pingali *et al*, 2005 [S; OR]), (Poulton *et al* 2012 [S; OR]), (Spielman *et al*, 2010 [S; OR])

[17] (Moseley, 2010 [P&E;OBS; ↓]), (Langyintuo *et al*, 2010 [P&E; OBS →]), (Fan *et al*, 2003 [S; OR]), (Reardon, 2012 [P&E; OBS→]), (Chamberlin & Jayne, 2013 [P&E;OBS;→])

improvements are needed to provide long-term finance to the seed sector and legislation should be harmonised for the more rapid regional spillover of seed varietal releases.

The other studies **demonstrate the benefits that can come from varying degrees of public sector support for agriculture.**

In an analysis of government expenditure and agricultural data (drawn from IMF, WB and FAO databases) for 43 developing countries (Asia, Africa, Latin America) from 1980 to 1998, Fan *et al* (2003 [S; OR]) found that government agricultural expenditure contributed strongly to agricultural growth. The provision of public goods in the form of roads, irrigation and education (proxied by literacy rates) all had positive and statistically significant effects. Disaggregating total agricultural expenditure into research and non-research expenditure components, revealed that although both their coefficients are positive, the coefficient for agricultural research is larger in magnitude and more significant, suggesting that productivity-enhancing expenditures, such as agricultural research investment, have larger output-promoting effects than other forms of public spending on agriculture (including subsidies).

Using a survey of 3,500 farmers operating in rice and potato value chains in India, Bangladesh and China, Reardon *et al* (2012 [P&E; OBS→]) confirm that the state has been instrumental in fostering private-sector involvement through investments in research and development, the distribution of seeds, infrastructure, cold storage facilities and electricity grids. The removal of restrictions on medium- and large-scale millers allowed foreign direct investment in processing and retailing, leading towards greater economies of scale and market consolidation.

Lastly, in a study of farm panel survey data on 1,233 farm households in 22 districts of Kenya between 1997-2010, Chamberlin and Jayne (2013 [P&E;OBS;→]) argue that cell-phones and new technologies lower transaction costs by improving traders' ability to cultivate more spatially-diffuse networks and make use of faster price-discovery and negotiation times. Their findings suggest that investments in telecommunications rather than road infrastructure could be more efficient for lowering the costs of trade in remote areas.

3. What type of partnership between public sector and private sector lead to better results?

Theoretical and conceptual overview

Multiple conceptual and theoretical papers support the argument that effective agricultural growth strategies need to draw on combined public and private investments that support various segments of the value chain in a complementary manner.[18] A strand of the conceptual literature asserts that the right sequencing of public and private sector investment is critical in unlocking the potential of agricultural markets. Based on the success of the Green Revolution, Dorward *et al* (2004b [S; OR]) postulate a three-phased approach: first, establish the basics through state-led infrastructure investment; second, kick-start markets through critical government interventions in seasonal finance and input supply systems; and third, government withdrawal from these markets for the private sector to take over.

Similarly, Spielman (2010 [S; OR]) maintains that agricultural reforms require careful sequencing to maintain short-term public engagement in input markets and extension services whilst creating new space for long-term private investment. This way the inefficiencies of public extension services caused by poor incentives can be overcome by attracting private agents whose technical advice to farmers is tied to their interest of selling inputs. Initial support can be justified by the high start-up costs and risks associated with developing new agricultural value chains and such support is often considered as instrumental in underwriting the high transaction costs of linking investors to smallholders (World Bank, 2013, [S; OR]). Some argue that strategic subsidies for inputs such as fertiliser may be needed in the early stages of market development but the way these subsidies are designed matters: targeted, *time-bound* input vouchers redeemed through private dealers can be important in building private input markets and stimulating growth in new crops.

