The advisory and extension system in Australia: Opportunities for strength in pluralism

Ruth Nettle, Margaret Ayre, Barbara King, Nathan La, Jana-Axinja Paschen, Nichole Reichelt, Erin Smith

Rural Innovation Research Group, Faculty of Veterinary and Agricultural Sciences, University of Melbourne, ranettle@unimelb.edu.au

Abstract: *National-scale studies of pluralistic advisory and extension systems and impacts from privatisation rarely encompass farmer and advisor perspectives for an integrated examination. Without such examination, all pluralistic systems may be considered to share the same risks or require similar forms of intervention. Combining farmer and advisor perspectives could assist diagnose and focus new governance efforts in pluralistic systems. This paper reports on an integrated methodology and results from a study of the Australian agricultural advisory and extension system to examine the extent to which Australia's pluralistic agricultural advisory and extension system shares the risks, consequences and governance challenges reported in other countries. Data on the attitudes, experiences and practices of accessing and using information, advice and support services was collected from farmers and advisors through focus groups in 4 different Australian states (n=143) and a national survey of farmers (n=1003) and advisors (n=655) across different agricultural activity. A nested conceptual framework was applied in the analysis (i.e. market failure; privatisation-related risks in agricultural extension; agricultural innovation systems (AIS)). Half the farmers surveyed were unclear on where to access information and support and reported increased demand for new knowledge and skills. All types of advisory organisations were reported as supporting farm practice change. Some market failures were identified, however only 3 out of 9 risks from privatisation reported in other studies were present. This analysis formed the basis for trial interventions targeting areas of risk. The integrated methodology holds promise for supporting focused policies and efforts in improving advisory systems.*

Keywords: *privatisation risks, pluralistic extension systems, farm advisors*

Introduction

The privatisation of extension services in agriculture is an international issue that has been the focus of much discussion and research for over 30 years. Unintended market and system failures have been associated with pluralistic advisory and extension systems, related often to coordination failures, given the range of actors and organizations needing to cooperate and coordinate their activities (for a summary see Faure et al., 2017 and Nettle et al., 2017). Unsupported reforms in advisory and extension arrangements are suggested as a key cause of problems in extension and advisory systems, resulting in fragmentation in services. This has resulted in calls for government to play a continued role in supporting a diversity of options and services for farmers and in the alignment of services (Garforth, et al., 2003). These international issues are also reflected in Australia with recent concern expressed at the national level about Australia's agricultural competitiveness and the role of the extension and advisory system (Commonwealth of Australia, 2015). Equally there has been commentary cautioning against 'unbridled' privatization and the need to focus on the role of government and the relationship between public and private providers in the advisory and extension system (Pannell and Marsh, 2013).

Issues in pluralistic advisory and extension systems have stimulated a large range of studies examining the consequences of privatisation, the problems of governance and coordination in advisory systems and the evolving roles of different organisations and especially actors from the private sector (firms, consultancy, farmers' organisations) in providing advisory services. There are frameworks to assess extension and advisory systems (e.g. Birner et al., 2009) and reform options in the funding and delivery of advisory services proposed

(Rivera 2000; Garforth et al., 2003). Most studies acknowledge that each country or region will have their own model of best-fit for their advisory system given contextual factors such as the policy environment; the capacity of potential service providers; the type of production systems and market access of farm households; and the characteristics of local communities (Birner et al., 2009; Klerkx et al., 2017). Yet despite these analyses and given the ongoing challenges in securing effective advisory and extension systems, there appears to be a gap in translating the evidence from national advisory and extension system analysis and recommended policy options to actions that support the transitions of actors. Studies to date may have identified the issues, but not necessarily the priority or focus for efforts or guidance in how to stimulate and support change.

One explanation could be in the methods used in the diagnosis and design of advisory and extension systems issues. This includes the ways the collective priority issues of farmers and advisors can be identified and prioritised to provide a focus for change and how key actors can be directly involved and part of the change efforts. For instance, the criteria for, and analysis of, the advisory and extension system in different European countries in a recent study focused on advisory perspectives but not farmer perspectives and did not explicitly engage advisors in change processes (Pragar et al., 2016, 2017). In New Zealand, the analysis of the agricultural innovation system canvassed a range of perspectives of key actors and involved them in system-level policy design, however farmer and advisor perspectives relating to the role of the advisory and extension system in agricultural innovation were not comprehensively canvassed (Turner et al., 2016). The consequences of limited integration of farmer and advisory perspectives in the diagnosis of issues and engagement in change include: uncertainty in the priority and focus for change; limited buy-in or ownership of the change by farmers and advisors who are impacted and affected by change; and, no imperative or momentum for needed change in policy or advisory practices. Arguably, these consequences are evident in the limited improvements in advisory systems being reported.

There is therefore a need to consider more integrated methods in advisory and extension system analysis that bring the collective perspectives of farmers and advisors together with an understanding of the advisory system configurations and dynamics and with engagement of stakeholders, including farmers and advisors in change processes. Without such integrated approaches, analysis of advisory and extension system constraints will remain as a diagnosis rather than part of supported change processes. This paper aims to contribute to this gap by describing a methodology and results from integration of farmer and advisor perspectives to diagnose risks in the pluralistic advisory and extension system in Australia and engage farmers and advisors in targeting priority advisory and extension service reforms. Conducted in the context of an Australian research and development project relating to the private sector role in agricultural extension (see http://rirg.fvas.unimelb.edu.au/ag-extension; Paschen et al., 2017), the paper reports on results of a study examining to what extent the Australian agricultural advisory and extension system shares the risks, consequences and governance challenges of pluralistic extension systems reported in other countries. The strength of the methods in targeting priority actions in the advisory system are discussed.

The next section of the paper briefly describes the Australian agricultural advisory and extension system context and background to the study, followed by the conceptual framework applied to examine the advisory and extension system and the description of the integrated methodology & methods. For the purposes of this paper we define the agricultural advisory and extension system as ‘the entire set of organizations and actors that will enable farmers to co-produce farm-level solutions by establishing service relationships to produce knowledge and enhance skills’ (adapted from Birner, 2009, pg 342 in Labarthe et al., 2013a).

