

Usage of Social Networking Tools in Research and Collaboration

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Abstract

Social networking tools have become an integral part of our daily lives. Research and collaboration is an area where social networking tools have been expected to play a major role by revolutionizing the way research is conducted, communicated and disseminated. The purpose of this paper is to explore the actual use of the various social networking services and tools that are available to help researchers work together, and to share resources and results. A two stage approach was employed in this research. Firstly, a descriptive/interpretive approach was adopted to provide an outline of the current and relevant literature with regard to social networking and its adoption in research and collaboration. Secondly, to confirm the initial findings from the literature review an online survey was conducted to elicit the extent to which social networking is used for research purposes in academia. The findings show that 93% of the participants use social networking to support their research collaboration activities for reasons including speed and efficiency. Among these, 56% respondents have used social networking for their research work for more than one year and found that these tools have greatly helped them in building successful collaborative research projects. In contrast, those who are not using social networking indicated reasons including time, privacy, and security concerns. This research can improve researchers' awareness of how social networking tools can be used in advancing the inter-organizational collaboration. This study significantly contributes to literature in the area of using social networking in research and collaboration.

Keywords: social networks, social participation, collaboration, sharing and openness, dissemination of knowledge, crowd-sourcing, social bookmarking.

INTRODUCTION

The concept of the "web" started 1989 with a project by Tim Berner Lee of CERN (European Organization for Nuclear Research) which aimed to create a platform for exchanging ideas and research among scientists. This static, 'read only' web or platform was referred to later as Web 1.0. Since then, this platform has developed and advanced to become more interactive, which gave way to the newer version "web 2.0". In this version of the web, the Internet has evolved from presentations of static Web pages (Web 1.0) to a format of user-interaction and co-creation of digital content. In recent years, the dynamic user-interaction of the web became the base for innovative social networking services such as Facebook, MySpace, YouTube, Twitter, and LinkedIn that quickly became part of our everyday life. With the capabilities that social networking services offer including speed of communication, accessibility, and ease of knowledge-sharing, these services have a great potential to create unprecedented trends in collaborative work (Lefever & Currant, 2010).

Social networks can play an important role to facilitate collaboration and research by allowing the creation of 'special interest groups' and 'communities of practices' and helping to make the communication among the members of such collaborative network better and faster (Wenger et al., 2010).

There is a vast range of social media tools that are specially designed for researchers to improve the way they work. One of the most important tasks that researchers do is to locate, use and disseminate information, and social media offer tools which can facilitate these activities. (Nicholas & Rowlands, 2011) conducted a study on the adoption/use of social media in researching 'life cycle' with the following highlights

- The three most popular social media tools in conducting research are collaborative authoring, conferencing, and scheduling meetings.
- In general, awareness of social media amongst members of the research community is high, but actual use is low.

- Some disciplines (e.g. arts and humanities) are less likely to use social media.
- Researchers under the age of 35 are generally more likely to use at least one social media application than the over 35s.
- The most used social media tools in a professional research context tend to be mainstream anchor technologies or 'household brands', like Skype, Google Docs, Twitter and YouTube.
- The main driver for the take-up of social media is pressure exerted by peers outside the researcher's own institution.
- Time-poor researchers are still unclear about the benefits of social media and this presents a major barrier to their take-up. Researchers also have serious concerns about the authenticity of crowd-sourced information.
- With regard to the dissemination of research, the traditional channels such as journals, conference proceedings and edited books are much preferred over the informal channels such as blogs by both social media users and non-users.

The main question to address in this research is, "How researchers are currently using the wealth of available social networking websites to support collaboration and research activities? Answering this question will provide the following information:

- The social networking sites that are currently used by researchers at academia.
- The social networking sites that are used at different stages of the research life cycle.
- How researchers build their social networks to avoid a) over-complexity; b) inefficient communication; c) noise, and d) exhaustive rather than invaluable? How to decide who to include in their networks as a researcher?

