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Social Media for Enhancing Innovation in Agri-food and Rural Development: Current Dynamics in Ontario, Canada

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Abstract

Communication for innovation in agriculture and rural development involves interactive and multi-stakeholder approaches that mobilize ideas and resources from the public and private sectors as well as civil society. Digital tools broadly referred to as Web 2.0 technologies, and in particular, social media such as Facebook, Twitter, blogs and webinars are allegedly channels of communication for innovation. These tools potentially offer support for collective learning processes and co-creation of knowledge. There is little evidence, however, to substantiate that new media are enabling innovation by and among stakeholders of agri-food and rural systems. Are diverse agri-food producers, rural entrepreneurs, scientists or researchers, community-level volunteers and public servants interacting more effectively in Web 2.0 environments? Are social media reinventing agri-food and rural information flows? Employing methods of multiple database searches, review of literature, and content analysis of 50 relevant online communities this paper identifies emerging issues in the development and use of social media in the agri-food and rural sectors with an emphasis on data from Ontario and, to a lesser extent, elsewhere in Canada. Findings suggest that the uptake of social media is still in an early, exploratory phase associated with modest opportunities and relevant limitations of Web 2.0 mediated multi-stakeholder collaboration. Notably, there are gaps in giving and receiving feedback which are intrinsic to dyadic communication as well as innovation processes. Limitations identified include (a) conflicting perceptions among stakeholders about the use, risk, credibility and institutional incentives associated with social media, and (b) lack of capacity that enables use and development of appropriate social media applications. The paper concludes by summarizing the importance of autonomous, user-oriented applications of Web 2.0 tools in agri-food and rural systems.

Keywords: Social media, Internet, Agriculture, Rural, Innovation, Communication, Canada, Ontario

1.0 Introduction

Communication is a key element of social interaction, learning and capacity,

building processes in agricultural and rural innovation systems (Leeuwis & Aarts, 2011; Rivera & Sulaiman, 2009). Traditionally, communication for innovation was conceptualized as a process of linear knowledge and information dissemination sent from a central point out to client decision-making processes (Röling, 2009a). The agricultural and rural extension problem was considered to be a lack of information, and therefore, the focus was more on effective information dissemination (Rogers, 1995). Often this approach positioned scientists as the primary sources of knowledge, subsequently, civil servants, professional journalists or communications staff as the senders of information, and then, farmers, entrepreneurs or rural citizens at the receiving end of communication and information flows. Of late, the functions and roles of communication have changed dramatically. Agricultural and rural communication processes are now understood as facilitating and learning from the knowledge of multiple stakeholders in order to explore ideas and mobilize public and private resources for activating innovation systems (Leeuwis & Van den Ban, 2004; Pant & Hambly Odame, 2010). As a result, there is an ongoing transformation of the theory and practice of agricultural and rural extension, also known in Canada and internationally by terms such as 'knowledge brokering', 'innovation brokering', 'knowledge mobilization', 'knowledge management' and 'knowledge translation and transfer' (Fisher, 2011a; Klerkx, Hall, & Leeuwis, 2009; OMAFRA, 2011; Phipps, 2012).

Implicit to new ways of understanding and doing extension are the use of digital and mobile technologies to access, store and analyze data and information to ensure timely and efficient translation of knowledge into productive use. As well, a range of media and communication technologies converge to support interactions that co-produce knowledge and build networks of innovating people, institutions and systems. Dozens of internet applications and services, generally referred to as Web 2.0 technologies, are already used or emerging in Canada's agri-food and rural sectors. Canada is not unique among other nations for its interest and use of Web 2.0 technologies for agricultural and rural development. In the United States, social media applications (e.g. blogs, Facebook, Linkedin, Twitter, YouTube) are emerging for more two-way (or even multi-directional) collaboration and learning between extension experts, entrepreneurs and farmers that creates new space for relationship building and innovation (Cornelisse et al., 2011; Fisher, 2011b; Gilbert, Karahalios, & Sandvig, 2010). The growth of new media is still often associated with urban, younger and more technological savvy users (Tapscott, 2009). Social media is, however, an active topic in extension and knowledge mobilization organizations in USA and Europe as well as in low income countries around the world and many new media linkages can be identified. "Agvocacy" networks US-based users of social media to think beyond marketing applications to wider social activism (AgChat, 2012; Francis, 2009). Leading research institutes exchange expert information on agronomic practices through YouTube and collaborative podcasts (Farm Radio International, 2011; IRRI, 2010). Non-profits are using a mix of short message services combined with radio broadcasts as "farming out" and "radio plus" (O' Donnell, 2011; Banks, 2011;, Chowhdury & Hambly Odame, 2013). Ghana Information Network for Knowledge Sharing (GINKS) used a process of making and publishing videos on the internet with the intention of sharing information called 'vlogging'. Short video entry trigger debates, people can comment on the videos, and share ideas, stories and information linking to other bloggers online and creating new conversations (Deh,

2009). Agricultural videos and audio scripts from around the world are being collected in searchable web portals.

In this paper, the intention is to examine social media applications and services in agri-food and rural innovation, reporting preliminary findings from an ongoing inventory of social media tools used in Canada, and specifically in Ontario, with its expanding rural Web 2.0 infrastructure and importance to the dynamic agri-food industry. The questions explored in this paper are firstly, what Web 2.0 tools are currently being used in the agri-food and rural sector? Secondly, is there evidence of social media creating and intensifying multiple stakeholder interactions? Thirdly, and finally, is there evidence that social media enables sharing of ideas and any other knowledge brokering that enables agri-food and rural innovation? The overall objective addressed by this paper is to begin to characterize and evaluate apparent practices and challenges of social media in the agri-food and rural sectors.

