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**Institutional factors influencing innovation adoption by dairy
farmers in Ireland**

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Institutional factors influencing innovation adoption by dairy farmers in Ireland

Theme (3) Network relationships and knowledge exchange in food chains and networks.

Strong ties and network cohesion are important for transfer of complex and tacit knowledge; whereas weak ties and structural holes which bridge organizational boundaries are important for the acquisition of diverse, new knowledge, potentially leading to innovation and innovativeness. Intensity and frequency of network relationships may positively impact on innovative power and outcome of food businesses. Acquisition, assimilation, transformation and exploitation of knowledge external to the company make up the absorptive and learning capacity of the company. Contributions focusing on network relationships of food businesses and/or absorptive or learning capacity and their impact on business performance are especially welcomed for this topic.

Abstract

Location-based resources are important factors in the entrepreneurial creation of wealth. This is as true in agriculture as it is in other industrial contexts. In this study, we are interested in how formal and informal institutions such as knowledge networks and localized 'webs' of influence act to facilitate or block innovation in the dairy farming industry. Our study of dairy farmers in Munster, Republic of Ireland (an intensive location for dairy farming), is located in a context in which there are policy-based interventions intended to improve the local economic environment. We are interested to know if these are effective, or if other factors within the institutional field are too strong and act to impede the take up of new ideas promoted within such initiatives.

Our study uses neo institutional theory as the methodological lens through which we assess the interplay of structural factors within the field. Using interview accounts, we are looking for evidence of embedded institutional logics, interpretive schemas, knowledge blockages, and the role of formal institutions on the development of innovation within the field. Through undertaking a deep study of innovativeness in one locale, Munster, with the proviso that we use this as an illuminatory context and not one that is necessarily representative of a wider field, we contribute to an understanding of the influences on resistance to innovation in farming contexts, and to the wider theoretical field of agricultural economics.

Introduction

In this research, we are interested in how formal and informal institutions such as knowledge networks and localized 'webs' of influence act to facilitate or block innovation in the dairy farming industry. Our study of dairy farmers in Munster, Republic of Ireland (an intensive location for dairy farming), is located in a context in which there are policy-based interventions intended to improve the local economic environment. We are interested to know if these are effective, or if other factors within the institutional field are too strong and act to impede the take up of new ideas promoted within such initiatives.

In our study, we are interested in assessing the factors that contribute to the propensity to acquire innovative knowledge and adopt innovative practices in Munster (ROI) one of the more intensive areas of dairy production in Ireland (Lally and Riordan, 2001) and the British Isles

more generally (Agriculture and Horticulture Development Board, 2013). We investigate how both formal and informal institutions such as research institutes, knowledge networks, and localized 'webs' of influence (Rieple et al., 2013), act to encourage or block the adoption of innovations amongst dairy farmers in this region of Ireland. We are interested in how the context, which is socially-constructed, embedded in norms of beliefs and values, and in which path dependency has led to a locally constituted set of learning communities, skill-sets and cognitive styles, influences the relative propensity of farmers to innovate.

This paper is structured as follows. We first review the diverse literatures that relate to agricultural economics and innovation adoption. We then describe our methodology and describe our qualitative research design including our interview protocols and data analysis methods. The following section discusses our data and findings, followed by the final section that draws out implications for theory and for further research.

Theoretical background

The economic background to the dairy industry in Ireland

The dairy industry worldwide is undergoing a period of significant structural change. This includes a move towards larger-sized, more intensive, farms driven by a search for greater efficiencies (Nehring, Sauer, Gillespie and Hallahan, 2011).

Insert Figure 1 about here

Changing structure of dairy farms in selected EU-27 countries and the United States. (Source: Nehring, Sauer, Gillespie and Hallahan (2011)).