The Australian agricultural advisory and extension system

The Australian agricultural research development and extension system (RD&E) is pluralistic and reflects many attributes of privatising extension systems internationally (Klerkx and Nettle, 2013). Following significant institutional change over the course of three decades, the

Australian RD&E system is however recognised as particularly complex (Hunt et al., 2012, 2014) being largely commodity/industry driven with multiple public, private, industry-good (shared government-farmer levy-arrangements by agricultural commodity) and farmer-owned R&D groups as well as vocational training providers involved in agricultural extension. A typology of advisory and extension services and organisations operating in the advisory and extension system in Australia is therefore used to relate this study to the international context. The typology is based on the advisory and extension system actor or organisation's primary purpose, their sources of funding and methods of service. Following Pragar et al., (2016), we identify a typology of advisory and extension actors to differentiate public actors (government), private actors (commercial and independent fee-for-service advice), farmer owned organizations, and third sector actors (NGOs) (Table 1).

Table 1. Typology of advisory and extension service organisations in Australia

Type of organisation	Example organisations	Definition
Government	Commonwealth (national), State agriculture and environment departments; Local government and 'catchment' (regional) organisations	Public
Research and Development Corporations (RDC's)	Sugar Research Australia, Dairy Australia, Meat and Livestock Australia, Horticulture innovation, Australian Pork limited, Grains Research and Development Corporation, Cotton Research and Development Corporation.	Industry (public-private co-investment)
Product re-sellers / farm input suppliers	Fertiliser, seed, feed merchants;	Private-commercial
Independent (fee-for-service) advisors	Farm management consultants, agronomists, specialist advisors (e.g. veterinary surgeons, crop specialists, breeding, etc.)	Private-commercial
Farmer-owned information, advice and support organisations	Local productivity services, farming systems groups, Landcare groups	Private
Processing companies	Processing companies' farmers supply associated with dairy, meat, cotton, grains industries (co-operatives/commercial)	Private-commercial
Other	Community organisations/philanthropic organisations	Third-sector, NGO (community)

In Australia, there is an implicit assumption that these private advisory sector actors will replace the role of the State in extension delivery, particularly in services that support farmer decision-making related to all aspects of farm management, yet there is concern that the private sector role and capacity has created gaps in services and impacting productivity and innovation (Commonwealth of Australia, 2015, 2016). The study reported in this paper forms part of a national project funded under a new Commonwealth Government initiative, the Rural RnD for Profit Program 2015 investigating the constraints and enablers of private sector engagement in RD&E, and exploring future roles of the private advisory sector (Paschen et al., 2017).

Conceptual framework

Developing a methodology and choosing methods to diagnose issues in the Australian agricultural advisory and extension system to support priority actions related to private-sector engagement, required a framework for data collection and analysis that could effect change in policy and practices. Evidence for change would need to resonate with the institutional logics of the key stakeholders, that is the internal policies and processes that influence the impetus and capacity for change (Turner et al., 2016). In Australia, these stakeholders are: government, industry (rural development corporations), the private-sector actors and organisations and farmers. For government and industry the concepts of market failure and

risk minimisation are particularly strong influences in whether change is considered or not, and for the private sector and farmers, commercial realities and trusted relationships are particularly strong influences on change. The study therefore applied a nested conceptual framework drawing on theoretical principles of market failure; privatisation-related risks in agricultural extension, and; agricultural innovation systems (AIS) to design an approach, choose methods and collect and analyse data. The specific concepts applied are discussed briefly next.

Concepts of market failure or the allocation of resources and the demand for and supply of services have been commonly applied to consideration of the privatisation of agricultural extension (Faure et al., 2012). However some economists have argued much market failure analysis in agricultural RD&E has the wrong focus, with too much emphasis on tests for 'public goods characteristics' such as 'non excludability' and 'non rivalry' in the extension function (Mullen et al., 2000). They propose an alternative focus toward the particular issues facing agriculture and the community and target the causes of failures there. This widens the focus for market failure considerations to not only include farmers ability to engage in commercial relationships related to information, advice and support (i.e. paying for advice from consultants), but the nature of advice and services by different organisations, their role and the extent to which farmers have access to and trust in these services, as well as if community interests are served. They identify changes at the public/private interface as critical sources of failures' (ibid, pg 643). In this paper, we take this wider view of market failure to consider the nature of demand and supply of information, advice and support of farmers in the context of the types of organisations involved and the relationship between actors.

Risks from privatisation have been documented widely in studies of agricultural extension systems. For our conceptual framework we use these identified risks to examine the extent to which there is evidence for these risks in the Australian context. Nine risks have been identified through a synthesis of key papers (Marsh and Pannell, 2000; Kidd et al., 2000; Klerkx et al., 2006; Faure et al., 2017):

1. Limitations in engagement of advisory services and support to implementation of complex innovations;
2. Lower consideration of environmental issues or of the complexity of the production system;
3. Increased specialisation in advisory topics to improve the marketing of services and reduced 'farming systems' advisory capacity;
4. Advisory methods preference toward technology transfer/value chain specification with less emphasis on building producer capacity;
5. Discontinuity in service provision due to changes in funding mechanisms and/or changes in the role of government;
6. Reduced willingness of farmers or advisors to engage in knowledge sharing/exchange (privatisation of knowledge);
7. Fragmented provision of services geographically as private-interest in providing services varies;
8. Exclusion of some farmers from the knowledge system due to an inability to purchase advisory services;
9. Increased use (and costs) of farm inputs with greater engagement of commercial farm input suppliers in providing advice.

To address the importance of trusted relationships in the advisory and extension systems, concepts from Agricultural Innovation Systems (AIS) were used. Specifically, the importance of multi-actor engagement and co-dependencies in knowledge generation and use and the socio-relational factors influencing demand for knowledge. To this end, involving farmers, private-sector advisors, government and industry in the diagnosis of issues and prioritisation

of change efforts was considered essential. For analysis, the role of social networks and the skills and strategies that constitute inter-professional expertise (e.g. 'relational practices') (after Phillipson et al., 2016: pg 323) were a focus. This included the level of connectedness between farmers, researchers and advisors and what influenced cooperation and collaboration. This mirrors European studies (Labarthe et al., 2013ab; Knieram et al., 2015; Pragar et al., 2016; 2017).

Together, these 3 concepts formed the conceptual framework for the study. This framework guided firstly the development of an integrated methodology that a) concurrently gained perspectives of the key stakeholder groups at nationally significant scale (farmers, advisors, government and industry); and b) involved stakeholder groups in the diagnosis and choice of priority actions for change. Secondly, the framework assisted in the choice of methods for data collection and in guiding analysis.