2.0 Social Media and Communication for Innovation

By definition, Web 2.0 technologies support websites, blogging, wikis, social networking (e.g. Facebook, LinkedIn), tagging and social bookmarking (e.g. Delicious, Pinterest), RSS feeds and mash-ups that aggregate and/or disseminate information (e.g. Twitter). The term 'social media' is loosely applied to Web 2.0 tools that herald a more informal and personal approach to information-sharing with the potential to shift from a top-down and corporate-based communication process to a more individualized, participatory and democratic approach whereby the users is creator, consumer and repeat innovator of the web content (Ashley, Corbett, Jones, Garside, & Rambaldi, 2009; Kietzmann, Hermkens, McCarthy, & Silvestre, 2011; Schein, Wilson, & Keelan, 2010). The revolutionary dimension of social media is its enhancement of communities and networks that underpin mass innovation as more ideas are being shared by more people (i.e. as individuals but also as communities of interest and communities of practice, societies and nations) than ever before (Wenger, White, & Smith, 2009).

Scholars argue that members of a society have both obligations and rights to discuss meaning and morality as part of their deliberate communication (Habermas, 1984). Language and communication channels are preconditions for social progress, and the action they facilitate, Habermas argues, is made possible because of shared meaning. In this respect, it is possible to understand the contemporary use of social media as accumulating a means of communication for creating or renewing meaning and identities within or across social actors (Hylland Eriksen, 2012). Social media may also enable power-sharing and 'newness' of democratic communication in virtual realms because presenting and contesting situated, and often different ways of knowing an issue becomes possible (Luders, 2008). Opportunities lie with members of society exchanging various points of view and know-how implicit within one another's right to communicate. Social media operates at its best when it abandons the need for consensus and operates as a method of learning and conscientization through social interaction.

Social media practices are relevant to the ongoing discussion about communication for agricultural and rural innovation. Apart from the interplay between technological and institutional factors within innovation systems, the renewed understanding of theories, practices and processes of human communication have a tremendous influence over successful agricultural and rural innovation (Hoffmann,

Gerster-Bentaya, Christinck, & Lemma, 2009; Swanson & Rajalahti, 2010). In the mid 20th century, modernisation scholars articulated communication as a necessary transmission of modern values and ideas (Lerner, 1958; Schramm, 1963). Science and public service were expected to inform society, often using one-way social marketing, health and entertainment education campaigns. Corporate mass media, such as radio, print, film and television played a key role. The need to modernize underpinned the 'diffusion of innovations' approach which emerged from agricultural literature and, subsequently, influenced diverse technology adoption studies in fields such as health, environment and economic development.

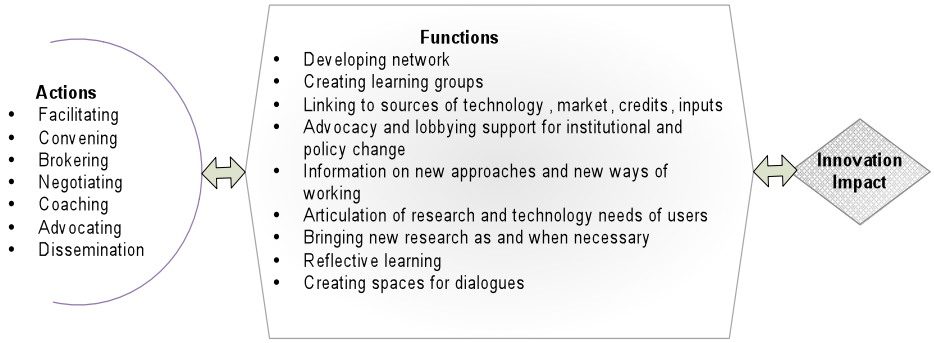
Late 20th century social scientists and community development practitioners responded critically to the notion of one-way information dissemination that employs top-down transfers of messages from an informed center. Earlier, scholars considered innovation as new information or technology and the role of communication as diffusing 'ready-made' technology (Manyozo, 2012; Rogers, 1995). In the new thinking, innovation does not just consist of new technical arrangements, but also new social and organisational arrangements, such as new rules, perceptions, procedures, agreements and social relationships (Leeuwis et al., 2004). The "telling, not asking" tendency has been widely disparaged in agricultural and rural areas of the world because the linear model was found to amplify socio-economic disparities within communities, both in developed, high income nations (Klerkx, 2008; Leeuwis et al., 2006) as well as underdeveloped, low-income nations (Pant et al., 2010; Röling, 2009b; Woodhill, 2002).

Genuine innovation rests on interaction, not interference. Innovation is increasingly recognized as a process of making knowledge, technology and information available for adaptation and use by various interacting individuals and organizations to result in social and economic change (Röling, 2009a; Sulaiman, Hall, & Raina, 2006). This process results in many concurrent information and knowledge flows among multiple people and institutions, and subsequently, the constant contextual re-ordering of relations in multiple social networks (Leeuwis et al., 2011). There is a need to abandon the idea that there is a singular, linear transmission of relevant knowledge, technology or information within the innovation process. Rather, rapid and continual re-negotiations occur in what needs to be shared, known, commented and acted upon. Communication, therefore, plays a fundamental role in establishing contact and re-ordering relations among various individuals and organizations not only in professional ways but also in many informal and personal settings. This implies communication is the dialogical process of creating socially-distributed meanings, definitions or understanding, wherein information, people and perspectives constantly think, act and interact (Tufte & Mefalopulos, 2009).

Recently, emerging discourses in agricultural and rural innovation suggest important strategies and services that implicate communication processes, including demand articulation and knowledge brokerage, visioning and scenario building, group process facilitation, interactive institutional assessment, novel ways of pursuing design and experimentation, negotiated storylines, discourse and representations, learning-oriented monitoring, performance measurement, as well as appropriate mixes of advocacy and conflict management (Klerkx et al., 2011; World Bank, 2012). These strategies and services need to connect different actors relevant for innovation and enable coherent actions. Not surprisingly, new media and communication methods are increasingly used to spread stories and/or foster

greater resonance of new discourses and conversations (Chowdhury, Hambly Odame, & Leeuwis, 2014; Hall, Dijkman, & Rasheed, 2010; Hambly Odame, 2003). Using social media, it can be argued, enhances the connectedness of different components of agri-food and rural innovation systems. However, simply being able to access these new forms of media is insufficient, what matters is the development of competencies among innovating individuals and organizations in order to harness the benefits of social media. Using the schema presented in Figure 1, several key functions and actions that underlie competencies for innovation can be defined.