There is also increasing competition internationally. The USA has very intensive farms, where cattle are reared indoors and fed with manufactured feedstuffs rather than grass. These are some of the most economically efficient farms in the world (Nehring, et al., op. cit.) with whom grassland-based dairy farms have to compete. On the other hand, consumer concerns with issues of sustainability and food quality are likely to influence buying behaviour. Traceability is becoming a more important issue (Maldonado-Siman, Godinez-Gonzalez, Cadena-Meneses, Ruíz-Flores, & Aranda-Osorio, 2013) and there is a small but increasingly vocal community of consumers that is concerned about the welfare of indoor reared animals and the feeding of what they consider to be unnatural foods to cattle. Their answer is grass-fed cattle, which in theory should benefit dairy farmers in southern Ireland, although the effects of such opinions, as with organic farming more generally, does not always follow through to higher sales. So the institutional forces shaping the competitive environment for dairy farmers in Ireland may be in their favour, or not, the outcome as yet is not clear. However, the belief that they need to change is certainly embedded within the belief systems of those in the Irish government and the funding they provide to institutions such as Teagasc to work with farmers to develop more innovative practices.

Another major change that is looming is the removal of milk quotas (Lapple and Hennessy, 2012). At the moment these provide a predictable outlet and price for EU milk producers. They act to protect European farmers from international competition. When these go, Irish dairy farms may find that they have to change radically in order to compete with more efficient international farms. British farms already lag behind Denmark, Germany and the USA in terms of performance, and this is likely to get worse.

So, there are a number of reasons why Irish farmers may be willing to consider changing the

customs and practices that have prevailed in the region, sometimes for centuries.

However, theories relating to clustering and resource abundance (for example Morgan, 1997; Porter, 1990; Peretto, 2012), tell us that there are less supportive and more supportive locations for innovation, and therefore there may be good reasons why innovation may not be achieved, even if desired. For instance, Maskell et al. (1998:81) suggest, "some geographical environments are endowed with a structure as well as a culture which seem to be well suited for dynamic and economically sound development of knowledge, while other environments can function as a barrier to entrepreneurship and change".

Neo institutional theory

An interest in the influence of environmental factors on innovation adoption leads us to institutional theory. This tells us that embeddedness is an important factor in the sharing of knowledge and the creation of institutional logics, that shape how people behave (Dacin et al, 2002; Tolbert and Zucker, 1996). In the process of innovation adoption, some authors have found that embeddedness plays an especially strong role in rural areas (Roper, 2001; Heanue and Jacobsen, 2008). Extending the role of embeddedness, both Heanue and Jacobsen (2008) and Christensen et al. (2011) identified the importance of knowledge networks on farm innovativeness. Orescyn et al.'s (2010) study of the influence of networks on innovation amongst arable farmers in the UK found that their knowledge networks, which included agronomists, research institutes and governmental departments, increased the adoption of innovations in new technologies and GM crops. Although dairy farmers may have different needs from arable farmers (Wenger et al, 2002), Hartwich and Negro (2010) also found that New Zealand's dairy innovation system depends on a small number of influential public and industry agents. The importance of partnerships in such networks has been noted (e.g. Hartwich and Negro, 2010 and DEFRA, 2013), however some research has suggested that farmers found the partnership models too complex and fragmented which made advice difficult to understand. The content and process of such advice provision is worthy of further investigation to ensure that the appropriate information reaches farmers when they need it.

Agriculture is a regulated industry and product innovation is controlled. However, innovation can include process and social activities (Diederer et al, 2003; Hartwich and Negro, 2010), neither of which are subject to the same types of regulatory control. One question is whether the strongly institutionalised control of product innovation blocks farmers' awareness of the possibilities for process or business model innovation (Teece, 2010). In fact McElwee (2006) goes so far as to claim that agriculture's 'regulated, complex and multi-faceted environment' acts as a significant barrier to entrepreneurial activity, and that there are particular barriers for farmers who wish to change their strategy to take advantage of new opportunities.

Other competing institutional factors include historical farm ownership structures. Those who *are* able to innovate can be constrained to a relatively small number of options because of restrictive tenancy agreements (McElwee 2006). McElwee and Robson (2005) also suggest that as some small farms may have been owned or managed within the same family for generations; this prevents farmers from becoming entrepreneurial as they have been "locked into a way of being," and have enjoyed a relatively secure pattern of work that blocks the willingness to take entrepreneurial risks (McElwee, 2006). This also manifests itself in poor management skills of the farmers, their level of education and their readiness to cooperate, and not in a lack of resources (ibid.).