Dorward *et al* (2004a [S, OR →]) emphasise the importance of new developmental approaches that recognise possible failures of both states and markets and craft innovative

[18] (Dorward *et al*, 2004a [S, OR]), (Dorward *et al*, 2004b [S, OR]), (Poulton *et al*, 2006 [S; OR]), (Poulton *et al* 2012 [S; OR]) (Wiggins & Keates, 2012 [S; OR]), (Delaney *et al*, 2011 [S; OR]), (Reardon, 2012 [P&E; OBS→]), (Diop *et al*, 2005 [P&E; OBS →]), (Spielman *et al*, 2007 [P&E; OBS →]), (Narrod *et al*, 2009 [S; OR]), (Poulton *et al*, 2006 [S; OR →]), (Dorward *et al*, 2005 [S; OR]), (World Bank, 2013, [S; OR]), (Chirwa, 2008 [P&E; OBS →]), (Xu *et al*, 2009 [P&E; OBS ↑]), (Leturque & Wiggins, 2011 [S, OR]) , (Jayne *et al*, 2002 [S; OR])

institutional arrangements providing checks and incentives for states and for commercial and non-state agents to work together. Moreover, Poulton and Macartney (2012 [S; OR]) examine whether the incentives of the private sector can be aligned to meet public policy objectives. The authors conclude that the private sector can be stimulated to deliver public outcomes if incentives are in place to avoid moral hazard and adverse selection. Potential safeguards include contract cancellation, performance-based payments, partial credit loss guarantees, competitive bidding and due diligence. However, the authors are sceptical of the capacity of many African state agencies, in particular, to effectively structure contracts in these ways.

Empirical evidence

18 studies have been identified that consistently argue for the role of complementary investments.[19] Empirical evidence is limited (8 studies)[20] and of moderate to poor quality. This evidence indicates a **consensus that complementary public/private investments are needed, but the nature of this is governed by geographical, developmental and economic context.** Different types of complementarities are thought to be suitable for different country contexts, regions, crops, smallholder types and high/low potential areas, suggesting a suite of policies and programmes.[21]

In the study of the impact of fertiliser subsidies in Zambia, Xu *et al* (2009 [P&E; OBS ↑]) find that the impact of the fertilizer subsidy program on overall fertilizer use depends on the type of area in which the program operates. In areas where the private sector was active and average wealth higher, subsidies have crowded out the private sector and in some cases government programmes reduced overall fertiliser use. Feedback from commercial distributors indicated that they wait to see where government programs are operating and the quantities to be distributed in a particular year and then arrange to distribute their fertilizer to other areas which will not compete with the government programs. However, in poorer regions with limited private sector involvement, subsidies have helped to encourage greater commercial demand for fertilizer and hence the development of a commercial input distribution system.

In developing cold chain storage facilities in India, government research and development in potato varieties and extension services for the new varieties were combined with tube well and cold chain storage subsidies and major investments in road improvements, power grid, and communications networks. Individually, these actions may not have worked well but taken together they were successful (Reardon, 2012 [P&E; OBS→]).

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[19] (Dorward *et al*, 2004a [S, OR]), (Dorward *et al*, 2004b [S, OR]), (Poulton *et al*, 2006 [S; OR]), (Poulton *et al* 2012 [S; OR]) (Wiggins & Keates, 2012 [S; OR]), (Delaney *et al*, 2011 [S; OR]), (Reardon, 2012 [P&E; OBS→]), (Diop *et al*, 2005 [P&E; OBS →]), (Spielman *et al*, 2007 [P&E; OBS →]), (Narrod *et al*, 2009 [S; OR]), (Poulton *et al*, 2006 [S; OR →]), (Dorward *et al*, 2005 [S; OR]), (World Bank, 2013, [S; OR]), (Chirwa, 2008 [P&E; OBS →]), (Xu *et al*, 2009 [P&E; OBS ↑]), (Leturque & Wiggins, 2011 [S, OR]) , (Jayne *et al*, 2002 [S; OR])