Figure 1. Possible functions and actions of agri-food innovation



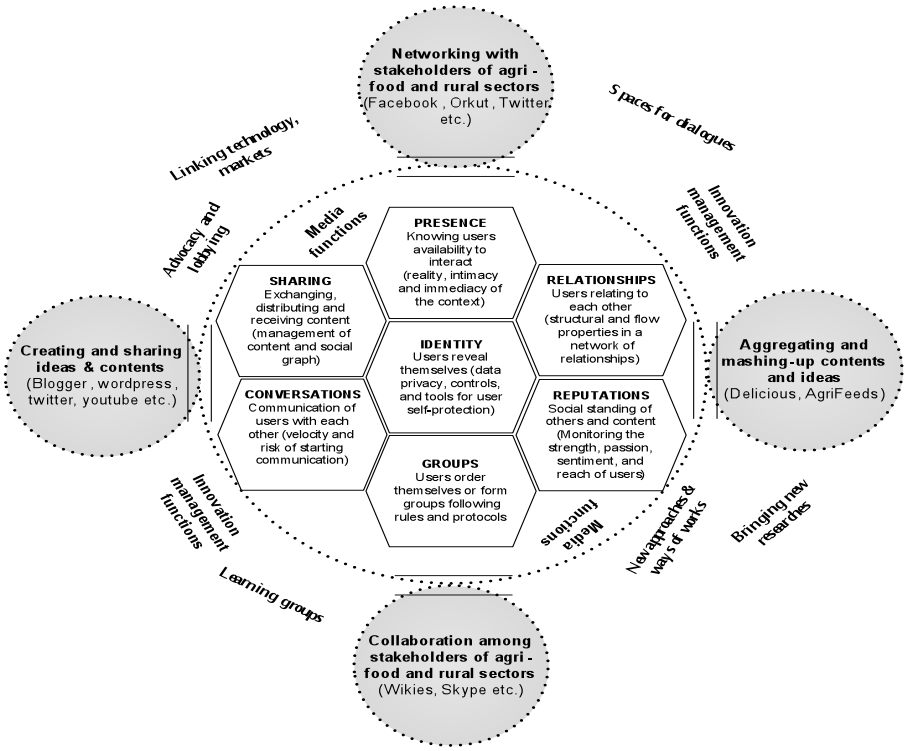
Source. Modified from Sulaiman Rasheed et al., 2011.

Therefore, analysis should focus on how social media are being used to develop innovation competencies. No doubt, social media have ushered in substantial and pervasive changes in the ways we communicate ourselves and in interaction with other individuals, groups and organizations. Social media appear to intensify communication in two major ways – by amplifying messages from traditional media (e.g. radio, TV, print media) and enabling new ways of collaboration and co-creation of content with target audiences (Schein, Wilson, & Keelan, 2010). Social media challenges contemporary corporate-based mass media which is criticized for its unknown or concealed goals and intentions (McPhail, 2010). In contrast, communities of social media are open networks where everyone (i.e. clients, users, members) has an opportunity to contribute their ideas and to support mass innovation with one-to-one, one-to-many, and many-to-many interactions (Ashley et al., 2009). Social media therefore has a number of key implications: (a) more people can use their voice than ever before, (b) information can be increasingly set free for people who need it for knowledge creation but who cannot access it (including availability and affordability), and (c) people have more freedom to be creative both as individuals, and collectively (Kreutz, 2008; Trenholm, Jensen, & Hambly Odame, 2010). Therefore, juxtaposing social media with the development of innovation competencies lets loose the "social" in new media. Following Kietzmann et al. (2011), the schema presented in Figure 2 identifies potential strategies for interaction among innovation actors often through virtual spaces.

Through the lens of innovation, we can see that social networking sites (e.g. Facebook, Orkut, Myspace, LinkedIn, etc.) are important means to hold conversations but also formulate ideas and learn using resource items such as photos, videos, audio or links to websites. Opportunities for collaboration and

doing things together are facilitated by groupware tools (e.g. wikis, Basecamph, Yahoogroups, Skype, Google Drive) and more specifically, help a group to start-up and implement their activities (e.g. accessing information, managing a project, publishing their work). Opportunities to create and distribute content, such as texts, photos, videos, and documents are also possible with blogging (Blogger, Wordpress) and microblogging (Twitter, Yammer) tools, video (YouTube, Vimeo) and image (Flickr, Picasa) sharing platforms. There are also tools that provide opportunities for people to find, use, organize and reuse content created and shared by others. For instance, feeds and syndication tools (Google News, AgriFeeds), and tagging and social bookmarking tools (Delicious, StumbleUpon) are important means of aggregating content on the web.

Figure 2. Links between social media and innovation functions



Source. Adapted by authors from Kietzmann et al., 2011.

The analytical approach adapted from Kietzmann et al. (2011) further suggests that the functional traits of social media can be applied by an individual, organization or community to develop its social media-based communication strategy. The need for strategy is relevant because new sites and services are emerging everyday resulting in competing attention to communication demands of individuals and communities online. For example, LinkedIn, a social media site for professionals, emphasizes identity and to some extent relationship and reputation function. Facebook, a popular social networking site, gives attention to relationship building with some functional attributes of presence, identity, reputation, and conversations. On the other hand, the popular video sharing platform YouTube functions mainly as a tool for sharing videos, with some facilities for conversation, reputation, and group development. Therefore, innovating individuals and organizations can use

the functional building blocks of social media to understand and monitor the function and impact of social media tools. This provides a strategy for social media applications to fulfil specific communication goals and interests. While the classic communication function (e.g. transferring messages and information) may still be used, it is necessary that social media support other innovation functions such as, broadening social spaces in virtual realms that are critical to driving innovation by engaging others as well as facilitating discussion among various actors (e.g. farmers, researchers, knowledge brokers, policy makers, entrepreneurs).

