

The role of Internet and social media in the diffusion of knowledge and innovation among farmers

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Abstract

The impact of the use of information technology (IT) has been gaining relevance recently in the way it can facilitate communication in the agricultural sector. Farmers can share innovations and knowledge alongside solving problems through social media, or other uses of the Internet. Farmer-to-farmer knowledge sharing is an important source of information, but potential obstacles to effective communication can include distance and the amount of time farmers can invest in knowledge sharing activities. The Internet has therefore become an effective way to overcome those obstacles. The internet allows farmers to share their experiences, which traditionally would have been over a farm-gate, via YouTube, web forums and online groups. There are Twitter feeds that farmers can go to, ask questions, or share experiences. Whilst some conventional farmers are also using these tools, they have become a lifeline for farmers hoping to or currently farming more sustainably. These farmers are likely to be disparate throughout the UK, may no longer share with their neighbours, but instead rely on social media for advice and mentoring. Key annual farming events are broadcasted live via Twitter. Farmers and other participants are encouraged to share highlights of the conference sessions, their comments on the speakers and event itself, allowing others unable to attend to receive information from the event. Internet and social media have a growing role in the diffusion of knowledge and innovation within the agricultural sector, allowing a greater number of farmers, researchers and practitioner to share information and experiment so as to facilitate innovative farming practices.

1. Introduction

When evaluating farmers' knowledge in relation to various agroecological farm management practices, it is important to consider that even though some farmers acquire information from family-led or traditional practices, Ingram (2008) pointed out that farmers tend to lack in-depth knowledge of specific scientific phenomena e.g. related to chemical or physical processes in soil management. In fact, farmers are more likely to rely on experience limited to their farm or that of someone close to them, family member or relative (Ingram et al., 2010). However, peers-exchange remains an important source of knowledge for farmers, in particular regarding current hot topics such as greenhouse gas emissions or more broadly, the sustainability and environmental issues related to agricultural sector (Klerkx and Jansen, 2010). As a result, networks of influence represent a valuable source of information for farmers, as well as advice and support (Klerkx et al., 2012). Examples of such networks in the UK include groups with different focuses: they can be specific interest groups (e.g. Pasture-Fed Livestock Association), have a geographic focus (e.g. Tamar Valley Organic Group), or a political focus (e.g. Conservative Rural Affairs Group), and they can span at local, regional or national level.

Rural communities in the UK have struggled for many years receiving slow internet connection, limiting farmers' possibilities to access internet communication outlets, platforms to engage with the wider community and globally (Helsper, 2011; Ofcom, 2013). As a result, the Internet has been slow to become part of everyday life in many farmers' lives in the UK. However, the development and introduction of

smartphones, broadband, and 3G mobile networks have provided opportunities for farmers to connect with their peers in spite of the distance separating them. Farmers can use internet tools such as web forums for discussion and debate, internet searches, digital versions of farmer magazines (Farmers Weekly, 2016a) to learn new knowledge, query problems, and access information on their phones, even in the middle of a field. Moreover, social media, such as Twitter, Facebook or a Google group, enables them to instantly communicate, over an electronic hedge, with online peers who may never meet face-to-face, but can advice, sympathise and relate, for instance, from a farmer in a tractor in the Scottish Highlands, to another farmer in Cornwall. Finally, several studies suggest that farmers tend to prefer kinaesthetic (“learn by doing”) or audio/visual learning to other learning styles (Franz et al., 2010; McLeod, 2006). As a result, IT now can allow farmers to view or record videos, listen to recordings and watch live web-streaming of conferences, with the subsequent benefit of enabling them to develop their knowledge and learning without having to leave their farms.

The need for more interaction and collaboration between farmers and researchers in order to promote innovation and knowledge exchange is highlighted by the surge in initiatives such as the Soil Association Field Labs (Soil Association, 2016). Open to all farmers, regardless of their farming system, e.g. conventional, organic, the labs are aimed at encouraging farmers to voice the issues and problems they would like to be researched, and then promote the sharing of information on innovative technologies, practices and collaborative research programmes that can foster greater environmental sustainability between the farmer and researcher.