[20] (Reardon, 2012 [P&E; OBS→]), (Diop *et al*, 2005 [P&E; OBS →]), (Chirwa, 2008 [P&E; OBS →]), (Xu *et al*, 2009 [P&E; OBS ↑]), (Rankin and Galvez Nogales 2013, [S; OR]), (Kindornay *et al* 2013, [S; OR]), (Heinrich 2013, [S;OR]), (Boland 2012, [S; OR])

[21] (Dorward *et al*, 2004a [S, OR]), (Reardon, 2012 [P&E; OBS→]), (Dorward *et al*, 2004b [S, OR]), (Chirwa, 2008 [P&E; OBS →])

Case studies compiled by Wiggins and Keates (2012 [S; OR]) confirm that a large and formal firm (processor, exporter, retail outlet) often takes responsibility for organising value chain linkages. On a broader note, Leturque and Wiggins (2011 [S, OR]) suggest that Thailand's success in transitioning from an agrarian economy dependent on primary exports to taking up opportunities in domestic and international markets for higher value produce has been down to private initiative, but the state facilitated and encouraged this by land tenure rules, the building of roads, investments in agricultural research and rural education, provision of credit through state-owned banks and the promotion of agricultural exports. The government was also instrumental in establishing public and semi-public agribusiness companies and in facilitating contract farming schemes.

Based on a FAO review of 70 case studies of public-private partnerships (PPPs) in Africa, Asia and Latin America, Rankin and Galvez Nogales (2013, [S; OR]) highlight the common challenges and constraints encountered within four types of PPPs: innovation and technology transfer; value chain/sub-sector development; market infrastructure; and agro-industrial food parks. In addition to the importance of the design of the collaboration and the specific roles and responsibilities of actors, the common challenges encountered included a variety of institutional failures, operational delays and misunderstandings, technical failures as well as higher costs and lower returns than assumed. Kindornay *et al* (2013 [S; OR]) highlight how many models are driven by donors who provide matched funding or a further financial incentive to firms to introduce changes into their business models and supply chains.

Such support has led to different types of partnerships: structured donor mechanisms (with strict conditions); semi- or non-structured donor-led models (which are less rigid and offer opportunities for more actors); public-private or multi-stakeholder coalitions (often aimed at a sector or specific value chain); and firm-led initiatives, including with non-profit organisations (Heinrich 2013, [S;OR]). Rigorous empirical evaluations of PPPs are at an early stage. However, anecdotal evidence suggests hidden costs related to PPPs (especially for value-chain PPPs) and the role of key enabling individuals are not fully understood(Boland 2012, [S; OR]). Moreover, and as already highlighted, Poulton and Macartney (2012 [S; OR]) highlight the inherent threats of moral hazard and adverse selection within PPPs in agriculture. For example, the threat of shirking within extension service contracts, low farmer acceptance of new products supported by challenge funds, and how guarantee funds can intensify competition within existing lucrative markets instead of expanding coverage to low-potential areas and poorer consumers. Whilst the authors offer a suite of incentives and mechanisms to overcome the principal-agent problems, they question the capacity of the state in Africa to implement such safeguards.

4. Commercialisation of agriculture and opportunities for the growth of agro-industries and smallholders.

Theoretical and conceptual overview

Theory suggests that whilst commercialisation leads to broad agro-industrial growth, some smallholders may struggle to participate and benefit. Commercialisation occurs with rising incomes and growing (urban) markets demanding higher-value products. It also arises when agricultural exporters meet higher public and private standards within the global market. Both processes lead to the greater use of purchased inputs, greater demand for processing, packaging and transportation, and the increased use of services (for machinery repair, finance and retail) thereby adding value in downstream and, to a lesser extent, upstream nodes of value chains (World Bank, 2013, [S; OR]). This transformation of agriculture can create greater opportunities for some smallholder farmers. However, investment constraints, a lack of ability to meet standards, and high transaction costs can often limit broad smallholder participation. Smaller farms often suffer from capital constraints and lack capacity to adopt technological innovations (partly due to low literacy levels). For example, high perishability and safe handling involves specialised production, packaging techniques and refrigeration, large capital investments which small and medium-sized farms often cannot afford.[22] Moreover, smallholders and small exporters often struggle to meet the precise product requirements from actors further down the value chain. For example, safety assurance, traceability, quality control, and credence factors are, in many cases, significant barriers to entry.[23] Lastly, a widely-dispersed smallholder population also increase transaction costs for firms (compared to contracting with large farms).