3.0 Methods and Data Sources

3.1 Study Context

In this paper, we intend to map out current social media practices in agricultural and rural innovation in Canada, with specific attention to Ontario. As explained later in the paper, social media is actively used in rural southern Ontario. This is one of the most densely populated rural areas of Canada and given Ontario's leading edge in digital technologies and media production within cities such as Toronto and Waterloo, one might expect that its rural areas benefit from relatively greater access to information and communication technologies (including availability and affordability). To some extent, this is the case, but rural southern Ontario currently has variable broadband coverage and relatively recent, but rapidly growing, mobile use (Hambly Odame & Pant, 2010; ROMA, 2011). By 2013, it is anticipated that given recent investments in fibre and fixed wireless an additional two million rural inhabitants will have some access to basic internet services, although at much lower quality of service than urban areas.

According to Statistics Canada (2011), Ontario has over a quarter of Canada's 205,730 farms. Ontario has the largest agricultural and food processing sector in Canada accounting for sales of $34 billion and approximately 11% of Ontario's employment. Ontario farms are mainly small- and medium-sized holdings characterized by less than 53 hectares or sales under $25000. The highest gross farm cash receipts are based on top commodities such as dairy, floriculture/nursery, cattle, vegetables, hogs and poultry totalling some $10.3 billion (OMAFRA, 2010). While it is forecasted that overall rural population in southern Ontario will increase, the number of small and medium sized farms is expected to continue to decrease in the rural landscape. The 2011 Census of Agriculture counted 51,950 census farms in Ontario, a 9.2% decrease since 2006. This compares to a 10.3% decrease at the national level.

Farming in Ontario is a major generator of related jobs in the wider provincial economy – including both non-farm and urban jobs. In addition to jobs on farms in Ontario, the agri-food industry accounts for roughly 800,000 jobs in the food processing and sales in wholesale and retail stores and services. This represents nearly $80 billion in sales, the largest food-related sector in Canada. New manufacturing and processing opportunities in a wider range of bio-products and bio-product driven agriculture (e.g. bio-energy, bio-chemicals and functional foods) expand the sector's sales levels even further. The growth in and overlap between the agri-food related jobs and the creative economy which includes artisanal, leisure, tourism and various knowledge-based enterprises is also apparent (Martin Prosperity Institute, 2012).

For farm and non-farm residents, communication, information technology and knowledge mobilization have been found to be central to growing the rural Ontario economy (Hambly Odame et al., 2010 Romanow & Bruce, 2006;). Through investments in rural broadband and mobile access, we can expect that there will be new forms of entrepreneurial development, teleworking and new platforms of agri-food exchange that encourage a wide range of development activity. Given that many rural communities in southern Ontario experience both an aging population and an out-migration of young people as a result of limited employment opportunities, digital economic and social (including health and education) opportunities are considered a priority for rural Ontario (ROMA, 2011).

3.2 Methods

This paper reports preliminary results of an inventory of various social media used by individuals and organizations involved in agri-food innovation. Firstly, using a combination of key words such as, 'Ontario', 'agriculture', 'food', 'rural', 'innovation', 'Canada', 'dairy', 'livestock', in the search engine and search interface of social media tools, different online platforms that focus on issues related to agriculture and rural development were identified and classified in an electronic database. A list of 50 social media tools was also developed considering their relevance to the agri-food and rural innovation system in Canada, and specifically, southern Ontario. Content analysis, a useful way to dissect and categorize social media by use of text, image and video was employed (Waters, Burnett, Lamm, & Lucas, 2009). Using a coding guide for the content analysis we reviewed the list of online platforms using social media tools, collected as of April 2012. The coding guide contained specific variables such as period of access, regions of communities, objective(s) for the use of social media by the individual/organization, type of information dissemination strategies, and practices (restrictions applied to the tool and forms of interaction). We closely examined various social media applications and publicly available information in order to understand the engagement of community members in discussion and dialogues. The data were analyzed using descriptive statistics. We also used a program known as 'tweetreach' (http://tweetreach.com/) to analyze patterns of communication in Twitter accounts during the last week of April, 2012. Additionally, pertinent publications related to social media applications were collected using various agricultural and social science database searches. The publications were reviewed for further analysis of relevant theory and practices of social media applications.

There were apparent limitations of the methodology including the real-time validation of only a small number of the found virtual cases, and emphasis on content analysis of multi-media-based social media tools. Within the limited scope of this preliminary analysis we did not investigate more intently the tools that are dedicated to audio, image and video based communication or include tools such as YouTube and Vimeo. As the inventory expands and the study progresses, we will include video-based tools in future analysis.

4.0 Findings

4.1 Trends in the users and use of social media

The findings indicate that social media practices among stakeholders in the agri-food and rural sectors are at an early stage. Of the 50 inventory records or cases analyzed, this activity has been introduced within the last five years (Figure 3).

There has been a dramatic rise of social media practices in past one year (April 2011-2012).

The results further indicate that Ontario-based individuals and organizations are most active in the Canadian networks. Most of the social media cases were initiated by agri-food and rural based individuals, organizations or on-line communities in Ontario, followed by those in British Columbia and Alberta (Figure 4). The scale and intensity of agri-food and rural development initiatives in Ontario are relatively large compared to other provinces. Few cases, however, reported having a national focus of interest.