In a recent study on farmers’ attitudes to climate change, a series of interviews were carried out by researchers, followed by a focus group meeting to engage with all the participants and develop future action in a collaborative environment with the researchers (Burbi et al, 2016). The focus group was organised over a day, allowing for sufficient time to travel. However, several farmers could not attend the meeting because they had limited or no staff to replace them at the farm when away. In order not to lose the opportunity to engage in the discussions, some farmers who could not attend called the researchers prior to the meeting, voicing the topics they were more concerned about and would have liked to discuss during the focus group. Other farmers acted as rapporteurs, collecting information from those who could not attend and reporting on the results of the meeting. Alternatives were found, but it has to be considered that family-run farms or small-scale farms often rely on limited labour force and cannot stay away from the farm for extended periods of time, sometimes even just 1 day. Distance and time may therefore hinder they possibility to engage with other farmers and researchers in person, making the Internet medium a more attractive option for them.

This paper is going to look at the authors’ research on the use of IT learning. An initial review of literature helped identify issues, which were examined in farmer interviews and focus groups across England.

2. Methodology

The authors interviewed a total of thirty farmers, farming mixed arable and livestock systems, with a combination of conventional and agroecological techniques. The interviewees were spread across England. The interviews were aimed at acquiring information on how the farmers accessed and implemented learning. The interviews were followed by two focus groups, which encouraged peer learning, and further consolidated the data gathered through the interviews.

3. Issues facing diffusion of knowledge and innovation

3.1 Farmer knowledge exchange

Contacts and interactions with other farmers, especially if they are happening regularly, can influence greatly a farmer’s attitudes and perception of innovation,(Rydberg et al., 2008) Influences external to the farmers’ immediate community can come from the media and extension officers, as well as consumers

group. Swanson and Rajalahti (2010) suggest that one of the greatest challenges facing the agricultural sector in the UK, as well as in other European countries, is that over the past 30 years governments have gradually reduced the funding for extension and advisory work. This has resulted in extension services having varying degrees of efficiency and impact, because they now rely mostly on private companies providing agricultural consultancy services in a rather fragmented manner (Oreszczyn et al., 2010). In England, it has been observed that some farmers who rely on networks of influence (i.e. a farmer's own family and peer-to-peer exchange group) to acquire and exchange knowledge among peers tend to resort to agricultural consultants only when these networks of influence do not succeed in providing the farmers with the advice needed (Klerkx and Proctor, 2013). Such premises foster even more fragmented and inconsistent external advice. Moreover, according to Buhler (2002), since more than a decade ago, funding for agricultural research in the UK has been shifted from collaborative projects involving both farmers and researchers to a system that relies on private funding, therefore reducing government expenses on extension services. Buhler further comments that this seems to be impacting on the reluctance that some farmers show in adopting new technologies or innovative practices (2002). More recently, Islam et al. (2013) has observed several case studies in the developing world and concluded that the combination of formal and non-formal education (i.e. inside and outside the classroom) has a positive impact on farmers uptake of innovation, as opposed to approaches that focus just on technical advice, without taking into account social implications that such innovations could have on farmers' livelihoods. The combination of formal and non-formal education and interaction with researchers has multiple advantages. It can be considered a step forwards in trying to compensate for the reduction in government funding by generating knowledge transfer activities and promoting advances and innovation in the agricultural sector, fostering knowledge sharing and ensuring transparency. This is vital because it also helps ensuring that the advice provided takes into account not only the technical aspects of an innovative practice, but the social and economic implications of it as well, giving the farmers the opportunity to choose the best option based on the farming system adopted (Islam et al., 2013; McKenzie, 2011). Therefore, two-way communication represents a broader approach to extension: it enables farmers and researchers to share and co-generate knowledge; whilst enabling researchers and policy makers to gain deeper knowledge of the underlying factors that can influence the decision-making process in the case of farmers and the means that the sectors uses to exchange and generate knowledge on innovation (Kings and Ilbery, 2010). As a result, such collaborative action can be considered beneficial in that it focuses on information directly of interest to the farmers in a practical way, and it attempts to avoid neglecting the environmental, social and economic implications that could also interest policy makers, not only researchers. The clear benefit from such knowledge exchange and interaction is the opportunity to facilitate the implementation of future policies, such as the ones focusing on promoting Good Agricultural Practices and, more broadly, the sustainable management on natural resources by the farming community (Islam et al., 2013; Röckmann et al., 2012).