Other barriers to the development of farm entrepreneurship that have been identified in previous research include economic barriers such as the inability to develop economies of scale or access support networks (Lowe and Talbot, 2000; McElwee, 2004). In fact, considerable

research has identified the importance of networks in entrepreneurial success (Ng and Rieple, 2014; Smith & Lohrke, 2008; Arregle, J. L., et al. 2013). Arguably the principal role of entrepreneurs is in building relationships with a range of parties (Greve & Salaff, 2003) There is clear evidence that their “social competence” and social capital is related to financial success (Baron & Markman, 2003; Aarstad, Haugland, & Greve, 2010). "Discussion networks" are especially important for acquiring and exploiting external knowledge in technology ventures, for example, in new product development (Yli-Renko et al., 2001). Further, inter-firm networks can produce significant, positive effects on the performance of firms that are able to leverage their networks from their business and social interests to capture valuable market opportunities (Lechner & Dowling, 2003). Strong ties for example have been associated with sales growth (Collins & Clark, 2003).

As farmers can have narrow social networks, they may have limited access to knowledge of opportunities or the means to develop and exploit new markets (Maskell et al., 1998; Lowe and Talbot, 2000). In line with these findings Diederer et al. (2003) found that farm innovators tended to value external sources of information. Support and network resources may be more likely to be sought from family and friends rather than those who can advise effectively about innovation development, though Bergevoet and van Woerkum (2006) found that using study groups are an aid to gaining explicit and implicit knowledge. In our study, one question relates to the role of agricultural research institutes in stimulating innovation. Munster is a region in which there are policy-based interventions to improve the institutional environment. Considerable investment goes into dairy research in the area, and one of our objectives was to know if this is effective, or if other factors within the field are too strong and act to prevent the take up and implementation of new ideas.

Innovation adoption theory

In this respect, another body of theory that concerns the innovation process lends insight to our study. This field not only examines the creation of an innovation, but also its dissemination and adoption (van der Veen, 2010; Soriano and Huarng, 2013). Where neo-institutional theory and innovation adoption theory overlap is where they show that for new ideas to be taken up within a field, through initiation and then take-up by early adopters or imitators, innovations have to have value, whether symbolic or economic (Akrich et al, 2002). Position in a network and other aspects of embeddedness are also areas where there are overlapping features between the two fields. In the fields of farm and agricultural innovation and entrepreneurship, less research appears to have been undertaken on some key areas - for example the innovation or entrepreneurial strategies of farmers, the role of women in agricultural innovation, and the effects of network centrality or location in a cluster on propensity to innovate.

What role embeddedness plays in agricultural innovation is an interesting question that does not yet appear to have been studied in much depth. In Munster, we already know that some farmers are deeply embedded in local knowledge networks, whereas others are not. And therefore one of our objectives is to assess whether the depth, and type, of embeddedness influences innovation adoption. Heanue and Jacobsen (2008) found that, in some industries in rural Ireland, embeddedness in a locale could be either advantageous or disadvantageous according to industry context: for firms in the metal products industry, deep, local embeddedness encouraged innovativeness while for furniture firms, it did not. Within a tight community, innovation maybe blocked, but may also be enabled as the pooling of knowledge and resources allows for risk to be minimised and hardship shared. What types of innovation are encouraged or discouraged by such a community remains to be discovered.

Innovations differ in terms of their novelty, difficulty, capital intensiveness, and the need for the involvement of other products and infrastructure in the adoption process (e.g. Soranio and Huarng, 2013). Innovators can be frontrunners / early adopters or laggards, normally with a corresponding lessening of risk as time goes on. Risks in new technologies are the result of imperfect information of the operating conditions and performance characteristics of the new technology (Diederer, et al., 2003). Diederer and colleagues also identify a number of other factors that are indicative of a propensity to be early adopters of innovations: the youth of the farmer; farms that are bigger or produce for heterogeneous markets; and farmers who develop innovations themselves or in co-operation with others. However, they also found that farmers in the dairy sector seemed to be less interested in the early adoption of innovations than other agricultural sectors. This, they suggest, is the result of the quota system and environmental regulations considerably limit what dairy farmers can do.