Methods

To collect data related to concepts of market failure and privatisation risks at a national level and of significant scale to attract the attention of government and industry for change, a quantitative survey of farmers and advisors with low margin of error and representation of both state and industry perspectives was considered important. To engage the key stakeholders (main change agents), participatory methods (focus groups and action research) with key actors was also considered important. A mixed methods approach was therefore developed and included farmer and advisor focus group forums and national farmer and advisor surveys generating both qualitative and quantitative data.

Focus groups forums with farmers and advisors were conducted in 4 different states of Australia and across different agricultural activity (n=143) in March-June 2016. These forums aimed to: define the key issues farmers face; the role of advisors and extension actors; the level of connection with agricultural research; and identify opportunities for improvement in engaging the private sector in extension. Finally, the forum was used to gain input and feedback on proposed changes to improve the system. Forum participants were provided the option to continue their involvement by being part of trial change interventions. Results from this part of the study are reported in other papers in these proceedings (Paschen et al., 2018; Reichelt et al. 2018; Ayre et al., 2018; King et al., 2018).

National surveys of farmers (n=1003) (conducted between July-September, 2016) and advisors (n=655) (conducted between November 2016 and February 2017) were undertaken. In the farmer survey, a stratified sampling scheme for the sector (or main farm enterprise) and State was applied, using both on-line (non-random) and telephone interview (random) methods. The respondent sample reflects the range of enterprises, age and education of the Australian farming population (ABS, 2017). With a total population of farm businesses between 92,329 and 126,000, the survey reports a margin of error (all farmers) of approx. 3%. In the advisor survey, both on-line (non-random) and telephone interview (random) methods were used. The sample targeted a range of advisors and advisory organisations. The sample achieved reflects a range of advisor types and organisations servicing most agricultural industries (beef, sheep, grains, dairy, horticulture, cotton, sugar, pork/poultry, etc) as well as responses from: independent (fee-for-service) advice (36% of sample) and sole operators (6%); product re-sellers/farm input suppliers (commercial) (22%); Research and Development corporations/industry orgs (7%); farmer-owned/farming systems groups/NGO's (9%); government (federal, state, local/catchment) (18%). To gain larger sample sizes, the participation in focus groups and surveys was promoted through research project stakeholder organisations and the various communication modes of these stakeholders including newsletters, websites, emails and social media (e.g. Twitter).

Questions in the focus groups and surveys were formulated using the conceptual framework and using questions from current studies in Europe (e.g. Prager et al., 2016; 2017). Questions related to farmers' demand for, use and satisfaction with information, advice and support services to enhance their farm decision making. Advisors were asked questions relating to the types of services provided and the types of farmers targeted, their level of

connection to research, development and extension and their current involvement and interest in professional development and collaboration with others. Using the conceptual framework to guide analysis, quantitative and qualitative data analysis techniques were used including descriptive and inferential statistics, coding and thematic analysis (Gibbs, 2002) with the assistance of SPSS™ and nvivo-10™ software.

Results

Farmers' perspectives on issues in the advisory and extension system

Focus group forums identified the main influences on farmer demand for services to be:

a) *Access to services* which included being a member of an industry body, part of producer groups, interacting with agronomists at meetings or phone access to consultants. The accessibility of on-line tools was important. Farmers noted 'word-of-mouth' as a way to access the information they needed.

b) *Accessibility of information and usefulness of information or advice.* This included how well information was interpreted and packaged, if it was co-ordinated with other advice, if what was needed was accessed through internet searching or relevant for their location.

c) *Knowing what information and advice they needed.* This involved considerations for choosing consultants/advisors and how this was not always straightforward. Choosing an advisor for the right stage of the business and having someone asking the right questions and bringing your attention to issues were noted as important.

d) *Limited time to attend events or sift through relevant information.* This was a driver for the use of an advisor, particularly related to whole-of-farm advice.

Through the national farmer survey, the majority of farmers reported challenges in accessing information, advice and support they needed whilst recognising their own limitations in skills and knowledge with the challenges of farming today. On average, only 40% of farmers agreed they 'always know' where to access information advice and support and only 56% of farmers agreed they had the skills and knowledge required in farming. Responses varied by sector, (overall likelihood-ratio chi-square test p-values for effect of industry: 0.049 and 0.052, respectively), with sugar cane farmers significantly more likely than beef cattle farmers to agree that they had the required skills and knowledge (Table 2). The high level of uncertainty in the knowledge system in industries and nationally, along with the self-identified need for greater skills and knowledge indicates a systemic issue in agricultural advisory and extension services.

Table 2. Australian farmers' opinions on sourcing information, advice and support in farming by farmers in key agricultural sectors

%agree*	Sheep for wool	Sheep for meat	Beef cattle	Dairy cattle	Cropping (grains)	Mixed	Cotton production	Hort (veg)	Hort (fruit)	Sugar Cane growing	Pork
N**	16	29/28	67	70/68	45	39	24	11	85	84	32/31
Always know where to get the information or advice needed	31%	34%	33%	46%	38%	46%	54%	64%	45%	58%	31%
Have the skills and knowledge required	69%	46%	48%a	65%	56%	56%	63%	73%	55%	75%a	65%

*i.e. response was 6 or 7 on a likert scale from 1 ("Completely disagree") to 7 ("Completely agree"); "Don't know" responses were excluded

**Second number is number of responses to "Have the skills and knowledge required"; only shown if this differed from "Always know where to get the information or advice needed"

a After adjusting p-values for multiple pair-wise comparisons using Sidak's method, the percentage for sugar cane growing was significantly greater than for beef cattle (p=0.039).

Farmers were asked which advisors and organisations they used in farm management and decision making and were then asked to identify a main source of information, advice and support (Figure 1). Here the nature of pluralism in Australia's advisory and extension system can be visualised.