Therefore, it can be suggested that in order to promote effective innovation in the agricultural sector it is highly important that farmers, researchers and policy makers engage in successful communication. As an example, Burbi et al. (2016) have addressed the issue of climate change, which is highly debated in these recent years and has to face obstacles both related to scepticism from some farmers and financial limitations in adopting innovative technologies that could reduce the impact of livestock farming in terms of greenhouse gas emissions from manure storage and treatment. The authors found that farmers tend to state that they would like to have access to unbiased scientific knowledge on climate change. This was likely to be related to the sense of confusion experienced by some farmers, combined with a lack of trust over government action. As a result, farmers expressed a preference for direct interaction with researchers and scientists and preferred collaborative work focused on finding practical solutions for the implementation of innovation (much like the Farm Labs project mentioned above). In such a context, it can also be considered that scepticism and confusion could result in opposite reactions from farmers:

some farmers could be discouraged from taking action and engage with a wider community of farmers and researchers, but at the same time, some farmers could be motivated to look for knowledge originating from other resources, especially if such alternatives are considered more valuable by farmers themselves.

3.2 Access to IT

As mentioned in the introduction, rural areas of the UK still lack access to broadband and experience slow connectivity (Ofcom, 2013), which can limit farmers' online access to knowledge and innovative techniques. Furthermore, slow connectivity can result in access to social media taking significantly longer than a farmer has time to spare, plus lack of experience of using social media can slow down a farmer's access and use of sites such as Twitter and Facebook (Hartless Rose, 2016).

Another issue the farmers interviewed have experienced is the risk of missing useful information due to the speed of its flow online, or the difficulty in finding specific, relevant, reliable and applicable information amongst the mass of online sources of knowledge (Hartless Rose, 2015a).

Ultimately the Internet represents an accessible means to obtain knowledge and promote the interactions between farmers and researchers across the country that may otherwise have little chance to engage in face-to-face interaction.

4. Possible solutions based on IT technology

4.1 Internet

In the UK, most farmer magazines and newspapers now have digital editions such as Farmers Weekly, and the Farmers Guardian (2016), while more localised farming regions also now release digital editions of their news (Three Counties Farmer, 2016). Farmers can access news, listings and other information relevant to their activities, with the possibility of sharing links to specific information or news to their peers, or leave comments directly on the website.

Although it is important to acknowledge that there are still rural areas in the UK where broadband and 3/4G mobile Internet are weak, it has become a common phrase to 'Google it' to find out information about specific topics of interest. Moreover, with the introduction of smartphones and tablets, answers to questions can be found instantaneously, even outside of the farmhouse. Search engines can be used to look up products for the best value suppliers, ordering goods, learning a new technique or simply booking a ticket for an agricultural show (RWAS, 2016).

Alternatively, web forums such as The Farming Forum (TFF) have become places popular for discussions amongst the farming community in the UK. It allows farmers from every spectrum to debate, discuss, advertise and share knowledge on a variety of topics. As with every online community where participants come from a wide range of differing backgrounds, discussions may occasionally turn into heated exchanges of opinions between participants passionately sharing their own views on specific topics, but overall, discussion topics are useful for those who use the Forum to gain knowledge or find innovative ways of improving their farming (TFF, 2014).