This paper is organized as follows. After the brief introduction, above, the following section sets out the methodology used for this research study, followed by an overview of the social media: definitions, classifications and rate of growth. Types of social networking used in research and collaborations are outlined. The paper concludes with data analysis, findings and discussion.

RESEARCH METHODOLOGY

This research focuses on the following three main steps:

- 1) Define what is meant by the term 'Online Social networks'
- 2) Put forward a taxonomy of social networks
- 3) Conduct a survey on the actual use of the various social networking services and tools that are available to help researchers work together, and to share resources and results.

Obviously, it is difficult, at this point in time, to

propose a state-of-the-art review of social media due to the speed at which the sector is evolving.

In order to achieve the research aims and objectives of this study, authors employed triangulation i.e. different research methods. Hence the researchers conducted a two-stage strategy.

Stage One: consists of the following: firstly, a descriptive/interpretive approach was taken to the existing literature in examining the wealth of information available. Hence, hundreds of international journals, conference proceedings, books, published reports, as well as the online resources of well-known sites, were consulted. Drawing on the existing literature on social networks has served to illustrate the diverse ways in which they are being used across diverse sectors in society. Secondly, an attempt is made to classify/categorise the different social networking sites with regard to the main services/functionalities that they offer. Having set out the main understandings from the literature, the researchers then go on to offer their own taxonomy of social networks. In this classification, the authors offer a comprehensive and coherent list of social networking sites for researchers. Thirdly, preliminary investigations of selected examples of the impact of social networks on business are outlined.

Stage Two: Authors conducted an online survey to investigate the adoption of social networking systems among university/colleges' researchers. Emails were sent to many researchers worldwide, 80 completed surveys were received.

OVERVIEW OF SOCIAL NETWORKS

The Internet has evolved from wired connections to cloud computing, through wireless connections. Social networking tools are part of part of 'Web 2.0'. These tools, as listed in this research paper, have become extremely popular in many countries around the globe. For example, an online survey (Alshabiba Newspaper, 2011) in Oman shows that 56% of the readers are using social networks to express their opinion. In 2006, Forrester Research (Charron et al., 2006) released a report called 'Social Computing', where the authors identified a trend happening online. They named this trend 'groundswell' and defined as "A social trend in which people use technologies to get the things they need from each other, rather than from traditional institutions like corporations".

The groundswell trend includes blogs and member-driven news sites such as digg.com as well as other social networks such as MySpace and Facebook, and user-generated content sites such as YouTube. Tools like Delicious, which lets people see and share their bookmarks with each other, are part of the trend, as are sites like Wikipedia, where people build a content resource together that emerges from a consensus. However, the roots of groundswell reach back before MySpace (Li & Bernoff, 2011). They gave examples

such as eBay, Craigslist, Linux, Rotten Tomatoes and others. Li & Bernoff (2011) introduced the notion of “Social Technographics” as a way to analyse the market’s social technology behaviour. The authors classify technology users into the following groups: *Creators, Conversationalists, Critics, Collectors, Joiners, Spectators* and *In-actives*.

DEFINITION OF SOCIAL NETWORKS

What is the difference between the terms ‘social networks’, ‘social networking’, ‘social media’ and ‘social networking sites’?. Social networks are traditionally defined as groups of people who, for example, share interests and/or activities (Kazienko et al., 2011).

Social networking is the act of participating or interacting with one another within these social networks. If this participation is carried out online i.e. through the world wide web, then these virtual societies are called ‘online social networks’ (Howard, 2008; Cheung et al., 2011; Leskovec et al., 2008). They can also be called ‘web-based social networks’ (Golbeck and Hendler, 2006), ‘computer-supported social networks’ (Wellman et al., 1996) or ‘virtual communities’ (Castells, 2003; Adamic & Adar, 2003). Kazienko et al. (2011) compiled these definitions as outlined in Table 1 below:

Table 1: Definitions of social networks on the Internet (Kazienko et al., 2011)