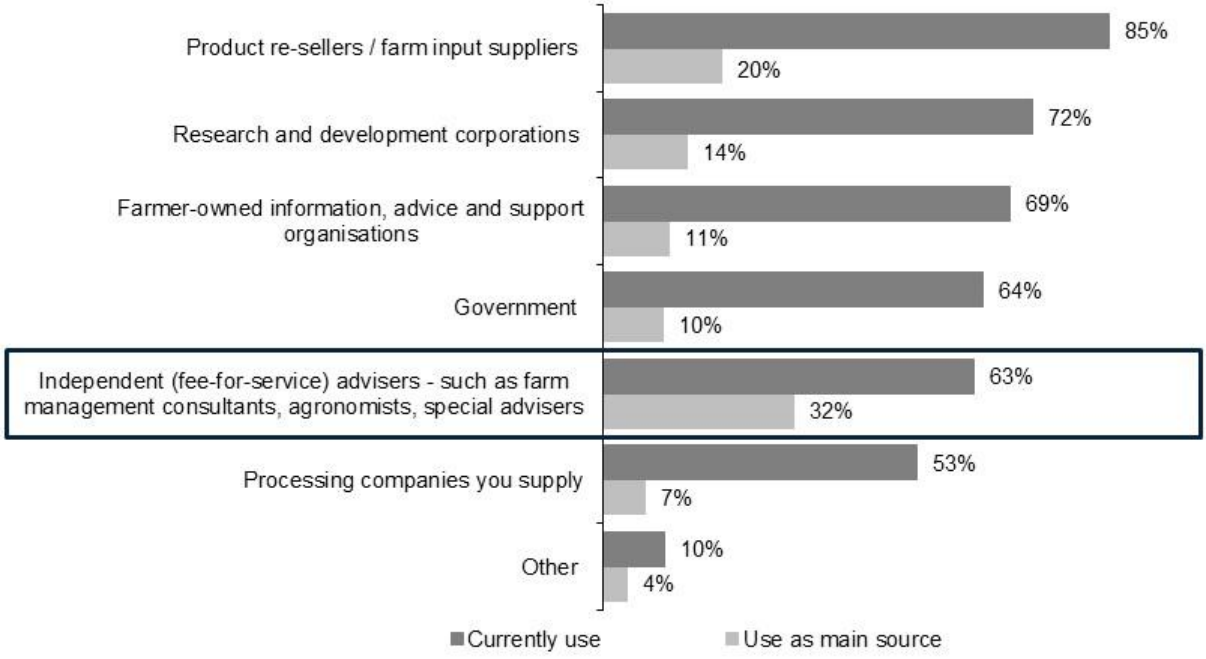

Figure 1. Farmers sources of information, advice and support (all used and main source)

On average, farmers used 4 sources of information, advice and support and product resellers (i.e. commercial farm input suppliers) were the most predominant source of information advice and support (85% used this source). However, farmers *main* source of information, advice and support differed considerably across the population. Here, product resellers were used by only 14% of farms and independent fee-for-service farm management consultants were the main source for 32% of farmers. Higher earning farms were more likely to mainly use independent advisors (44% of those using these services had farm incomes of AUD501,000 or more), while those from lower earning farms (farm earnings less than AUD500,000) were more likely to mainly use free service options such as product re-sellers (46% of these farms) and Government services (31% of these farms). Different agricultural industry sectors had different profiles of pluralism, for instance 49% of grain/cropping farmers reported independent fee-for-service farm management consultants as their main source, significantly higher than the national average.

Further, farmers credited their engagement with their 'main source' as influencing changes in their farm operations. Private, industry, not for profit and public sector organisations were all used by farmers in practice change. Further analysis of changes made by farmers showed patterns of use of different main sources of advice relative to the type of farm management decisions. For example, Figure 2 shows the importance of farmer-owned organisations over other types of actors/organisations such as independent fee-for-service advisors for decision making related to infrastructure, machinery and equipment. This reflects the importance of farm demonstrations and trust in peer experiences relating to product choices and large investment decisions.

An overall increase in demand for information, advice and support from farmers' main source over the next 5 years was reported by 32% of farmers.

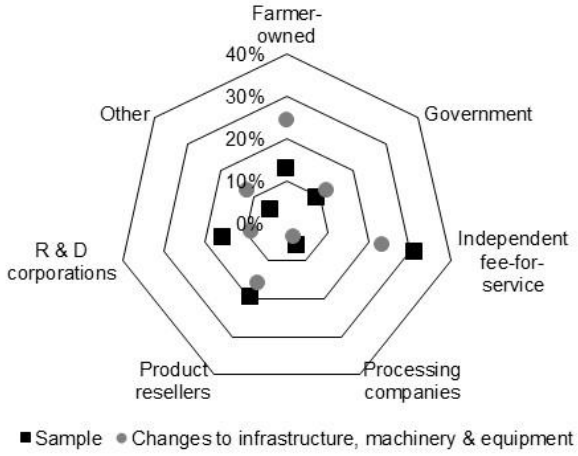

Figure 2. Farmer-owned organisations and other sources were over-represented in terms of farmers changing infrastructure/machinery/equipment. For these decisions, independent fee for service and R&D corporations were under-represented.

With respect to farmer attitudes towards paying for advice (whether they currently paid for advice or not), 37% saw benefit from paying for advice, 31% felt that paying for advice would be profitable, 40% were unsure of the benefit and 21% said they believed it would have no benefit. Affordability was an issue for only 28% of farmers who said paying for advice would be difficult in the next 12 months, therefore a large proportion of farmers are 'fence sitting' (i.e. not overtly positive or negative) and appear to be waiting to be convinced about the benefits.

Farmers were asked about their interaction with researchers and research organisations and here, on average 80% of farmers responding had at least 1 interaction with agricultural researchers/organisations in the last 12 months and on average 57% had contact at least quarterly. 50% of farmers said they would like a little or a lot more interaction than now.

These results highlighted key issues for stakeholders to consider. Firstly, the range of advisory actors and organisations and their relative importance to different populations of farmers provide some insight to the reasons for farmer uncertainty in accessing information and support they need, with their current sources not necessarily providing all their needs in farm management. Further, the results indicate that all advisory actors and organisations need to be considered and engaged to reach and influence a large proportion of the farming population. The result that all actors and organisations support change is significant evidence for the need for co-ordination across services in the system with no one organisation having a monopoly of influence on change. The results also specifically highlight the importance of product resellers and independent fee for service advisors as key sources for farmers. Further, there appears limited evidence that any one group of farmers is being excluded from access to services, with all farm types (industry, farm size, etc.) able to access services from government and other free sources. Finally, farmers reticence to pay for advice being related to uncertainty in the value rather than the cost of services is an important result, pointing to the ability of stakeholders (including the private sector) to influence or support farmers in understanding the value of advice.