Producer organisations can reduce transaction costs per farmer and address information and communication blockages although collective action will also incur internal transaction costs within the producer organisation. Smallholder integration into more demanding value chains may be more successful where **producer organisations** can facilitate training, aggregation

[22] (Kirsten & Satorius 2002, [TC]; Swinnen and Maertens, 2007 [S; OR])
[23] (Giovanucci *et al*., 2008, [S; OR]), (Humphrey and Memodovic, 2006 [TC])

and compliance with standards (World Bank, 2013, [S; OR]). Producer organisations can also: facilitate higher producer prices by supplying bulk quantities that have some quality assurance; adapt to market conditions faster by seeking alternative buyers; negotiate more effectively with prospective firms; and facilitate finance and technology by channelling outside actors to their members.[24] In this respect, such organisations may play a dual role, acting as a bonding mechanism within communities, but also providing an important bridging function with outside actors (such as firms and development agencies).

Contract farming is one approach for involving smallholders in agroindustry development, increasing employment and improving the inclusiveness of growth. Contract farming tends to involve a firm providing 'inputs' on credit in exchange for exclusive purchasing rights over the specified crop. Contract farming can reduce firms' transaction costs and risks and provide an efficient means of sharing incentives and risks in some sub-sectors. Contract farming schemes are only likely to succeed where contracts can be enforced. In many developing countries with weak judicial processes and law enforcement institutions this is likely to be limited to circumstances where side-selling[25] is difficult (e.g. where the contracting buyer has a monopsony) or unattractive (e.g. where buyers coordinate to disincentivise side-selling) ion among buyers result. In terms of poverty reduction, contracting with smallholders can be beneficial: small farms are owned by the poor, often use local labour, and often spend income nearby. Moreover, in many developing countries, small farms may have advantages over large farms in terms of labour-related transaction costs, in particular supervision and motivation (Hazell *et al*, 2006 [TC]).

For firms, contract farming can offer a number of opportunities: increased reliability in supply quantity and quality; greater control over the production process and crop attributes, to meet standards and credence factors; reduced co-ordination costs, as a more regular and stable supply permits greater co-ordination with wider activities; greater flexibility in expanding or reducing production compared to full vertical integration (and economies of scale in procurement of inputs). On a broader note, and especially where access to land is highly politicised, it can overcome land constraints.

Contract farming also offers numerous opportunities for farms: it can allow access to a reliable market; it can provide guaranteed and stable pricing structures; and most importantly, it can provide access to credit, inputs, production and marketing services (seed, fertiliser, training, extension, transport, and even land preparation). On a wider note, contract farming can open doors to new markets for a farm's produce, stimulate technology and skill transfer (particularly for higher-risk crops, which resource-poor farmers might typically avoid), and it can support farmers in meeting vital standards.

The recent literature on contract farming with smallholders contains **five key debates**. First, the degree of smallholder participation in contracting schemes. The second debate is the impact of participation on smallholders' incomes/welfare. Third, that crops exhibiting high variation in quality, that perish easily, that are hard to grow, or that command a higher price per kg are more likely to be grown through contract farming. The argument here is that

[24] (Bijman, 2008 [S; OR]), (Bijman *et al,* 2007 [S; OR]), (Berdegue *et al,* 2008 [P&E; OBS])
[25] Side-selling is the practice of selling the crop to another buyer in violation of the contract.

standard crops that have uniform quality and are not perishable are usually traded in spot markets since the transaction costs are low.