One of the factors known to be associated with innovativeness is organisational slack (Chen, Yang & Lin, 2013). This may be defined as the spare resources or capacity that organisations have available to experiment, to share and exploit new knowledge, or to deal with the emotional stresses of new product development (Akgün, Keskin, & Byrne, 2012; Richtner, & Sodergren, 2008; Chen, Yang, & Lin, 2013; Richtner, Åhlström, & Goffin, , 2013; Argote, & Greve, 2007). Slack includes surplus employees, unused time or productive capacity, overlapping jurisdictions, or idle information (Bourgeois, 1981; Staber and Sydow, 2002; Hargadon, 1998).

These help firms to leverage their existing capabilities and integrate their existing knowledge into new products. In addition to slack, assimilation capacity refers to the firm's routines and processes that allow it to analyse, process, interpret and understand the information obtained from external sources (Tepic et al. 2012). The size of an organisation tends to be related to the presence or otherwise of slack and assimilation capacity; the smaller the firm, the less slack that is available, suggesting that locations where farms are small may be unable to be as innovative as those locations where farms have consolidated into larger concerns.

Caloghirou et al. (2004) found that there were a number of important aspects associated with enhanced innovativeness in farming. Besides R&D intensity and the number of employees that have an academic degree in a scientific or engineering field, organizational openness towards knowledge acquisition and sharing were important. These factors included searching patent databases, reading scientific or business journals and joining in networks where knowledge could be acquired. In line with the work on weak ties (Granovetter, etc etc) farmers with higher assimilation capacity appear to have a wider network of regular contacts. These help them to recognize changes in technical possibilities, regulations, competition and consumer demands (Tepic et al. 2012). Research in other contexts has similarly shown that the proportion of professionals in an organization is a strong predictor of innovation adoption (Damanpour, 1991; Pierce and Delbecq, 1977), and in turn professions exert considerable normative and mimetic pressures on organisations to adopt new practices (DiMaggio and Powell, 1983, 1991; Adler and Kwon, 2013; Tolbert and Zucker, 1983).

Summary of literature and development of our research questions

From this review of relevant literature we were able to establish that there is relatively little research that has examined the factors contributing to the adoption of innovation in the dairy farming industry, and almost none that we could find that examined the Irish dairy context. As this is different from many other areas where research has been undertaken because of the distorting effect of milk quotas and the small size and family-ownership structure of the local industry, and given the Irish government's attempts to increase the adoption of new ideas it appeared to be a context worthy of examination.

Similar to Adler and Kwo, (2013) who looked for “the roles played in the diffusion process by facilitating and impeding factors at three levels: individual professionals (their autonomy, expertise, values, identities, and ties), professional organizations (their strategies, structures, cultures, skills, and systems), and the broader institutional field (professional associations, accountability demands, and competition)”, we will be looking for factors such as:

- network position - centrality, weak vs strong ties;
- knowledge networks and clusters;
- organisational slack and assimilation characteristics
- personal openness factors such as reading, degrees, networking, openness,
- innovation blockers.
- competing institutional logics and interpretive schema,
- and the role of formal institutions on innovation adoption, or innovation rejection, within the field.

We are also looking for links between these and the types of innovation adopted, the source of an innovative idea, and its path through the field and the recursive influence of certain factors on other factors.

Methodology

In order to undertake this study of the institutional factors influencing innovation in Irish dairy farms we contacted a purposive cohort of 33 dairy farmers and employees of government agencies in the Munster area. This area is one of deeply embedded historical relationships based around agriculture, religion and family, and we do not claim that it is representative of other regions. It is also an area in which there are specific government interventions aimed at improving the performance of dairy farms and agriculture more generally. Teagasc (The Irish Agriculture and Food Development Authority) is the government agency responsible for improving the agriculture and food industries. Its mission is to 'support science-based innovation in the agri-food sector and the broader bio-economy that will underpin profitability, competitiveness and sustainability' (Teagasc, 2013). In Ireland, all dairy farmers pay a levy to Teagasc's Research Institute, which funds research into dairy farming. Hence we were interested in the role of Teagasc, as well as other institutional factors that influenced the dissemination and adoption of innovation in this region. For this reason a purposive group of respondents was deemed appropriate.