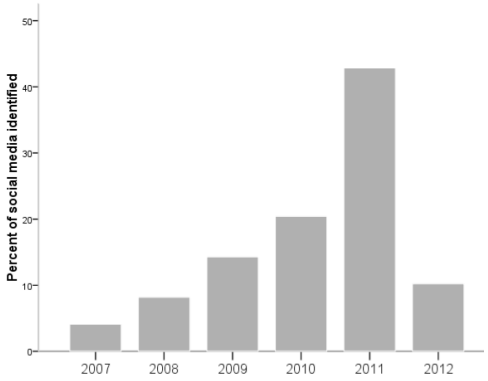


Figure 3. Social media cases according to the year of introduction (n=49)

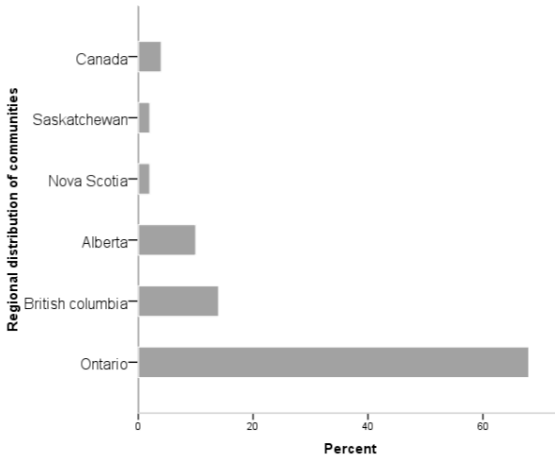


Figure 4. Regional distribution of social media cases (n=50)

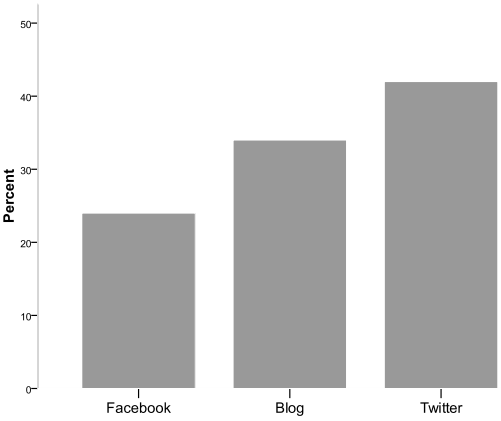


Figure 5. Different social media tools used by the stakeholders (n=50)

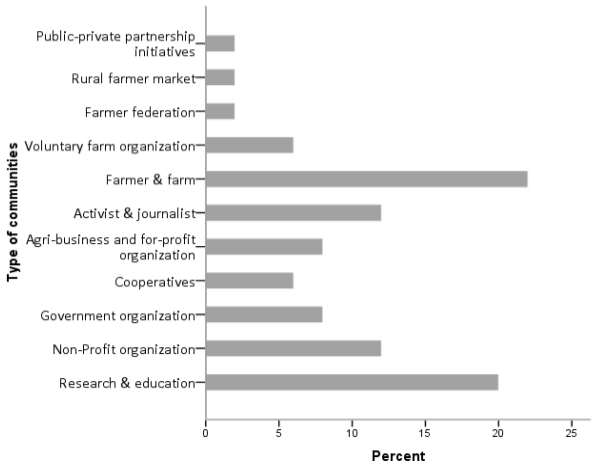


Figure 6. Types of stakeholders using social media (n=50)

Among different social media tools, Twitter is preferred by most stakeholders (Figure 5). Less use is made of Facebook, and blogs.

The findings show that there is a wide range of stakeholders who are deploying social media. Individual farmer and farm-based social media accounts are predominant, followed by those facilitated by the stakeholders of research and education, non-profit organizations, activists and journalists (Figure 6).

4.2 Forms of media used and topics

Content analysis of the social media posts indicate that text and discussion posts are the preferred formats used in social media, followed by image and news link postings. Video and audio were the least deployed means of information dissemination.

Table 1. Forms of media used for communication (n=50)

Forms of Media	Frequency	Percent
News Link (Sharing news link of own or external source)	33	66
Video post	6	10
Image post	40	80
Audio post	18	36
Discussion/text post (Posting topic for discussion including news link)	50	100

Agri-food and rural stakeholders are using social media to discuss a wide range of topics (Figure 7). Farm policy and sustainable farming are the most discussed topics. This is followed by topics concerning employment, agri-food value chains and the development of a new generation of farmers.

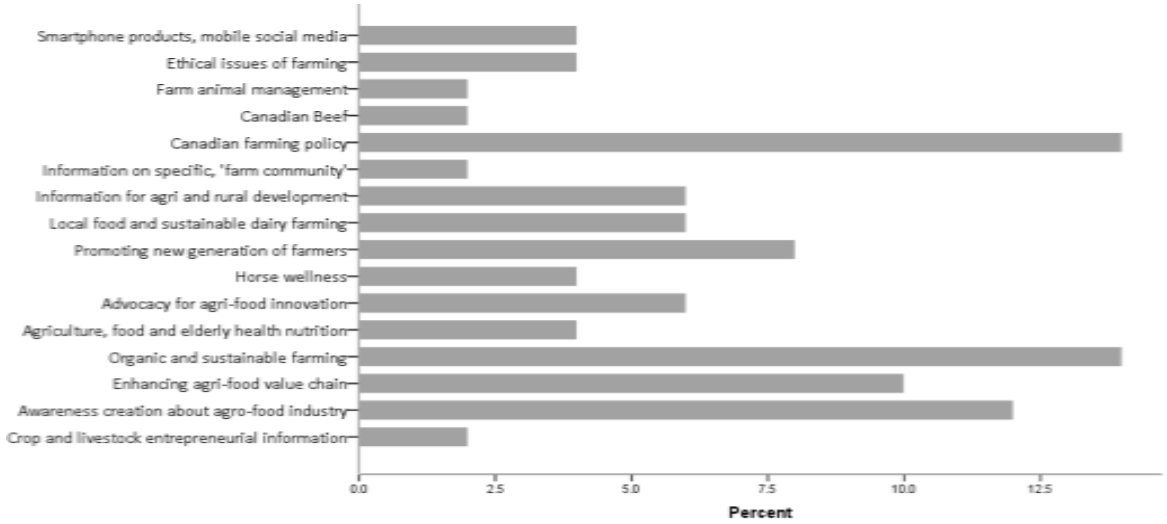


Figure 7. Topics discussed in different social media platforms (n=50)

4.3 Social Media for Organizational Development and Knowledge Transfer

Social media have potential in creating new social and economic opportunities. Several cases were found where interactions through social media are addressing organizational goals within the agri-food and rural sectors.