Advisor perspectives on issues in the advisory and extension system

Focus group forums revealed key challenges for private sector advisors in engaging in the RD&E system and influences on their supply of services. Advisors reported that access to research outputs can be expensive and support to access and translate the latest research to benefit their clients were needed. Advisors reported they often don't have time to prepare competitive funding grants to conduct their own practice-based research and found themselves in competition with formal research organisations. Advisors indicated there was

an unclear cost-benefit for them to participate in professional development and training, however they were concerned about the loss of expertise in extension, particularly advisory 'soft skills', and limited career pathways for young advisors.

In the advisor survey, 86% of advisor organisation 'leads' (259/290) said providing information, advice and support services to farmers was 'moderately or extremely important to their business' and 89% (259/290) said their capability was strong/moderately strong in providing extension services. Half of the advisors had received agricultural extension related training, however this was mainly provided 'in-house' and sole-operator fee-for-service advisors were significantly less likely to have participated in professional development or training in the last 12 months. This is an important group in the Australian system, with many geographically isolated farmers only having access to this type of advisor in their local area. Advisors associated with industry organisations were far more likely than other advisors to have received professional development or training in extension. Advisors reported interest in increasing capability in areas such as: targeting farmers with tailored information based on their goals and values; designing and delivering farmer training; and, design of extension programs for adoption.

70% of advisors worked directly with farmers on a one-to-one basis. Around half of advisors had a role in providing technical and analytical services and in communicating with farmers via media. Advisors 'main' services related to livestock (21%) and crop production (15%), whole farm management/farm business management (11%), with most advisors reporting on average 3 service areas. Whilst 30 % of advisors said they provided environmental services, only 7% noted this as a main service.

Public and Industry organisations tended to work with groups of farmers and played a key role in communicating with farmers through media. Commercial farms of all sizes were targeted by over three quarters of advisors. Of the different types of organisations industry organisations were significantly more likely to target lower income farms (98% 'income $100-$500k'), while farmer based organisations were more likely to target higher income farms (100% > $1M).

In total, 83% of advisors said they were engaging at least quarterly with researchers/research organisations (303/365).

In terms of engagement of advisory organisations in the delivery of agricultural extension services of industry or government, advisors in public organisations were significantly more likely to have been directly engaged by government or industry to deliver training or extension programs and projects, while those in private organisations were less likely to have been engaged. (Table 3).

Table 3. Involvement of advisors in delivering agricultural extension projects/programs (% involved by advisor employment type*)

Public organisation (government) (n=105)	Industry organisation / association (n=30)	Non-governmental organisation / not for profit (n=27**)	Farmer-based organisation (n=20**)	Sole Operator (n=41)	Private organisation - Commercial (n=87)	Private organisation - Consulting (n=46)
85%^{c}**	77%^{bc}	70%^{abc}	65%^{abc}	51%^{ab}	40%^{a}	39%^{a}

*Advisors in other employment types (n=7) were excluded from these analyses.

*"Don't know" responses by advisors in these categories (n=1 in each category) were excluded from these analyses.

**Percentages sharing a superscript were not significantly from each other (i.e. p>0.05 after adjusting p-values for multiple pair-wise comparisons using Sidak's method); overall likelihood-ratio chi-square test p-value for effect of advisor employment type<0.001

When asked to respond to questions on their current level of engagement in the RD&E system only 14% of advisors rated their involvement as 'strong' and on average 46% of advisors said they were rarely or not involved (n=365). Overwhelmingly advisors sought

greater involvement with the RD&E 'system' specifically relating to: invitations to discuss and provide input to research; be kept up to date on extension projects; involvement in research priority setting and translation of research to meet client needs; design, development and delivery of extension projects. (Figure 3)

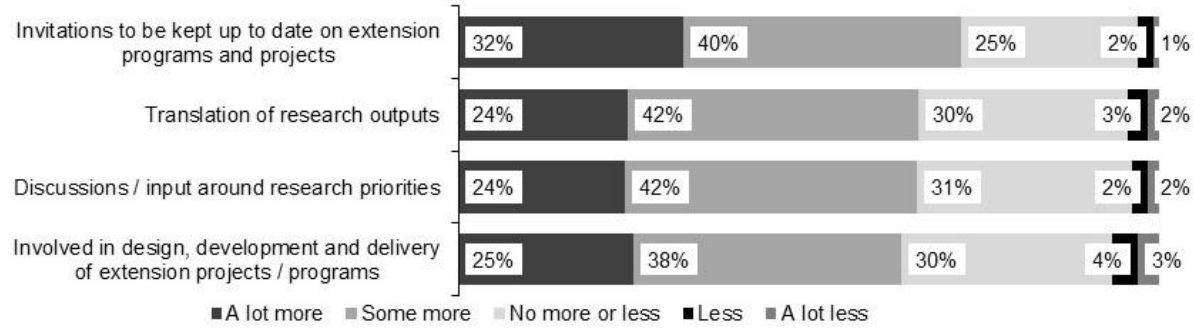

Figure 3. Advisor preferences for future engagement in the RD&E system

Coordination and collaboration amongst advisory services is important for more effective systems and so the willingness of different types of advisors and advisory organisations to collaborate with one another was examined. Most advisors were likely to collaborate with public and farmer-owned organisations. However, advisors were polarised when it came to collaborating with farm input providers/product re-sellers, Independent (fee-for-service) advisors and private companies. (Figure 4). Advisory organisations were asked about their interest in forming partnerships with RD&E organisations with 60% of organisation leaders (n=290) extremely interested in partnership options to better support farm productivity.