Our cohort was selected on the basis of their geographical location in Munster. Most, but not all, participated in discussion groups facilitated by Teagasc. Introductions to most interviewees were facilitated by a dairy specialist in the area, a current -, and a former employee of Teagasc's Moorepark Animal & Grassland Research and Innovation Centre. The former employee is now retired but is still working as a freelance in the industry and is a former colleague of one of the authors of this paper.

All were interviewed by either one or both of the authors over eight days in January and September 2012 and July 2013, in addition to a number of informal discussions which provided background information. We adopted a semi-structured format where key themes were explored, but interviewees were encouraged to talk freely about related issues if they wished. The themes included 1) **institutional context** factors, such as government policies and institutions, agricultural economics, and Irish socio-economic background; 2) factors related to **institutional logics**, such as relational capital, participation in knowledge networks, background and experience, and psychological attributes such as attitudes to learning, knowledge

acquisition, farming practices, and innovation; 3) **evidence of innovativeness**.

Each formal interview lasted for between one to one and a half hours. They were audio recorded and transcribed by a professional transcriber. Occasionally, further information was sought in a follow-up telephone call.

Data are being analysed using standard thematic qualitative coding techniques (Miles and Huberman, 1994; Flick, 1999), using NVivo 10 to assist in this process. A guiding model of potential institutional influences on farmer innovativeness was drawn up following the review of literature. This was used to inform our initial analysis of the qualitative data. From this we look for evidence of embedded institutional logics, interpretive schema, knowledge blockages, and the role of formal institutions on innovation adoption, or innovation rejection, within the field.

Additional factors that emerged from the interview data were used to modify the initial schema. From this interplay between theory and data we hope to draw explanations of the influences on the propensity to innovate and improve farm performance in this region.

Data presentation and analysis

Our initial classification of the data is shown in Table 1. Our analysis is at an early stage, but a scan of the raw coding of the data suggests that certain factors appear to be more important than others. These are 1) Teagasc 2) family 3) quota and land 4) financial performance / incentives and 5) personal characteristics and attitudes.

Table 1: Selected NVivo nodes and initial quantification of data

A) Demographics

- background
- experience
- education
- age
- marital status

B) Farming

- farm size
- number of employees
- financial performance
- manner of acquisition
- farm type

C) Institutional context

- Irish Dairy Board
- EU/ROI quota system
- ROI social economic environment
- Land ownership structure
- Government
- Teagasc
- ROI dairy farming industry

D) Networks

- Social relationships

- Discussion groups
- Family
- Teagasc advisors
- Fellow farmers
- International links
- accountant
- bank
- Outside-industry links
 - a. National
 - b. International
- suppliers (AI and milking machines)
- non-industry friends

E) Knowledge sources

- farmers journal

F) Outlook on life

- ambition
 - decision making
 - risk taking
- motivation
- measures of success
- learning approach
- contentment
- Entrepreneurship
- Hard working
- Attitude to farming

G) Evidence of innovation

In this paper we are looking to understand how institutional context, feeding through competing institutional logics, leads to dairy farm innovation. This paper is a work in progress and we have not yet finalised the linkages between these three factors. Figure 1 shows the various institutional contexts influencing the southern Irish dairy farming industry. Some of the more 'local' institutions are left out of this diagram in the interests of simplicity

Institutional context: constellation of institutions

- ROI soc ec env ——
- EU quota system ——
- ROI quota system - - -
- dairy farming ind ——
- ROI DF ind - - -
- ROI Govt ——
- Coops ——
- Teagasc ——
- Moorepark - - -