Social networks	Definitions	Ref.
Computer-supported social networks	When computer networks link people as well as machines.	(Wellman et al., 1996)
Web communities	Web page collection with a shared topic.	(Kazienko, 2007) (Huberman et al., 2009)
Virtual communities	A group of people who are linked to one another by hyperlinks placed on their homepages.	(Adamic & Adar, 2003)
Web-based social networks	In this kind of network the following conditions need to be met: Users must explicitly establish their relationships with others, the system must have explicit support for making connections, and relationships must be visible and browsable.	(Kazienko et al., 2011; Kazienko, 2007)
Online social networks	The definition of an online social network is not really established and different researchers use this term to describe different networks in which people interact with each other by means of different services on the Internet (e-mail, forums, blogs, social networking sites, etc.).	(Donath, 1999; Jung et al., 2007; Lazer et al., 2009; Yang et al., 2006)

Social networking sites are the websites where the

interaction happens (Cohen, 2011; DigitalLikeness, 2008; Musiał & Kazienko, 2012). Many websites could be classified as being ‘social networking sites’. For example, (Ebizmba, 2011) lists the 15 most popular social networking sites as: Facebook, Twitter, Blogger, MySpace, Digg, Ning, Google+, Stumbleupon, LinkedIn, Second life, YouTube and Flickr, Tagged, orkut, hi5, myyearbook, Meetup, Badoo, bebo, mylife, Friendster.

Social networking sites deliver content through communication, collaboration/authority-building, multimedia, reviews and opinions, micro-blogging, publishing, photo sharing, entertainment and brand monitoring (Bard, 2010). Bard proposed techniques and technologies such as aggregators, audio, video, live-casting, RSS, mobile, crowd-sourcing, virtual worlds, gaming, search, conversation apps and Wikis.

Another definition of social networking sites was given (boyd & Ellison, 2007):

“web-based services that allow individuals (1) to construct a public or semi-public profile within a bounded system, (2) to articulate a list of other users with whom they share a connection, and (3) to view and traverse their list of connections and those made by others within the system.”

However, there are also differences between the terms ‘social media’ and ‘social networking sites’. Cohen lists 30 definitions for social media that have been articulated by many other researchers (Cohen, 2011). (Kaplan & Haenlein, 2010) define social media as *“a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user-generated content”*. Hence, we can say that social media is just like other media, a means of communicating and exchanging information. Social media offers the opportunity to create or disseminate facts, opinions, arguments etc. in many forms (video, audio, image, text) i.e. the social media platform provides the tools for self-expression in various forms. Groups of people with common interests are associated together on social media (SocialMediaToday, 2010).

Clearly the terms ‘social networking sites’ and ‘social media’ are used interchangeably. Therefore, we will consider them as having the same meaning and, for simplicity, throughout this paper we will use the term ‘social networks’ to reflect this new phenomenon and ‘social networking sites’ when we are specifically talking about websites, tools or applications.

SOCIAL NETWORKS CATEGORIES /CLASSIFICATIONS

The Web 2.0 technologies helped in shaping the Web currently in use. There are numerous social networking sites. They have been classified or

categorized or taxonomized in different ways. (Shrivastava et al., 2011) discussed the major Web 2.0 services and applications, grouping them into blogs, wikis, tagging and social bookmarking, multimedia sharing, audio blogging and podcasting, RSS and syndication and social networking. (Kietzmann et al., 2011) discussed about social media functionality and introduced a term 'honeycomb' of social media as it relates to business. Their categories are: 'sharing', 'presence', 'relationships', 'reputation', 'groups', 'identity', and 'conversations'. Similarly, (Nicholas & Rowlands, 2011) come up with the following categories: social networking, blogging, microblogging, collaborative authoring, social tagging and bookmarking, scheduling and meeting tools, conferencing and image or video sharing. (Communities.gov.uk, 2008) put forward the idea of categorizing social networks based on the categorization developed by Digizen: profile-based social networks; content-based social networks; white-label social networks; multi-user virtual environments; mobile social networks; micro-blogging/presence updates; social search; local forums; thematic websites. Many other researchers and practitioners (Kassel, 2011; Anderson, 2007; Safko, 2010; Culnan et al., 2010; Digizen.org, 2011) also explained the categorization of social networks.