Social media for social marketing campaigns: Campaigns are an important driver for social media use aimed at creating awareness of specific issues and targeting behavioural changes. For instance, 'Farmers Feed Cities' has transitioned from a 2005 lobby effort to an online platform managed by Ontario Grains and Oilseeds, a coalition including Ontario Bean Producers' Marketing Board, Ontario Canola Growers' Association, Ontario Coloured Beans Growers' Association, Seed Corn Growers of Ontario and Grain Farmers of Ontario. They have been deploying social media for social marketing aimed at increasing wider public awareness about the agricultural sector, its importance and contribution to the Canada's economic, social and physical wellbeing. Another example is '100% Canadian Milk' – a dairy industry community that uses social media to increase consumer awareness of pure Canadian milk products, free of antibiotics and growth hormones.

Social media for community engagement: There is also evidence of the use of social media for connecting relevant stakeholders, linking information and sharing potential resources. Developed by a computer software specialist in California, 'Local Harvest' is a North American platform for organic and local food producers with an interactive mapping interface for several Canadian provinces, including Ontario. The organization uses social media to connect consumers to local food in their areas and promote a wider agenda of conscientious food consumption. Social media for online direct marketing is also noted with platforms such as 'Ontario Farm Fresh Marketing Association' (ontariofarmfresh.com) using membership and public sector support to promote local farming and food, and increased networking amongst Ontario farmers and consumers. More than 300 feeds (in a variety of languages) are offered on the site to link to information about local food in Ontario. Lines between urban and rural areas are blurred with cross-references to platforms associated with the rural creative economy such as the 'Ontario Culinary Tourism Association' which, in turn, appears in the networks of 'Sustain Ontario' an initiative based in downtown Toronto with a mission for information dissemination on sustainable agriculture and food systems.

Social media for community engagement and fundraising: Social media are used not only for community engagement, but also to create opportunities for attracting financial support from the community and beyond. Rural Ontario Institute is a not-for-profit organization which uses social media for promotion of their events, policy analysis, program activities and linking to different voluntary and fund raising activities. Ontario Federation of Agriculture has a members' only log-in community. Christian Farmers Federation of Ontario does not include such a platform although it provides relevant links to its community. Similarly, Farm Start, which focuses on new farmers (including new Canadians and younger farmers), uses social media to build its membership and fundraising by posting their activities, linking to capacity development events, and economic opportunities in the agriculture industry. Among these organizations, Twitter, Facebook and YouTube are the preferred, and often the only social media tools used.

Social media for enhancing outreach of business and science: Findings indicate that a small number of private sector companies have made a business from building websites for farmers, including platforms that incorporate social media. These businesses also use their networks for revenue generation through advertising and subsidiary e-business platforms. Examples include 'Agri-ville.com' focused on western Canada, and its original platform 'Farms.com' based in Guelph, Ontario. Such sites aggregate large amounts of information on a free portal and offer free e-newsletters to members. Membership attracts advertising as well as 'sale-of-service' information or advice.

In contrast, direct outreach by agri-food scientists and rural researchers typically focus on outreach from their institution's website or information listed on their professional web page. In the past, agri-food scientists and rural researchers rarely used social media tools and feeds. Now, there is a growing inspiration to use social media for enhancing outreach of research. A recent example is the blog entitled 'Ethno-cultural Vegetables Ontario' based on a research initiative at the University of Guelph concerning ethno-cultural vegetables and value chain related information. At this point in time, however, there is little evidence of public, online social media interaction between agri-food scientists and stakeholders.

4.4 From disseminating information to enabling social interaction

In this section, we report findings on social media enabled communication flows that operate beyond the classical process of information dissemination. Access to discussion and dialogue forums using social media are potential means for enabling socially inclusive interaction. Findings show that more than half of the social media accounts allow only members and friends to participate in discussion and feedback threads (Figure. 8). One-third of the social media platforms give access to anyone who is interested to comment. There are relatively few social media platforms that keep discussion and reflective comments to a restricted audience.

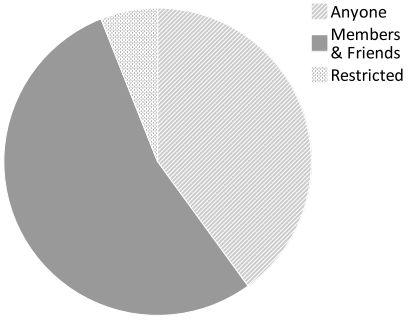


Figure 8. Public access to participate in comments & discussion forum (n=50)

Findings indicate that users adopt 'like' apps for responding to Facebook posts (Table 2). This is an instant and prompt way to respond to a post, although it does not provide sufficient insight into the communication between users about a specific issue.

Table 2. Pattern of responses using Facebook 'like' applications (n=12)

Type of post	Frequency	Percent
'Like' member/others' post	11	93.3
'Like' own posts by members/others	10	83.3

While examining the apps for 'comment' and 'share' in Facebook and blogs, we observed that sharing of information and links is a common practice and commenting is apparently less frequent (Table 3).

Table 3. Discussion patterns in Facebook and blogs (n=29)

Types of responses	Frequency	Percent
Comment to other	11	37.9
Comment by members	10	34.5
Comment by others	14	48.3
Sharing others' information & links	17	58.6
Sharing own resources by others	10	34.5

Sharing knowledge is a necessary function of social media to support innovation. We identified a substantial number of accounts that post comments and resend additional comments to one another; however, the frequency and tendency for this activity is apparently low among the overall range of cases. Activity in the Twitter accounts provides further evidence on the limited two-way communication behaviour among social media users (Table 4 and 5).