Fourth, that contract-farming initiatives are usually undertaken by large firms. Minot (2007, [S; OR]) argues that such arrangements require substantial fixed costs, in particular a team of extension agents to engage, liaise and monitor farmers. Obviously, such fixed costs are easier for large firms to absorb. In addition, firms with large processing plants that require a steady flow of raw materials (sugarcane is a good example here, where out-growers supplement plantation production), tend to contract outgrowers.

Fifth and finally, that contract-farming arrangements are most likely to supply markets in developed countries, and supermarkets within urban centres in other countries. The argument here is that greater demand for quality as well as credence factors tend to increase the likelihood that a crop is grown under contract. These markets are most likely to pay a premium for quality attributes.

Contract farming can be seen to sit under a broader umbrella term of **inclusive business models** where smallholders are engaged by firms on 'equitable' terms (Kelly, 2012 [S; OR]). This includes, *inter alia*, backwards integration by processors and forwards integration by input providers. Importantly, it also includes efforts by retailers, such as supermarkets, to include smallholders in their supply chains.[26] In contrast to the specific literature on contract farming which focuses mainly on the potential for smallholder inclusion and benefits, the emergent literature on inclusive business models tends to focus more on the business case for incorporating smallholders within agroindustry development.[27] Such models face significant challenges and high start-up costs in their initial phase.

Empirical evidence

Empirical studies are mixed on whether **producer organisations** improve smallholder participation. 5 studies of moderate quality were reviewed. Research in 8 countries found that membership of producer organisations was correlated with participation in modern markets in only half of the countries; in the rest the correlation was not significant or was negative (Huang and Reardon, 2008 [P&E; OBS →]). However, there is an agreement in the literature that the type of producer organisation matters: focusing on market-orientated, member-based POs that only provide benefits to members is preferable to broader community-based POs.[28]

The type of commodity is also significant. Barrett (2008 [S; OR]) highlights how producer organisations have improved smallholder engagement with firms for cash crops, especially dairy and horticulture. However, there is limited evidence of successful PO intermediation for staple-food crops. One exception is Bernard *et al* (2010 [P&E; OBS]) who found that, on a non-contract basis, producer organisations obtained a 7% premium for members when

[26] Whilst a supermarket revolution is certainly underway to meet the demands of a rapidly expanding urban middle class in Africa, it is important to note their market share is still small. Local stores, kiosks and open markets remain important for the sale of fresh produce. Indeed supermarket sales account for 16% of total food retail sales in Kenya and 9% in Zambia, two of the African countries where supermarket penetration has proceeded furthest.
[27] (Bright and Seville, 2010, [S; OR]), (Kelly, 2012, [S, OR]), (Paglietti and Sabrie 2013, [E; NE]), (Lundy *et al* 2012, [S; OR])
[28] (Bernard *et al*, 2006 [P&E; OBS]), (Berdegue *et al*, 2008 [P&E; OBS])

marketing staple-food produce (by utilising better market information, timing the sales of produce effectively, and moving into retails sales). But Bernard *et al* also highlight the frequent finding that poor, small farmers are not well-represented in staple-food producer organisations as the costs of membership are prohibitive.

The empirical evidence on contract farming also displays a mixed and nuanced set of messages. In a synthetic review, Prowse (2012 [S; OR]) compares 44 cases of contract farming where 35 cases were assessed as 'successful', 9 as 'failed'. The comparison of 'successful' and 'failed' cases enabled Prowse to revisit the 5 debates outlined above. The evidence on the degree of smallholder participation in contract farming schemes suggests **poorer smallholders are often excluded**. 10 studies find low levels of participation by poorer smallholders.[29] For example, Barrett (2008, [S; OR]) who finds a strong association between asset holdings, especially of land, and geographic factors (such as market access and agro-ecological zone) with participation. Freguin-Gresh *et al* (2012, [P&E; OBS]) argue that although **contract farming** generally improves the agricultural production of **participants,** it often does not benefit the poorest. Results show that **contract farming** mostly involves the better resourced, who have previously benefitted from specific development paths and public support. Moreover, based on 1,200 households across regions and crops in Madagascar, Bellemare (2012 [P&E, OBS) shows that those participating in contract farming had larger landholdings, greater assets, better education and were more likely to be a member of a producer organisation. Taking these finds one step further, Wiggins and Keates (2012 [S; OR]) argue that marginal smallholders may find better prospects as wage labourers on larger farms instead of participating in improved supply chains as producers.