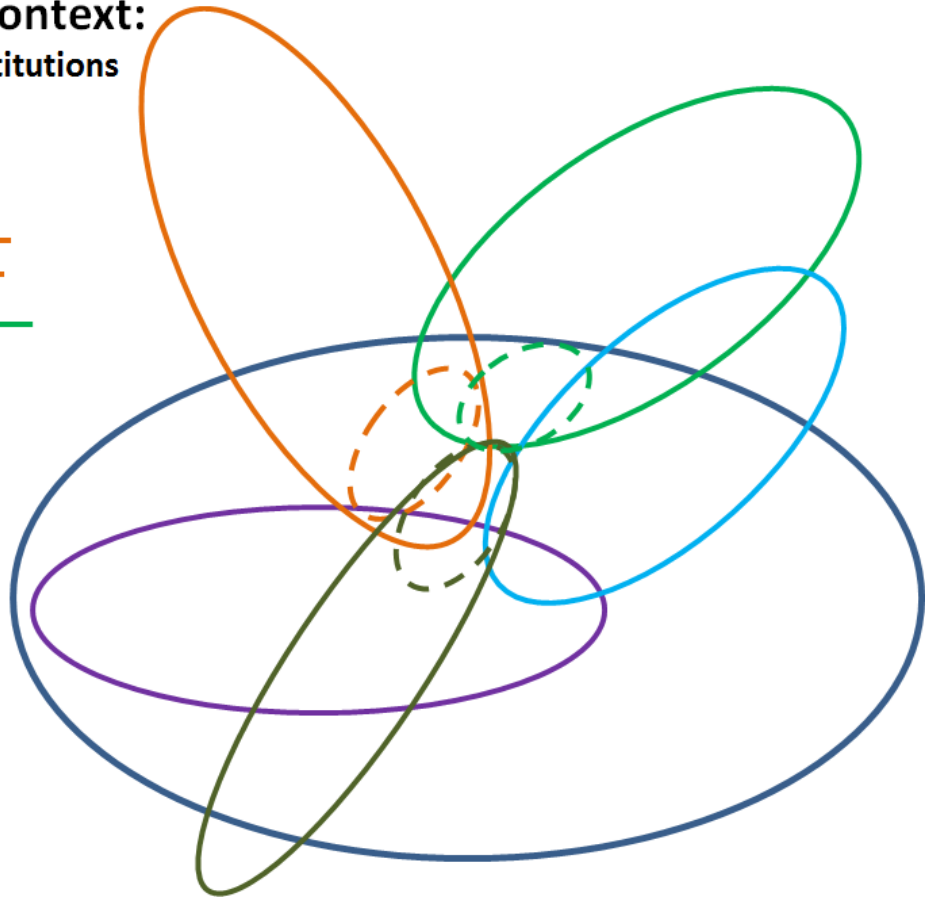


Table nn shows our initial attempt to understand the dynamics in the field that we have studied.

Table nn Examples of innovations and institutional factors

Innovation	Relevant institutional contexts	Institutional logics in play
New grass varieties and grassland management	Moorepark (Teagasc) research (international research institutes)	<p>Blockers: Moorepark (Teagasc) dominance</p> <p>'It's not suitable for my land'</p> <p>'Teagasc research doesn't apply to my land'</p> <p>'There isn't as much variation and difference in how people think and do the thing as there used to be'. ... Teagasc. They're more...they're more em...they're delivering a message, as opposed to facilitating a discussion ... You get that more and more at the meetings. It's a bit of a bugbear of mine, ... Certainly, the DairyMIS group has...when I was starting out first, there was some very strong characters there that had their</p>

	<p>International dairy farming industry</p> <p>Grass breeding suppliers</p>	<p>own views on how things should be done, and didn't particularly prescribe to the Teagasc view, eh, which I think is very important.</p> <p>Enablers: Moorepark evidence / research / peer usage: 'I suppose, re-seeding going forward, you'll go to Teagasc to know what are the better types' 'like a lot of it is grass-based, like Teagasc would be very pro grassland management, which is very good – I'd be pro it as well'</p>
<p>Milking machines, new technologies, new building types</p>	<p>Farmers' Journal</p> <p>Suppliers</p> <p>Dairy farming industry</p>	<p>Blockers costs / life style 'Yeah, because even the 20 unit ones, you'd wonder how they manage, do you know, [particularly] a single person. Well, I suppose you'd have the automated cluster removers, wouldn't you?' Cost is a major issue like. I'd love to have a big swanky parlour and...but it's very bog-standard</p> <p>Enablers Lower costs / peer usage (international as well as national):</p> <p>'So, basically, what I'm doing in the parlour is that I put them on the cows, and they come off themselves then when the cow is milked, you know, so that saves me time in the parlour.' 'Oh, like, well, they all...I knew that the automatic scrappers were [done] by the crowd that do the milking machines' 'He built a new milking parlour, one of the first [?], based on what they saw in New Zealand.' lifestyle: 'when I put in the new parlour, it just makes things very simple, and I have a very good parlour, and milking cows now is a pleasure.'</p>