There are few Twitter accounts which have engaged a large audience by following others and being followed by others (Table 4). The majority of accounts have not reached a wider audience. Typically, these accounts were introduced more recently, and had intermittent activities in their accounts. Most Twitter accounts indicate a low engagement of their audience based on the categorization defined by average and standard deviation of the Twitter profile data (Table 5). Another observed factor for having low audience engagement is the inability to adopt effective strategies of audience engagement such as, choosing potential followers, being followed by others and posting relevant and effective messages.

Table 4. Activity profile of the Twitter account (n=21)

Characteristics	Activity profile		
	Minimum	Maximum	Average
Followers	5	5383	1170
Following	14	641	3008
Total tweets	6	16581	2138

Table 5. Extent of audience engagement in the Twitter account (n=21)

Characteristics	Extent of audience engagement[1] (% of the accounts)		
	Low	Medium	High
Followers	67	24	9
Following	62	29	5
Total tweets	86	5	9

[1] The cut point between the three categories (low, medium and high) was determined based on average and standard deviation.

The findings from the analysis of communication pattern in Twitter accounts for the last week of April, 2012 indicate that some accounts did not have any activity, while others were very active in tweeting, re-tweeting, and replying (Table 6). The active accounts tend to have engaged large audience.

Table 6. Communication pattern of Twitter accounts (last week of April 2012; n=21)

Communication pattern	Activity profile		
	Minimum	Maximum	Average
Tweet	0	27	8
Re-tweet	0	20	4
Reply	0	27	5
Total audience reached	0	20501	5598

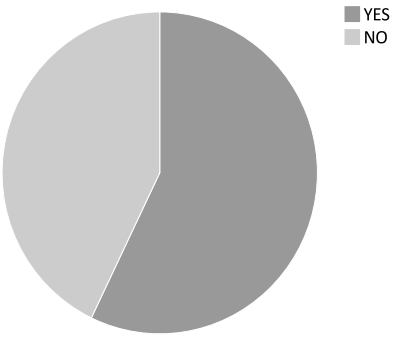


Figure 9. Proportion of twitter accounts that tweeted, re-tweeted and replied in the last week of April, 2012 (n=21)

On average, Twitter accounts performed more tweeting than re-tweeting and replying to posts. More than one-third of the Twitter users either did not re-tweet or reply (Figure 9). Tweeting a message or link is a means of exchanging knowledge and information. Re-tweeting and replying to the tweeted posts indicate

expressions of intentional communication typically in the form of an offered insight, example or a shared meaning or perception of the communicating parties.

5.0 Discussion and Key Challenges

The findings indicate that social media tools are emerging as an important means of information sharing and communication in the Canadian agri-food and rural sector. However, individual and organizational accounts are recent and vary considerably in size of audience and (inter)activity. Twitter is currently the most widely used social media tool among the cases, followed by Blogs and Facebook. Most social media cases have been functioning for the last 12 to 24 months. Among various stakeholders, farmers and producers are predominant users of social networking sites. Government agencies are comparatively slow in adopting social media as a more interactive communication strategy opting instead for information dissemination.

People use text and image most frequently in social networking sites. Video and audio are the least preferred forms of communication. This is indicative of internet access and capacity challenges that stakeholders encounter in the development and use of video and audio, including exchange of such material through different social media sites.

Sustainable agricultural practices and agricultural policy issues are the most widely discussed topics, followed by topics of agri-food industry and market sales. Stakeholders are evidently using social media to fulfill various development related goals. Stakeholders generally adopt social media to meet four identified goals. They use social networking tools for social marketing campaign, community engagement, and enhancing outreach of business and science. The use of social media for enhancing business, fundraising and economic transactions in agriculture and rural sectors, however, is at an early stage of development. It is not yet known if the role of social networking sites in building trust relationships, and reducing multiple layers of bureaucracy in problem solving relationships contribute to direct "hands on" benefits such as adaptation of productive technologies, enhanced peer-to-peer knowledge flows or improved financial or time-saving transactions (Gajjala, Birzescu, & Anarbaeva, 2011; Staiger-Rivas et al., 2010).

The findings of this study are somewhat consistent with the results of a comprehensive survey of agricultural professionals in Ontario by Guiry and Hilderley (2012). Their results indicate that 84% of the agri-professionals visited at least one social networking site in the last year, of which 23% found social media to be very important and 50% found it somewhat important for their work. The most often used tool is Twitter followed by YouTube, Facebook and Blogs. The majority of agricultural professionals (68%) use social media for sharing and/or capturing knowledge and information in order to fulfill their agricultural roles and duties. Other reasons for using social media are to build their contact network (49%), followed by marketing (38%), socializing (37%) and keeping in touch with colleagues and contacts (36%).

Overall these preliminary trends in the use of social media indicate greater emphasis on disseminating information and transferring messages as compared to engaging users in dialogue, reflective and problem-solving discussions. The findings corroborate earlier observations made by Greenberg and MacAulay (2009) that most Canadian Environmental Nonprofit Organizations (ENPO) do not

leverage social media for dialogical forms of communication such as, constituency engagement, relationship building and conversations. The findings of this and that of Greenberg and MacAulay (2009) identify existing tensions between instrumental and dialogical forms of communication. Given the recent nature of social media activity among a wide range of partners in the agri-food and rural sectors, it is important to build on these findings for future strategies that will emphasize interaction and engagement with the widest relevant audience. Based on the findings, therefore, three key challenges are discussed that are supposedly associated with social media-enabled communication in rural Ontario.

Access challenges: These challenges pertain to rural broadband infrastructure, technologies, language, and communication media that restrict users from participation in social media and internet sites. In rural Canada, broadband infrastructure has developed substantially over the past ten years, yet the quality of service based on considerations such as speed and network density is low (Chiefs of Ontario, 2013; Clement et al., 2012; Fiser & Clement, 2009; Middleton, 2008). While 'dial up' services are waning, broadband connections greater than 1.5 megabits per second are still unavailable or unaffordable for many rural households in southern Ontario. Gap effects in fibre and wireless access within rural areas create challenges for continuous access that adversely affect business and public institutions (Hambly et al., 2010). Social media tools such as wikis, blogs and YouTube require high download and upload speeds, symmetrical connectivity. In comparison to other users in urban and peri-urban areas of the Province, rural Ontario is disproportionately affected by the lack of synchronous digital connectivity.