Based on a systematic literature review of social media arena this study yielded a categorization/classification that is based on the functionality of social networks. Figure 1, illustrates preliminary taxonomy or classification of social networks as it exists today.

Obviously there are different categories of social network and each category contains a large number of social networking sites that, in many cases, are still increasing in number, but which perform similar or slightly different functions. Furthermore, each social networking site provides many services that address different needs of both people and organizations, and the functionality of each site can overlap with another. Indeed, over a period of time we observed a kind of convergence in the proposed services. For example, the 'gaming' category has a number of social networking sites that might be considered as part of the 'virtual world' and vice versa. Similarly, Facebook, MySpace and LinkedIn can be used to promote research, innovation and collaboration among researchers as well as business managers. Hence, different researchers might come up with slightly different classifications.

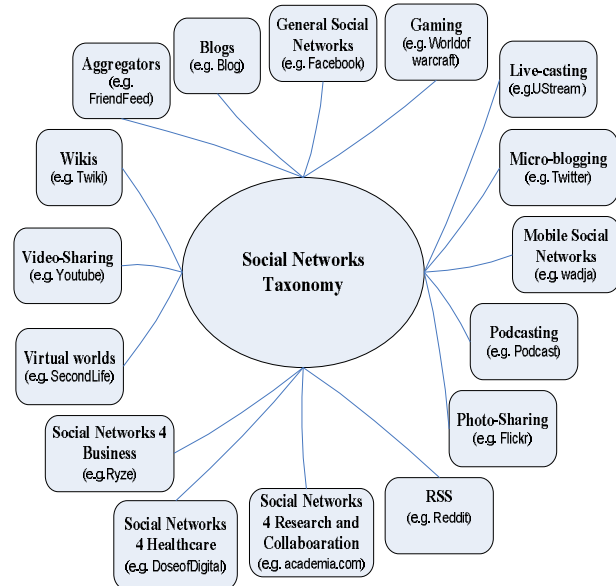


Figure 1: Preliminary Taxonomy of Social Networks

As it has been noted by (Culnan et al., 2010), businesses can utilise 'virtual customer environments' (VCEs) to form online communities of interest around firms, brands or products. Thus, many of the above-listed social networks are for different purposes such as social marketing, customer feedback, the monitoring of competitors and market research etc.

Some new social networking sites provide a large spectrum of services, such as Google +. Any new service proposed by one provider is immediately taken up by others, certain features of the service being changed slightly for copyright reasons. For example, 'Circles' in Google+ was immediately followed by 'Groups' in LinkedIn, 'Networks' on Ryze, and 'Lists' in Facebook.

New services generate new needs for users. For example, Facebook allows users (customers) to have one list of all contacts. This worked fine at the beginning, but then another need was generated in which users/customers wanted to have different lists for different purposes such as Friends, Family, Acquaintances, Following, and Followers. Any person or organization can now create a group to meet their own needs and requirements.

(Dawson et al., 2010) proposed student social network which can be utilized in research and collaboration. According to (Nicholas & Rowlands, 2011; REBIUN, 2011) social networking tools that are designed for the purpose of research and collaboration can be classified into three main categories, each with subcategories, as outline below:

1. Sharing research
 - Scientific social networks, databases and platforms.

- Collaborative authoring (file sharing, and online storage).
 - Mind-mapping and crowd sourcing.
 - Online surveys.
 - Social Search.
 - Conversation, communication and video conferencing applications.
 - Presentation sharing tools.
 - Project management, meeting scheduling and collaboration tools.
2. Sharing resources (tagging, bibliography, bookmarking and citation tools)
 3. Sharing research results
 - Reading and publishing tools.
 - Scientific news services.
 - Open access.

Figure 2, elaborates on this, and more details with examples and descriptions can be obtained from the authors.