<p>Larger herds</p>	<p>Land ownership structure</p> <p>Lifestyle concerns</p> <p>EU quota</p>	<p>Blocker Costs / management / lifestyle / land availability/EU quota ‘So, like, we’re looking at it, and we’re saying, okay, there isn’t any point really in putting in huge investment and getting into a lot of extra cows if all the profit is going to go on labour, and/or we’re going to have a terrible life as well’ ‘I suppose you could say land availability, you know, is always an issue in this country’ ‘...quota was the big issue, em, whereas now, I have enough quota, quota’s going’</p> <p>Enabler family / partnerships ‘the partnerships are just combining different families’ lands together to farm them together as a bigger unit’</p>
<p>New uses for farm land</p>	<p>Land quality</p>	<p>Blocker - land quality ‘The land was more suitable for the dairying as well because...for tillage, there’s some of the farm hilly and that.’ Enabler - land quality ‘Oh, spruce. I’ve only got seven acres of it though – because I couldn’t make land out of it, so I took the easier option.’</p>
<p>Different dairy breeds</p>	<p>AI</p> <p>Teagasc (Moorepark)</p>	<p>Blockers Availability of suitable varieties/ Teagasc ‘...as I said, I was using Normandes and found it hard to get the...the straw’ ‘...there’s a lot of stuff they [Teagasc] do there, on cross-breeding and things, I don’t necessarily agree with’</p> <p>AI / peer usage (national/international)/ suitability ‘he [AI man] said, no, there’s other ones there and they’re...Montbeliardes and they had got so many straws and...’ ‘I suppose I picked that up from New Zealand when I was there’ Just...they seem to be more suited, they seemed to be cows that could hold a bit more condition on themselves, you know – they wouldn’t be as high maintenance a cow.’ ‘A friend of mine had used these Rotbunt bulls’</p>

<p>Knowledge acquisition</p>	<p>Family and social networks</p> <p>Psychological characteristics</p> <p>Education and experience</p>	<p>'Well, New Zealand is the...kind of the cool place to go if you want to see large herds operating', and indeed had visited other countries'.</p> <p>Blockers</p> <p>Discussion group</p> <p>'So...I think, in a way, it kind of ruins the whole discussion group thing because I think fellows really now are only in it for the money, whereas, before, you actually had people in it that wanted to be in it, you know.'</p> <p>Farmer I: "I presume they...and that's all down to the man that is driving it like, the facilitator, because he's the guy that bounces the...sort of the questions off of the farmers, and you have to get the farmers to, eh, tell about their experiences, to express."</p> <p>Farmer D: "Yeah, I wanted to. Well, I had actually tried to get in before, but it was...they weren't taking in anyone at that stage, so..." and " Em...I suppose I would have been aware that it had the most information like, do you know? It was at the edge of em...farming technology, of what was happening in farming, and I suppose I would have known some of the people in it, do you know, and seen how they were farming and presumed, I suppose, that they...do you know, that that's where they would have been getting it."</p> <p>Farmer A"there can be a lot of research that's done that gets published that...when you weren't involved in it or anything else, you can take at face value, but when you've actually been involved with it and you've seen it on the ground, you kind of find some of the nuances</p>

		<p>within the research, as to, you know, whether it really did work or didn't work or, you know, or possible areas or flaws within some of the em...within the actual research paper that fundamental...fundamental flaws that, when you just read a paper, you may not pick up on."</p>
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Connections and competition between institutions and institutional logics

In Figure 1 above, there are considerable areas of overlap between the different institutional fields in our study. Drawing such a diagram is helpful in showing areas where there are strong areas of overlapping interests. These are areas where there is either established collaboration over outcomes, or negotiation or competition over outcomes. The diagram also shows areas where there are no linkages, and therefore the channels that may be usefully used to establish linkages, or institutional fields that would need to be created for linkages to occur. In this paper we are more concerned with the first aspect, and what is happening within existing institutions. For example, Coops have links with farmers, who have to negotiate over the quality and amount that they can sell - and the price that they will get for the milk. The coops are then linked to the wider soc /econ environment, who in turn regulate the demand and price of the milk.