In contrast, a more optimistic interpretation is offered by Reardon *et al* (2009 [S; OR]) who outline that although smallholders tend to be excluded in dualistic agrarian economies there are numerous exceptions to this pattern. In addition, Swinnen and Maertens (2007 [S; OR]) posit that although theory suggests transaction costs and investment constraints imply that smallholders should be excluded from participating, empirical work suggests a much greater degree of participation.

Of the 35 successful cases on contract farming assessed by Prowse 2012 [S; OR]), 54% (19 total) of contracts were with small farms, and 26% (9 total) were with a combination of both small and large farms.[30] When restricting the successful cases only to those studies that attempted to address selection bias, Prowse found 6 with small farms and 3 with a combination of small and large farms. But the extent of smallholder participation appears to be mediated by the agrarian structure: the review only found 2 instances – Colombia and Kenya – where landholding inequality is very high. All other successful cases had a more equal distribution of land. Therefore, the evidence suggests **smallholders are more likely to participate in contract farming when inequality in landholding sizes is low**. The evidence also suggests the poorest smallholders are less likely to participate in any agrarian context.

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[29] Kirsten and Sartorius (2002, [TC]), Key and Runsten (1999, [P&E; OBS]), Baumann (2000; [S; OR]), Singh (2002; [P&E; OBS]), Delgado *et al* (2008; P&E; OBS), Da Silva (2005; [S; OR]); Birthal *et al* (2005, [P&E, OBS), Barrett (2008, [S; OR]), Freguin-Gresh *et al* (2012 [P&E; OBS]), Bellemare (2012; [P&E, OBS).

[30] 10 of the 19 instances of success with small farms were through a producer organisation

Second, recent evidence also lends strong support to the hypothesis that **contract participants display significantly higher incomes than non-participants**.[31] For example, 5 recent quasi-experimental studies all show significantly higher incomes for contract growers.[32] The broader agribusiness literature supports these findings.[33] However, this argument is still open to debate. Whilst recent empirical work has addressed selection bias at the household level (thus controlling for the observed characteristics of participants and non-participants), there has been no discussion in the literature about controlling bias when selecting initiatives to evaluate. In other words, there is little surprise many contact-farming initiatives studied show increased incomes for participants compared to non-participants (*ceteris paribus*), for if they had not raised incomes the schemes may well have collapsed (and thus not be available to be studied).

Third, recent evidence does suggest that crops which exhibit **a high degree of variation in quality, perish easily, are hard to grow, or command a higher price per kg, are more likely to be grown** on contract terms. However, there is also limited evidence to suggest that mundane and ordinary commodities can also be grown successfully via contract farming. For example, Prowse (2012 [S; OR]) highlights how successful cases of contract farming include apples, onions, potatoes, rice and soya. This finding is reflected in findings on the broader restructuring of staple food value chains in Asia.[34]

Fourth, recent evidence supports the contention that contract-farming arrangements are usually entered into by **large firms**. Whilst it is easier for researchers to find and work with firms that are larger (and thus introduce a form of scheme-level selection bias), and there are examples of cases where small firms do engage successfully in contract farming, the weight of evidence tends to support this hypothesis.[35]

And fifth, recent evidence supports the hypothesis that contract-farming initiatives are most likely to supply **markets in developed countries, and supermarkets within urban centres** in developing and emerging economies. For example, of the 35 'successful' initiatives assessed by Prowse (2012 [S; OR]), 19 targeted export markets, 9 the local urban markets, with the remaining seven cases utilising a variety of markets, or did not clearly stating the end market. Focusing just on studies that address attribution and selection bias, eight out of ten initiatives were providing products for export markets.