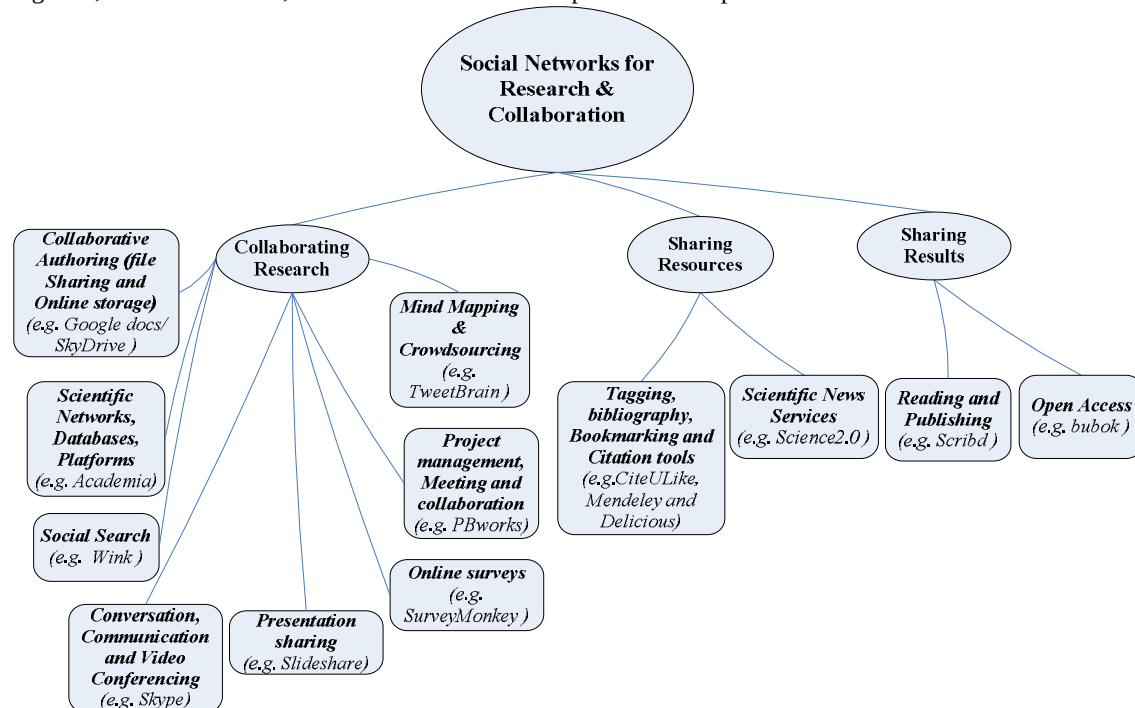


Figure 2: Social Networks for Research and Collaboration

GROWTH RATE OF SOCIAL NETWORKS

The social networks have grown rapidly and, as a matter of fact, there is massive growth both in the number of social networking sites and their functionalities. In fact, people have difficulty in choosing amongst the large number of sites and their different combinations of functionalities. Indeed, it is easy to find comparisons of products (e.g. when you want to buy a new car or TV), but such a comparative evaluation of social networking sites has to be developed. Authors are trying to provide a guideline to social networks. The difficulties of such an analysis arise from the facts that (1) new social networking sites appear almost each day, (2) all social networking sites evolve continually (are modified or new features are added), and (3) the size of the population using social networking sites is increasing exponentially. Table 2 provides a snapshot of the population of some well-known social networking sites (SNs).

The popularity of each social networking site changes according to the features/services provided by that site in comparison with other sites. This study also highlights the fact that some social networking sites experience more growth than others in the number of active users; for example, Facebook (which, if it was a country, would come third in the world in terms of population), Google+ and LinkedIn, while some other sites such as Elluminate (www.illuminate.com) have ceased to exist, and DimDim (www.dimdim.com) which has been acquired by Salesforce.com. Table 2 shows the growth of some social networking sites has increased considerably in a small span of time. In some cases users more than doubled between late 2011 and very early 2012, as with Google+.