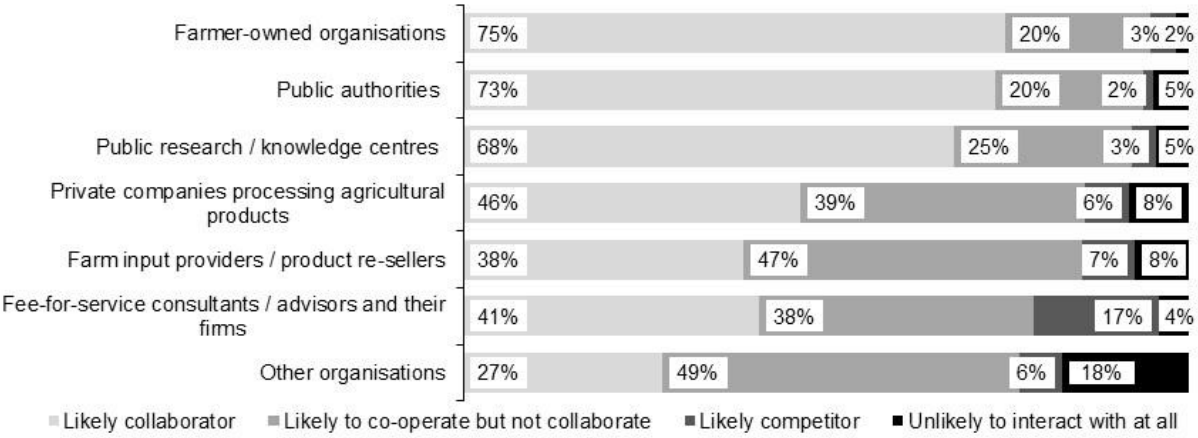

Figure 4. Advisors willingness to collaborate or co-operate with other organisations (on-line responses only, n=265) (employee advisors and sole operators)

These advisor results highlighted key issues for stakeholders to consider. Overall, the advisory sector appear interested, willing and to some extent fully able to provide services to farmers and work more closely with RD&E. However the low level of engagement of the private sector in key activities association with the RD&E system and relatively low willingness to pay for services by farmers, presents a significant challenge to the strength of the system and further private sector engagement. Whilst the private-sector may be able to meet demand, they do not have a remit to help the system work or necessarily change services without strong signals to do so. Further, whilst advisors expressed interest in increased interaction with researchers and research organisations, it is unclear how this would occur without support. The results provided a clear indication of the type of activities and collaboration and coordination advisory organisations were most open to. Whilst there was scepticism to cooperate or collaborate with the private sector – the preference of all to work with farmer-owned groups provides a mechanism for industry, government and private sector to work with.

Discussion

Specifying the nature of market failure

The type of market failures found reflect information/communication failures of 'public good character' (Mullen et al., 2000). This relates to the high proportion of farmers who are currently not convinced of the advantages and benefits of paying for advice, uncertainty concerning where to access information, advice and support; and self-identified capacity gaps. Whilst international studies have identified affordability of services for some farmers as an issue which provided an argument for alternative funding models for advisory services (Klerkx et al., 2006; Labarthe et al., 2013ab), here greater effort to promote the value of advice and include the private sector in RD&E is needed.

Additional market failures identified were:

a) High transaction costs for the private sector to up-skill/interact with R&D. This concerns the cost of training and the business impacts for advisors to consider and embark on re-training or developing new business areas such as in digital agriculture services. The issue is reflected in the higher engagement of government and industry compared to the private sector in professional development and reflects a type of exclusion of the private sector. The importance of providing support to private sector advisors to engage in professional development and new areas of advice has been confirmed in recent studies in the Australian context (Nettle et al., 2018) and reflect findings from an EU study of 227 advisory organisations (Prager et al., 2016).

b) Barriers to entry of young advisors into the private sector. This concerns the limitations to growth and renewal of small-medium sized advisory businesses (less than 10 employees) and the private sectors ability to bear the costs of training new graduates/entry-level advisors. Whilst this may be considered as a general issue of structural adjustment, in Australia these businesses provide important services to the geographically spread farming population in which these advisors may often be one of few sources of advice available.

These sources of market failure provided insight to areas for action by government, including through industry. The integrated methodology assisted in defining the nature of market failure and the main reason for intervening as well as likely impacts from taking action. As a result, stakeholder groups chose the issue of the barriers to entry of new advisors and models of new entrant development to trial a new approach (see paper King et al., 2018).

Identifying the main risks from privatisation

The risks of privatisation reported in the international literature (Kidd et al., 2000; Klerkx et al., 2006) were assessed based on the evidence of this study. Using the evidence generated from the study, 3 out of 9 risks from privatisation were present in the Australian context (Table 4).

Table 4. Summary of risk analysis from privatisation in the Australian advisory and extension system

Risk	Low current risk
Limitations in engagement of advisory services and support to implementation of complex innovations	Increased specialisation in advisory topics to improve the marketing of services and reduced 'farming systems' advisory capacity
Lower consideration of environmental issues or of the complexity of the production system;	Advisory methods preference toward technology transfer/value chain specification with less emphasis on building producer capacity
Discontinuity in service provision due to changes in funding mechanisms and/or changes in the role of government	Reduced willingness of farmers or advisors to engage in knowledge sharing/exchange (privatisation of knowledge);
	Fragmented provision of services geographically as private-interest in providing services varies

	Exclusion of some farmers from the knowledge system due to an inability to purchase advisory services
	Increased use (and costs) of farm inputs with greater engagement of commercial farm input suppliers in providing advice

The limited dissemination/engagement of advisors in complex innovation relates to the results that advisory roles were heavily weighted toward production/day-to-day farm management decisions of farmers. Whilst farmers were connected with a range of providers (including researchers) and preferred interactive forms of learning, complex farm management responses such as farm expansion/contraction, digital agriculture, planning for climate extremes or modifying farm systems due to market signals (e.g. animal welfare, nutrient use on-farm or new markets) require new skills and capabilities and access to a range of expertise by both farmers and advisors. There is therefore a risk from privatisation, unless the functions of extension and engagement of the private sector equally focus on the whole farm system in coordination of advice and in consideration of the capacity of the knowledge system to support adaption to emerging challenges.

Similarly, the lower priority of environmental issues is evident with only 7% of advisors nominating this as a main focus of their advice. The separation of the advisory system in Australia with government roles focused on environment and private sector roles to productivity, there is the potential for opportunities to be missed related to joint benefits for the environment and farm productivity when considered from a whole farm system perspective. In general, greater integration of environment and productivity issues are required across the advisory system.

The risk from discontinuity in service provision due to changes in funding mechanisms relates to the reports from advisors and farmers of business risks from annual or tri-annual changes to, and discontinuity in, policy and funding of projects, programs and services. Further, because advisors may work with more than 1 industry body or provide services for different levels of government, they report varying levels of sophistication in pricing, contracting and engagement in extension, all of which require a level of cross-sectoral engagement to address. Expecting advisors to cover the full costs of professional development which have both a public and private interest is an issue also raised.