In addition to these 5 debates, Prowse (2012 [S; OR]) highlights how the recent literature includes various forms of innovation to encourage successful commercial production through contract farming. Innovations within contract design include penalty deductions/bonus payments at the end of the season depending on the extent to which production differed from the average for all growers, stipulating a third party to measure produce, or encouraging growers to produce food crops in parallel with a cash crop or in the off season. Financial

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[31] (Prowse, 2012 [S; OR])
[32] (Birthal *et al* 2008; [P&E, OBS), (Bolwig *et al* 2009; [P&E, OBS]), (Miyata *et al* 2009; [P&E, OBS]), (Ramaswami *et al* 2005, [P&E, OBS), (Setboonsarng *et al* 2008; [P&E, OBS]). See also Minten *et al* (2009; [P&E, OBS).
[33] (Reardon *et al*, 2009 [S; OR])
[34] (Reardon 2012 [P&E; OBS→])
[35] (Prowse 2012 [S; OR])

innovations included split-pricing schedules, growers receiving a small number of shares as part of a payment structure (to foster mutual interest and benefits), and using third-parties as a source of credit (with farmers' collateral and the credit provider absorbing initial losses). Turning to institutions, both dispute-resolution agencies and intermediary organisations can provide services and support to make a breakdown in communication and co-operation less likely.

Finally, the empirical evidence on **inclusive business models** is less well developed than that on contract farming. It also offers a very mixed assessment of smallholder benefits from involvement with agribusiness.

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Annex 1: Assessment summary

Study	Research Type	Research Design	Quality
Banful (2011)	P&E	OBS	→
Barrett (2008)	S	OR	N/A
Bellemare (2012)	P&E	OBS	→
Berdegué *et al* (2008)	P&E	OBS	N/A
Bernard *et al* (2006)	P&E	OBS	→
Bernard *et al* (2010)	P&E	OBS	↑
Bijman *et al* (2007)	S	OR	N/A
Bijman (2008)	S	OR	N/A
Birthal *et al* (2005)	P&E	OBS	→
Birthal *et al* (2008)	P&E	OBS	→
Boland (2012)	S	OR	N/A
Bolwig *et al* (2009)	P&E	OBS	↑
Bright and Seville (2010)	S	OR	N/A
Chamberlin and Jayne (2013)	P&E	OBS	→
Chirwa (2008)	P&E	OBS	→
Delaney *et al* (2011)	S	OR	N/A
Diop *et al* (2005)	P&E	OBS	→
Djurfeldt *et al* (2005)	P&E	OBS	→
Dorward *et al* (2004a)	S	OR	N/A
Dorward *et al* (2004b)	S	OR	N/A
Dorward *et al* (2005)	S	OR	N/A
Fan and Rao (2003)	S	OR	N/A
Fan *et al* (2008)	P&E	OBS	→
Friguin-Gresh *et al* (2012)	P&E	OBS	→
Giovanucci and Purcell (2008)	S	OR	N/A
Hazell *et al* (2006)	TC	N/A	N/A
Heinrich (2013)	S	OR	N/A
Huang and Reardon (2008)	P&E	OBS	→
Humphrey and Memedovic (2006)	TC	N/A	N/A
Jayne *et al* (2010)	P&E	OBS	→
Jayne *et al* (2002)	S	OR	N/A
Kelly (2012)	S	OR	N/A
Key and Runsten (1999)	P&E	OBS	→
Kirsten and Satorius (2002)	TC	N/A	N/A
Kindornay *et al* (2013)	S	OR	N/A
Langyintuo *et al* (2010)	P&E	OBS	→
Leturque and Wiggins (2011)	S	OR	N/A
Lundy *et al* (2012)	S	OR	N/A
Mason *et al* (2011)	P&E	OBS	↑
Mason *et al* (2013)	P&E	OBS	↑
Mercoiret *et al* (2006)	S	OR	N/A
Minot (2007)	TC	N/A	N/A
Minten *et al* (2009)	P&E	OBS	↑