Table 2: Populations of Some Popular Social Networks

SNS Name	Year Created	Created by	Description/Focus	Population (active Users) Million (in 2011)	Population (active Users) Million (in 2012)	Ref.
Facebook	2004	Mark Zuckerberg	General social networking site	800	900	(Facebook, 2012)
Twitter	2006	Jack Dorsey	Mobile social networking site, Micro-blogging	200	300	(Twitter, 2012; Aevermann, 2010)
LinkedIn	2002	Reid Hoffman	Business and professional	135	150	(LinkedIn, 2012)
MySpace	2003	Chris DeWolfe and Tom Anderson	General social networking site	100+	-	(MySpace, 2012)
Google+	2011	Larry Page and Sergey Brin	General social networking site	50+	170	(Google+, 2012)
Plaxo	2002	Justin Miller	Aggregator, address book	15	-	(Plaxo, 2012)
Bebo	2005	Michael Birch and Xochi Birch	General social networking	117	-	(Bebo, 2012)
Baboo	2006	Andrey Andreev	General social networking site	86	133	(Baboo, 2012)
Flickr	2004	Ludicorp	Image/Video	32	-	(flickr.com, 2012)
delicious	2003	Joshua Schachter	Social Bookmarking	8	-	(delicious.com, 2012)
Orkut	2004	Orkut Büyükkökten	General social networking site	100	-	(Orkut.com, 2012)

Table 3: Growth of different Media/Tools

Media/Tool	Years to reach 50 million users
Radio	38
TV	13
Internet	4
iPod	3
Facebook	<1

Clearly, as Table 3 shows, social networking populations have been growing fast, especially when compared with growth in use of other media/tools in recent history. For example, Facebook added over 200 million users in less than a year, and iPod application downloads hit 1 billion in 9 months (Totalprofit, 2012).

The fact that each social networking site has different features and that some of them regularly expand their features and functionalities makes it difficult for both individuals and groups to choose a specific social networking site and, as a consequence, people tend to register (belong) to several networking sites to satisfy different needs ('Flickr' for photos, blogs for discussion, 'delicious' for bookmarking and 'ResearchGate' for communicating to a research community and so on).

DATA ANALYSIS

The data collected from the surveyed of researchers from around the world was analyzed using descriptive analysis in order to uncover some of the most important trends. The total number of completed questionnaire were 80. The following table shows the demographic distribution of the sample:

Table 4: Demographic details

Items	Percentage	
Gender	Male	72.5
	Female	27.5
Age group	18-25 years	3.75
	26-35 years	37.5
	36-45 years	41.25
	46-55 years	10
	Above 55 years	7.5
Education	Bachelor	5
	Master	63.75
	Ph.D.	27.5
	Others	3.75
Computer and internet skills	Novice	0
	Low	7.5
	Medium	22.5
	High	52.5
	Expert	17.5

Approximately 73% participants were male whereas remaining were female. Around 79% participants belonged to middle age group (26-45 years) which reflects the inclination of middle age group people towards social networks. Majority of the participants (64%) hold a Master's degree. Since the majority of the participants are highly educated, the computer and internet skill level of the sample is mostly in the high-expert level (70% of respondents).

Out of the sample, there were around 93% respondents who were using social networking systems. Among those, around 56% respondents are using social networking for their research work for more than 1 year. There are four main reasons behind using social networking including "family and friends", "news and media", "research" and "chat". The priority of respondents goes to "family and friends" whereas "research" comes on third rank. There were four main types of social networks "

general social networks”, “blogs”, “online surveys”, and “News, RSS, etc...”. This enlisting is based on the priority of the respondents. The four main types of social networks used for research and collaboration, as ordered by the sample, are “Facebook”, “YouTube”, “Wikipedia”, and “Google docs”. In addition, the four main reasons of using social networks for research and collaboration are “explore ideas”, “collaborations with researchers”, “conversation and communication”, and “share documents”. These are ranked tools based on the sample responses.