These sources of risk provided stakeholders with priority areas for action to reduce adverse impacts. The integrated methodology assisted in defining the specific risks in the Australian system and allowed stakeholders to assess how significant the impacts from inaction would be. As a result, stakeholder groups chose the issue of engaging the private sector more in complex innovation problems (e.g. adverse impacts from nutrient run-off from farms on the Great Barrier Reef; Precision Agriculture Services; involving supply chain advisors in R&D) to trial new approaches to address these risks. (Paschen et al., 2018; Reichelt et al. 2018; Ayre et al., 2018).

Identification of systemic issues in the advisory and extension system

Analysing the results from an innovation system perspective (Birner et al, 2009; Hermans et al 2015), the study found weaker institutional arrangements and governance structures for the advisory and extension system in Australia than in NZ (Turner et al., 2016) and the EU (Prager, 2017) Whilst there is a diversity of actors influencing farm change in Australia and clear need for greater engagement of the private sector in key RD&E activities, fragmentation is evident in weak networks and lock-in to existing, strong but limited networks of advisors (Kidd et al., 2000; Garforth, 2003). Whilst government is recognised internationally as having an important role in incentivizing needed cohesion such as supporting new organisations to increase awareness of advice and services provided by other organisations, and in co-ordination and co-operation so to ‘best fit’ local circumstances (Birner et al., 2009, p 343), there is currently a lack of clear policy or directives in Australia, with a hands-off approach of government. This issue will be addressed by project stakeholders in the next 12 months. One of the considerations for stakeholders will be the acknowledgement of the types of new capacities that co-ordination requires. International authors describe this as ‘inter-

professional capacity' (Phillipson et al., 2016) which relates to the ability of advisors to distinguish and work with different professional practices such as that of a fee-for-service advisor relative to that of an advisor within a farm input/retailer organisation. Further, it highlights the importance of government and industry capacity to be able to consider or assess 'relational agency', 'interactional expertise' and 'deference/referral behaviour' of advisory services (ibid) and promote and harness diversity in intermediary practice (Cerf et al., 2017). This has also been recommended by Labarthe et al., (2013ab). In this regard, the integrated methodology has to date only assisted in highlighting key issues for consideration by government and industry and is yet to support new policy directions or tangible institutional action.

Conclusion

This paper contributes to knowledge about methods and processes that assist in linking the assessment and diagnosis of pluralistic advisory and extension systems to focused action amongst stakeholders to address system constraints. Applying a conceptual framework that brought together theoretical perspectives that resonated with stakeholder groups (i.e. market failure, risk and innovation systems), the paper described a methodology and results from an Australian study in which integration of farmer and advisor perspectives at the national scale allowed insight to specific attributes of pluralism, the nature of market failure and the most important risks of privatisation to address. Further, by engaging key stakeholders in the process, small-scale or niche change efforts to address the identified systemic issues were pursued. The potential to use the national survey as a repeatable instrument to monitor change in the key areas identified as well as assess the impact of interventions or policy changes over time has also been recognised. The relatively large sample of farmer and advisor participation in the survey across Australia provided a form of evidence that attracted the attention of institutional stakeholders, farmers and advisors alike.

The conceptual framework, brought together different disciplinary perspectives of the extension and advisory system and in combination averted to some extent the limitations of the narrow disciplinary perspective of each in interpretation of results. No methodology is without weaknesses however and the cost of national surveys and stakeholder engagement as well as potential for respondent bias influencing interpretation of results is acknowledged.

The results from the study itself has generated interesting insights into the nature and consequences of pluralistic advisory and extension system arrangements in the Australian context, that to date have been anecdotal, relying on secondary data or opinion and has not to date allowed meaningful comparison to other nations ((Hunt et al., 2014; Pannell and Marsh, 2013). Here the study shows that Australia shares only some of the risks, consequences and governance challenges described in the international literature with the 'hands-off' approach of government relating to the role of the private sector in extension a source of greatest concern. There is some scepticism about the interest of government in becoming 'hands-on' to address the issues that cannot be addressed by the private sector alone.

Further research is needed related to methodologies and frameworks for advisory and extension system assessment that bridge the gap between diagnosis and action. Whilst engaged research methods as described here are important, the results of this study suggest that aligning the approach with the institutional logics that enable or constrain change within and between institutional actors may be more important than the form of engagement and participatory approach. The importance of appropriate theories of systems change in the frameworks of assessment developed is therefore critical.

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References

ABS. 2017, Land management and farming in Australia, 2015-16 (Catalogue 4627.0), Australian Bureau of Statistics, Canberra, Australia.

Ayre, M., McCollum V., Waters W., Samson P., Curro A., Nettle R., Paschen J-A.,., King B., Reichelt N., 2018, Exploring the value proposition of digital technologies in smart farming: an approach co-designed by agricultural advisors (these proceedings)

Birner, R., K. Davis, J. Pender, E. Nkonya, P. Anandajayasekeram, J. Ekboir, A. Mbabu, et al. 2009, From Best Practice to Best Fit: A Framework for Designing and Analyzing Pluralistic Agricultural Advisory Services Worldwide. *The Journal of Agricultural Education and Extension 15 (4): 341–355*

Cerf, M., Prost, L., Jeuffroy, M.H., Lusson, JM., Omon, B., Petit, M.S. 2017, Contrasting intermediation practices in various advisory service networks in the case of the French Ecophyto Plan, *The Journal of Agricultural Education and Extension, 23:3,*

Commonwealth of Australia 2015, Agricultural Competitiveness White Paper, Canberra, Australia

Commonwealth of Australia 2016, Smart farming: Inquiry into agricultural innovation, House of Representatives Standing Committee on Agriculture and Industry, Canberra, Australia

Faure, G., Y. Desjeux, and P. Gasselin. 2012, New Challenges in Agricultural Advisory Services from a Research Perspective: A Literature Review, Synthesis and Research Agenda. The Journal of Agricultural Education and Extension 18 (5): 461–492.