Miyata *et al* (2009)	P&E	OBS	↑
Moseley *et al* (2010)	P&E	OBS	↓
Narrod *et al* (2009)	S	OR	N/A
Paglietti and Sabrie (2013)	S	OR	N/A
Pan and Christiaensen (2012)	P&E	OBS	↑
Pingali *et al*, 2005	S	OR	N/A
Poulton *et al*, 2006	S	OR	N/A
Poulton and Macartney, 2012	S	OR	N/A
Prowse, M. (2012)	S	OR	N/A
Ramaswami *et al* (2005)	P&E	OBS	→
Rankin and Galvez Nogales (2013)	S	OR	N/A
Reardon *et al* (2012)	P&E	OBS	→
Reardon *et al* (2009)	S	OR	N/A
Setboonsarng *et al* (2008)	P&E	OBS	→
Singh *et al* (2002)	P&E	OBS	↓
Spielman *et al* (2007)	P&E	OBS	→
Spielman *et al* (2010)	S	OR	N/A
Swinnen and Maertens (2007)	S	OR	N/A
Wiggins and Keates (2012)	S	OR	N/A
World Bank (2000)	TC	N/A	N/A
World Bank (2013)	S	OR	N/A
Xu *et al*, 2009	P&E	OBS	↑

Key:
P&E: Primary and Empirical
S: Secondary
TC: Theoretical and conceptual
EX: experimental
OBS: Observational
SR: Systematic review
OR: Other review
↑ High quality
→ Medium quality
↓ Low quality

Annex 2: Literature search methodology

The interrogation of the evidence base for this paper was built on an iterative process designed to ensure that the paper covers a range of evidence that was indicative of the scope of the evidence base for each of the sections (that is, the full range of arguments and empirical research was represented). This included:

A structured literature search of the following databases and repositories:

- SviVerse Scopus
- Web of Knowledge
- Google Scholar
- DFID's research repository R4D
- International Initiative for Impact Evaluation (3ie) systematic review and impact evaluation databases.

The search was designed around search strings created for each of the sections. Further inclusion criteria for this rapid search were:

- Date: after 2000 – present - unless considered seminal.
- Languages - English
- Population - developing countries
- Region - no regional limitations.

Focused searches by authors - The results of this search were used by authors to construct their theoretical and conceptual arguments. Once constructed the theoretical and conceptual sections of the paper formed a framework for a further literature search to identify further sources of the empirical evidence that underpins the arguments presented.

Peer review – The development of the paper is supported by a steering group and each section has both DFID peer reviewers and external peer reviewers. At each stage of the process – from the identification of the focus areas to the drafting of the final documents the peer reviewers have contributed their assessments and suggestions relating to the representativeness and strength of the evidence base that we are drawing from.

Annex 3: Critical appraisal

For a full description of the methods used for critical appraisal in this paper please refer to the ***DFID How To Note on Assessing the Strength of Evidence***.

The basic criteria for assessing the quality of the studies cited in this paper are summarised in the table below:

Principles of quality	Associated principles	YES/NO
Conceptual framing	Does the study acknowledge existing research?	
	Does the study construct a conceptual framework?	
	Does the study pose a research question?	
	Does the study outline a hypothesis?	
Openness and transparency	Does the study present the raw data it analyses?	
	Does the author recognise limitations/weaknesses in their work?	
Appropriateness and rigour	Does the study identify a research design?	
	Does the study identify a research method?	
	Does the study demonstrate why the chosen design and method are good ways to explore the research question?	
Validity	Has the study demonstrated measurement validity?	
	Is the study internally valid?	
	Is the study externally valid?	
Reliability	Has the study demonstrated measurement reliability?	
	Has the study demonstrated that its selected analytical technique is reliable?	
Cogency	Does the author 'signpost' the reader throughout?	
	Are the conclusions clearly based on the study's results?	

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