Social media sites examined in this study do not promote the use of one brand or type of handheld device over another. According to the recent OMAFRA study, agri-food stakeholders in Ontario who use smartphone and tablet computers reported using Blackberry products (65%), while only 23% used iPhones, 8% Android and 2% the Windows based operating system (Guiry et al., 2012). It is important to recognize that until recently, technologies developed by the Waterloo, Ontario parent company Research in Motion (RIM) made Blackberry the product of choice for public sector workers. More recently, variations among users exist on the basis of age and personal preference. For social networking purposes, agricultural professionals reported using mobile devices primarily for checking and sending e-mail, texting, and to a lesser extent, Twitter (14%) and Facebook (5%). Major drawbacks for use of smartphone technology are small size of the screen, poor network coverage and quality, and this may be affecting the uptake of social media applications relevant to agri-food stakeholders.

In Ontario, and elsewhere in Canada, government service agencies for agri-food and rural sectors work in two official languages, i.e. English and French. The website and social networking sites of most agencies deliver messages in English and may not be accessible to those users who are not proficient in the language. People with low media literacy and certain disabilities also face challenges to access the internet and use social media sites. This raises issues of social inclusivity with internet sites and social media applications. This study finds no substantial discussion of these issues within the literature or on the social media sites examined in the survey.

Capacity challenges: Simply having access to the internet and social networking sites may not necessarily ensure effective use of social media. For rural

development professionals, it is necessary to understand the clients, their needs, and techniques to effectively deliver the message to them. Studies indicate that large numbers of young farmers are more interested to deploy internet and social media for agricultural purposes (Guiry et al., 2012; Whitacre, 2008). Typical responses from agri-food and rural organizations have been to offer training and advice on the benefits of going online and using social media. Communicators are urged to improve their skills for integrating different media and social media applications rather than relying on any single tool (Fisher, 2011b). Agricultural professionals in Ontario may not use social media in their work due to lack of awareness about its benefits and lack of their time in developing the site and updating content (Guiry et al., 2012). For communicating research, social media have been used with lower priority by the scientists and their partners working in the international agri-food sectors, though this situation is recently changing due to expectations and funding for public researchers to communicate their work through social media (Edge, Martin, Rudgard, & Thomas, 2012; Sblijic, 2012).

Privacy, security and proprietary rights: Several studies have raised challenges associated with privacy of information, secure on-line dialogue and discussion and respecting proprietary rights within on-line interactions (Bertot, Jaeger, & Hansen, 2012). Concerns are raised about different types of "cookies" embedded into websites, specifically social media sites like StumbleUpon, Facebook, and Twitter that can collect personal information and track search inquiries and the time spent on each web page, etc. Cookies are automatically encoded so the user cannot know what, when, by whom and for what use their activity is being tracked (Pierson & Heyman, 2011). Facebook and Twitter have free and continuous access to all content that the users post or resend from others' posts including text updates, photos, videos, etc. Copyright issues and policy that prohibits others who have access to the user content (friends, followers, etc.) from using/reproducing the content affect the accuracy, credibility and ownership of on-line content (Parrish, 2010). Users are allowed by many social media services to take data from one website and combine it with data from another, commonly known as *mashup*s. The information management policy of many government agencies usually impose security and accuracy of data, which restricts their use of social media for connecting with those they serve (Bertot et al., 2012).

6.0 Conclusion

Only recently, individuals and organizations in the agri-food and rural sectors are including social media tools in their communication for innovation. It is evident that in the Ontario context, multi-stakeholder platforms and networks have started and will grow both in number and, ideally, evolve beyond classical flows that primarily emphasize information dissemination. Social media do play a role in making information available, but there exists no sufficient evidence, in the context of agriculture and rural development, of their role in building dialogue and taking action to solve problems and innovate. For instance, agri-food and rural stakeholders prefer tools like Twitter that allow short message exchange, instant update of activities, and links to different ideas and opinion. On the other hand, Facebook and blogs have a propensity for emphasizing relationship building and dialogical communication, but these tools are moderately used for giving and receiving feedback that is intrinsic to dyadic communication. Moreover, some forms of media are more often used than others. Video and audio are effective means of demonstrating evidence, new ideas, and stimulating dialogues, yet these

forms of media are not widely deployed and lack of rural connectivity is also likely at fault.

Some stakeholders appear to be slow in adopting social media in their communication processes of interacting with clients. Government agencies, which are influential actors in the agri-food innovation system, have begun to adopt social media as part of their communication strategies. A similar trend applies to other organizations such as producer associations, farm federations, voluntary rural organizations and farmer markets. In addition to the constraints that may be explained by technological, access and capacity challenges, stakeholders are critical about an unbridled use of social media due to concerns related to risk, credibility and benefits associated with time and other resources spent on developing Web 2.0 media. The way forward should be indicative of democratic and user-oriented practices of social media. However, this will apparently require investing more resources for capacity development (in particular, individual skills and organizational learning) that enables Web 2.0 confidence in using and developing appropriate social media applications.

Tracking relevant data and issues raised in this study will continue. Further analysis should include interview methods to identify reasons for the reluctance or a lack of understanding of social media applications for agri-food and rural sectors. There is evidence that individual farmers who use social media are doing so to establish not only their professional networks but also their on-line reputation and business acumen; therefore, positively maintaining their social media interactions is a factor in doing their business well. Agricultural professionals in Ontario overwhelmingly agreed that the government agencies such as OMAFRA are correct to be using social networking tools as part of their communication strategies (Guiry et al., 2012). This study further supports that there is a need to improve the development and use of social media to support innovation processes in Ontario's agriculture and rural sectors.

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