Faure, G., Huamanyauri, M.K., Salazar, I., Gómez, C., de Nys, E., Dulcire, M, 2017, Privatisation of agricultural advisory services and consequences for the dairy farmers in the Mantaro Valley, Peru. The Journal of Agricultural Education and Extension, 23:3,

Garforth, C., B. Angell, J. Archer, and K. Green. 2003, Fragmentation or Creative Diversity? Options in the Provision of Land Management Advisory Services. Land Use Policy 20 (4): 323–333. doi: http://dx.doi.org/10.1016/S0264-8377(03)00035-8

Gibbs, G.R. 2004, Searching for Text, In: Seale, C. (ed.) Social Research Methods- A reader, Routledge, London, pg 301-311

Hermans, F., L. Klerkx, and D. Roep. 2015, Structural Conditions for Collaboration and Learning in Innovation Networks: Using an Innovation System Performance Lens to Analyse Agricultural Knowledge Systems. The Journal of Agricultural Education and Extension 21 (1): 35–54. doi: 10.1080/1389224X.2014.991113

Hunt, W., C. Birch, J. Coutts, and F. Vanclay. 2012, The Many Turnings of Agricultural Extension in Australia. Journal of Agricultural Education and Extension 18 (1): 9–26. doi:10.1080/1389224X.2012.638780

Hunt, W., C. Birch, F. Vanclay, and J. Coutts. 2014, Recommendations Arising From an Analysis of Changes to the Australian Agricultural Research, Development and Extension System. Food Policy 44: 129–141.

Kidd, A. D., J. P. A. Lamers, P. P. Ficarelli, and V. Hoffmann. 2000, Privatising Agricultural Extension: Caveat Emptor. Journal of Rural Studies 16 (1): 95–102.

King, B., Martin, S., Sobotta, I., Paschen, J-A., Nettle, R., Ayre, M., Reichelt, N. 2018, Becoming an adviser within the privatized extension sector: Challenges and successes of seven early career advisers (these proceedings)

Klerkx, L., K. De Grip, and C. Leeuwis. 2006, Hands Off But Strings Attached: The Contradictions of Policy-Induced Demand-Driven Agricultural Extension. Agriculture and Human Values 23 (2): 189–204.

Klerkx, L. and Nettle, R. 2013, Achievements and challenges of innovation co-production support initiatives in the Australian and Dutch dairy sectors: a comparative study. Food Policy, 40: 74–89

Klerkx, L Straete, E,, Kvam, G-T., Ystad, E., Harstad, R. 2017, Achieving best-fit configurations through advisory sub-systems in AKIS: case studies of advisory service provisioning for diverse types of farmers in Norway, The Journal of Agricultural Education and Extension, 23:3: 213-229.

Knierim, A., K. Boenning, M. Caggiano, A. Cristóvão, V. Dirimanova, T. Koehnen, P. Labarthe, and K. Prager. 2015, The AKIS Concept and its Relevance in Selected EU Member States. *Outlook on Agriculture* 44 (1): 29–36.

Labarthe, P., M. Caggiano, C. Laurent, G. Faure, and M. Cerf. 2013a. Concepts and Theories Available to Describe the Functioning and Dynamics of Agricultural Advisory Service. http://www.proakis.eu/sites/www.proakis.eu/files/Deliverable_WP2%201_concepts%20and%20theories%20of%20AKIS(1).pdf

Labarthe, P., and C. Laurent. 2013b. "Privatization of Agricultural Extension Services in the EU: Towards a Lack of Adequate Knowledge for Small-Scale Farms?" Food Policy 38 (1): 240–252.

Marsh, S.P. and Pannell, D.J. 2000. Agricultural extension policy in Australia: The good, the bad and the misguided. *Australian Journal of Agricultural and Resource Economics* 44(4): 605-627.

Mullen, J. D., Vernon, D. and Fishpool, K. I. 2000, 'Agricultural extension policy in Australia: Public funding and market failure' in *The Australian Journal of Agricultural and Resource Economics,* vol. 44, no. 4, pp. 629-645

Nettle, R., Klerkx, L. Faure, G., Koutsouris, A. 2017, Governance dynamics and the quest for coordination in pluralistic agricultural advisory systems, *The Journal of Agricultural Education and Extension, 23:3,* 189-195, DOI: 10.1080/1389224X.2017.1320638

Nettle, R., Crawford, A., Brightling, P. 2018, How private-sector farm advisors change their practices: An Australian case study, Journal of Rural Studies, Volume 58, Pages 20–27 https://doi.org/10.1016/j.jrurstud.2017.12.027

Paschen, J-A., Reichelt, N., King, B., Ayre, M., Nettle, R. 2017, Enrolling advisers in governing privatised agricultural extension in Australia: challenges and opportunities for the innovation system, Journal of Agricultural Education and Extension, 23:3, 265-282 http://dx.doi.org/10.1080/1389224X.2017.1320642

Paschen, J-A., Shovelton, J., Evers, E., Hollier, C., Nettle, R., Ayre, M., King, B., Reichelt, N. 2018, Facilitating the collaboration of practitioner and scientific knowledge: experiences from an Australian action research intervention (these proceedings)

Pannell, D.J. and Marsh, S.P. 2013, Public-sector agricultural extension: what should it look like in 10 years? Farm Institute Insights, Vol. 10, No. 1, February 2013

Phillipson, J., A. Proctor, S. B. Emery, and P. Lowe. 2016. "Performing Inter-Professional Expertise in Rural Advisory Networks." Land Use Policy 54: 321–330.

Prager, K, Labarthe, P, Caggiano, M, Lorenzo-Arribas, A. 2016, How does commercialisation impact on the provision of farm advisory services? Evidence from Belgium, Italy, Ireland and the UK. *Land Use Policy*, 52, 329-344.

Prager, K., R. Creaney, and A. Lorenzo-Arribas. 2017, Criteria for a System Level Evaluation of Farm Advisory Services. *Land Use Policy* 61: 86–98.

Reichelt, N., Knee, J., Hancock, B., Linley, I., McNicholl, D., Norval, A., Paschen, J., Nettle, R., King, B., Ayre, M. 2018. *An opportunity not to be missed": the possibilities to support Australian dairy and meat processors in agricultural advisory service provision (these proceedings*

Rivera, W. M. 2000. "The Changing Nature of Agricultural Information and the Conflictive Global Developments Shaping Extension." The Journal of Agricultural Education and Extension 7 (1): 31–42.

Turner, J., Klerkx, L., Rijswijk, K. Williams, T., Barnard, T. 2016 Systemic problems affecting co-innovation in the New Zealand Agricultural Innovation System: Identification of blocking mechanisms and underlying institutional logics. NJAS - Wageningen Journal of Life Sciences193