Massive Open Online Courses such as the Farmers Weekly Academy, allow farmers to keep up with their Continuing Professional Development (CPD) by signing up to online courses and expanding their knowledge (Farmers Weekly, 2016b). As another example, Lancaster University offers a free online course on soils of the duration of 4 weeks, with the possibility of watching classes online in basic or high definition, depending on the student's Internet access speed, as well as downloading transcripts of each class for reference. At the end of the course, which is expected to take approximately 3 hours per week of study, students will be issued a certificate of attendance (Future Learn, 2016). The flexibility of such courses can be seen as an advantage in the case of farmers who spend most of their time running their

farms and may have limited time to spend online or it may be difficult for them to keep a regular schedule to attend classes, even in the case of online classes at fixed times during the week.

Interest groups also provide specific courses that can interest farmers, in particular those adopting agroecological practices. For instance, RegenAG UK (2016a) has been organising courses for a number of years, led by practitioners from various backgrounds and aimed at farmers, as well as researchers and the general public. Even though these courses are not online and require farmers to leave the farm for at least 1 day, the internet medium represents a source of knowledge that is easy to access and allows farmers to explore a variety of options in terms of courses, one-day events or workshops on the topics that most interest them at a specific moment in time. The courses are also followed up with resources sent to the attendees via email. Training is also offered by organisations like Holistic Management International (HMI, 2016b), the Biodynamic Association UK (2016) and the Permaculture Association UK (2016b). These institutions provide free access to range of information and knowledge base that could interest farmers, and they also list courses available throughout the year, some of which, such as the Permaculture Design Course, are available as online learning (Permaculture Association UK, 2016c). An interesting example of how farmers organise themselves and share knowledge among their peers and the general public is the website of the Pasture-Fed Livestock Association, where one can find a section titled “Learn More” and one titled “Research News” (PFLA, 2016b). These sections feature news of direct interest to members of the association, mostly farmers, and the general public, with links to events and other sources of information of easy access. The PFLA itself was founded by farmers and can therefore represent an example of self-organisation within the farming community, with the aim to share knowledge and innovation adopting IT technologies and social media.

4.2 Audio/visual media

Audio or visual media can provide a valuable source of information for farmers. YouTube has enabled farmers, both in the UK and around the globe, to record new techniques that they are using on their farms and share the videos online for others to watch, learn and use. As an example, through farmer interviews, it was revealed that one farmer was feeling isolated in Northumberland (in the North of England), with neighbouring farms not implement the same farming techniques. However, he had found videos filmed by another farmer in another area of the country, showing successful and less successful implementations of a specific grassland management option (Havard, 2015) and he stated that he considered the videos to be as helpful as the more traditional farm walks (Hartless Rose, 2015b). Although this is just an example and it obviously cannot be generalised, it has to be noted that in recent years it has become more common practice at conferences to have sessions and keynote speakers broadcasted live via YouTube or other similar online video channel (IPCUK, 2015; ORFC, 2016). Videos can be broadcasted also using software such as Skype (Kasesalu and Tallin, 2003), allowing farmers to follow what interests them the most in spite of the distance. Farmers who could not attend the events, such as the Oxford Real Farming Conference (ORFC, 2016), for financial reasons, distance or due to limited time available can then retrieve videos and transcripts of each session online. The farmers interviewed also followed live updates from the events via Twitter or Facebook (Hartless Rose, 2015b).