There are also a number of nested institutions - for example Moorpark dairy research Institute is nested as a subsidiary of Teagasc, who both engage separately and jointly with the Irish government. Teagasc, in turn, is influenced by international Research Institutes and the international farming industry. Another example is the Irish quota system which is nested within the EU quota system and also sits within the Irish social / economic environment.

The ROI quota system influences the research that Moorepark does. Until recently this has been focused on efficiency, and is a response to the contingencies of the Irish quota system. For example, current limitations in land availability, generally small farm sizes and fragmented ownership structure is the result of the Irish quota system which acts to protect smaller farms from economic exigencies (Newman and Matthews, 2006). However, given that the quota system disappears in 2015, Moorepark's research focus is changing to help the farmers prepare for its abolition and to helping farmer's think about how to be competitive on a larger scale. After 2015, Moorepark's focus may change again - and at that point different institutions will have a stronger pull. Land ownership is likely to be more fluid, thus the institutions that are likely to have more influence are the co-ops, and some from outside the current structure, for example international farming companies or private equity firms.

In our data we already see competing logics between those who recognise that the world will change in 2015 and are anticipating what they would need to do differently, for example adopt new methodologies and technologies or buy up additional land wherever possible, and those that are deeply attached to the 'small is beautiful' ethos that has been possible until now. Almost all the farmers in our cohort were the owners of medium-sized farms (>100 acre, >50 milking

cows) which typically had fewer than five employees. A few owned large farms (1000 acre, > 600 milking cows). Many had inherited the farm from their parents; the farms typically having been in the family for two or more generations. They were all male and most were married with children, in approx 30% of cases the wife worked outside the farm. When the decision was taken as to who should inherit the farm, it seemed that they had been the child that had expressed the strongest interest or were the oldest, although our understanding of this process is necessarily limited by our single-source data. This system of inheritance means that the individuals (all men) who take over the farms may have been selected-in for their desire for continuation and stability. Often, father or brother still farmed in the area. In some cases the fathers, despite being officially 'retired', were still working on the farm.

In most cases, there was little sign of burning desire for change, or to rock the boat. Life-work balance was also mentioned as an important shaper of behaviour. Few radical innovations were found, as is, in fact typical of the dairy farming industry (Diderham 2003); overwhelmingly innovations were incremental in nature. The picture generally, therefore is one of contentment and stability. Therefore the problem for those who want to improve efficiency, international competitiveness - or the threat that the removal of the quota will pose - is where to attempt to introduce innovation into a field where there are few of the obvious stimuli to radical change.

Here we have good evidence of some of the ways in which different institutional logics were competing for dominance. Moorepark (and behind it, Teagasc and the Irish government) was one of the institutions that was trying very hard to impose its own view of the future on these farmers.

Teagasc ran discussion groups that most of the farmers that we interviewed attended. The discussion groups provide informal fora for the dissemination of Moorepark's research as well as the sharing of best practice between farmers. These used to be accessed on a voluntary basis but more recently farmers had been paid an incentive to participate. Teagasc as the Irish government's advisory agency provided experts to take part in these groups, mostly as facilitators. They drew on the research that Moorepark had undertaken, but also based advice and control of the groups on their own industry knowledge. The groups' members are invited by either the Teagasc advisors or other group members. However, not all of the farmers in our cohort participated in these groups although, given that this was a purposive cohort, most did. Those who did not either had not been invited (and had not made determined efforts to join), and / or did not attend because they saw little value in them. The relationships within the groups and the differential patterns of knowledge acquisition within the cohort are factors that we need to analyse further.

Most of the most innovative farmers were members of the Blackwater group, a high status, invitation-only, forum. Farmers in this group were selected on the basis of their willingness to participate in Moorepark's research and were selected by interview. They provided some of the raw data that Moorepark used. They are thus both exclusive and selective, but farmers who want to be part of this discussion group tend to do so because of access to cutting-edge information and role models.

Conclusions

At the moment, much remains to be done in terms of analysing our data and understanding the deep relationships between the institutions and the ways in which the different institutional logics are drawn upon and to what effect on innovativeness. For example we remain to understand the relative effects of strong versus weak ties, embeddedness and reputation (especially within strongly embedded networks such as this field) and the effect that these have on blocking knowledge as well as the ability to access it..

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all this section needs checking