4.3 Social media

Twitter has become a way for some distantly diverse farmers to chat as well as debate and exchange information. Some farmers belonging to groups such as #ClubHectare (Twitter, 2012) or the account @AgriChatUK (Twitter, 2011a) often greet each other at dawn, or whilst eating their lunch, sharing knowledge of how their day has gone. Following its establishment in the US, AgriChatUK debates topical farming issues every Thursday between 8-10pm. Whilst some farmers feel that AgriChatUK has peaked and has become less relevant (Hartless Rose, 2015c) there are still very lively discussions each Thursday amongst regular Twitter users. Among the latest topics addressed during the Thursday online meetings

was "How to use IT effectively to make better business decisions" (17/03/2016), which further highlights the importance that IT tools are taking in the agricultural sector. Furthermore, farming conferences such as the Oxford Real Farming Conference use their Twitter account (2011b) to broadcast to those who cannot attend the event, and ask questions during the plenary debates from Twitter and Facebook users.

Facebook pages and groups are a growingly popular platform for farmers, in particular those farmers adopting management systems such as holistic management (HMI, 2016a), permaculture (Permaculture Association UK, 2016a) and, more globally, about sustainable farming across the globe (Farmers for a Sustainable Future, 2016). Some farmers also use Facebook to connect with their peers in the same area, as it is the case, for example, of the Warwickshire Rural Hub (2016), which organises regular meetings and farm visits for their members, free of charge, and share practical, up-to-date information regarding National Farmers Union (NFU) membership and activities, rural payments or other legislative requirements farmers need to be aware of, whether they farm conventionally, or organically or follow other guidelines. RegenAG UK is particularly active on Facebook, sharing information on courses aimed at farmers and the general public, including researchers (RegenAG UK, 2016b). It even has a space dedicated to biofertilizers, which is a topic of great interest among small-scale farmers choosing not to apply industrial fertilisers (RegenAG UK, 2016c). Farmers are also using Facebook to become more political about issues that they feel strongly about, for example in the under-30s branch of the Farmers Club (2016). The use of social media isn't limited to farmers outside of the mainstream agricultural sector, i.e. conventional, organic, but it has become a widespread tool to communicate even for Farmers Weekly and Farmers Guardian, who feature on their website links to their social media accounts.

Google groups are another example of a means for farmers to share experiences and interact, overcoming the issue of distance and financial limitations to attend events, conferences or even farm walks organized by farmers groups. The Pasture-Fed Livestock Association (PFLA, 2016a) are frequently asking questions to each other, or sharing experimentations with each other via their Google group, with advice offered alongside. Access to the group is allowed to all PFLA members and supporters. Researchers can also be given access, in order to communicate with members of the association, seek knowledge exchange or conduct surveys on a number of topics of farmers' interest, such as climate change, soil health, farm management or grassland productivity.

5. Conclusion

Farmers across the UK face a number of challenges with regards to attending activities and events that promote knowledge exchange among their peers, as well as engage in co-learning programmes with other researchers. Issues such as the cost of attending conferences and courses, or the distance and the time farmers have to take off their businesses can reduce the motivation to engage in knowledge exchanges, potentially slowing down the uptake of innovative practices on-farm. Limitations in the use of IT and social media still include access to fast and reliable interconnections and the availability of spare time to browse through the mass of Twitter feeds, Facebook updates and forum feeds. However, the Internet and social media are becoming increasingly useful in enabling farmers from across the whole country (if not the globe) to share views and experiences, successes and failures, creating online communities that contribute to the diffusion of knowledge and innovation across the agricultural sector. Moreover, a number of initiatives provide free online courses for farmers, whilst social media platforms such as Twitter, Facebook, Google groups or YouTube have the multiple benefits of promoting farmer-to-farmer exchanges, as well as the broadcasting live of national and international events and conferences. Such growing interest in the Internet and social media is likely to help avoiding the feeling of isolation that some farmers may experience, especially those farming in remote areas of the country, have smallholdings or implementing agroecological practices and therefore may be reluctant to follow advice provided explicitly for conventional or organic farms. This leads to the possibility of research institutions to

further adopt social media as a means to communicate with farmers, collect data and information for research and creating continuing interaction, albeit online, between farmers and researchers in the UK, as well as globally.

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