Table 5: Impact and usage of social networking systems

Items	Percentage
User of social networking systems?	Yes 91.25
	No 8.75
Duration of using social networks for research.	Less than 1 year 22.5
	Between 1 and 2 years 20
	More than 2 years 36.25
	Did not respond 21.25
Four main purpose of using social networks	Family and friends 22.13
	News and media 18.85
	Research 17.21
	Chat 12.70
Four main types of social networks	General social network 23.46
	Blogs 11.19
	Online surveys 10.46
	News, RSS, etc... 9.38
Four main types of social networks used for research and collaboration.	Facebook 10.51
	YouTube 9.11
	Wikipedia 7.71
	Google docs 7.47
Four main reasons of using social networks for research and collaboration.	Explore ideas 22.51
	Collaboration with researchers 16.45
	Conversation and communication 16.45
	Share documents 15.58

Main Reasons for Not Using Social Networking

Based on the responses gathered from survey, it was found that there are three top reasons for not using social networking systems, which are:

- Time concerns
- Privacy concern
- Security concern

Main Reasons of Stopping the Use of Social Networking

Based on the analysis, it was found that some people stopped using social networking due to following reasons:

- Time concerns
- Privacy concern

Usage of Social Networking in Research Life Cycle

When the researchers investigated the usage of social networking in the research life cycle, it was observed that it has limited use of the social networking sites that are dedicated for research and collaboration.

Most of the researchers are using online surveys for data collection purpose.

Social Networking Systems Help Individual Researchers

When the researcher asked the following question “How do you think the Social Networking Systems help individual researchers?” The participants listed the following ranked reasons:

- Enable researchers to communicate with other researchers and stakeholders faster and more easily
- Enable researchers to conduct online surveys
- Provide a wealth of information
- Enable researcher to store their work on the cloud and access it anytime, anywhere

Social Networking Systems Can Support Collaborative Research

When the researcher asked the following question “How do you think the Social Networking Systems can support collaborative research? The participants listed the following ranked reasons:

- Enable communication between collaborate researchers and other stakeholders faster and more easily
- Enable researchers to conduct online surveys
- Provide a wealth of information
- Enable researchers to share documents
- Enable researchers to store their works on the cloud and access it anytime, anywhere

Social Networking Systems Help in Becoming a Better Researcher

When the researchers asked the following question “Do you think that Social Networking Systems will help you to become a better researcher?” Majority of the participants (55%) answered positively.

FINDINGS AND DISCUSSION

Instances of use of social networking tools and services for the purposes of research are quite few. The application of these tools in research is still in a nascent stage and the nature and frequency of use can be considered modest in terms of maturity and formality. The reluctance to use the tools may be attributed to the perception of social media as a means of entertainment and not for professional research work. Moreover, researchers who participated in the survey view social networking as a complement to traditional means of communication such as email instead of a substitute. As regards the choice of social media as an alternative means of publishing research work, respondents showed a preference to adhere to traditional publishing channels including journals and conference proceedings. Some, however, mentioned open access publication as a preference for publication.

Although researchers expressed interest in file-sharing and online storage tools, including Software as Service (SaS), they seemed to be concerned regarding the privacy and security of such services. In general, younger researchers showed a greater familiarity with the use of these tools and the associated capabilities, for example, rapid and unconstrained dissemination of ideas, discussion, findings and feedback. One of the concerns associated with the adoption of these tools and services was that their rapid development and proliferation made it hard to keep track of them and to assess them properly. Issues such as trust, quality and promotion were also stated as concerns by some researchers.

CONCLUSIONS

In spite of numerous developments in the use of social media offering more diverse functionalities and services, social media and open research are not yet widely adopted in scholarly research and publications. However, based on current trends, social media is likely to evolve and mature and to be used to greater degree in conduct of research and its publication. At present, social networking and its related tools and technologies such as online surveys and file-sharing, are primarily employed to reach wide audiences of research participants. Further, the current trend of using social media as supplement to rather than a replacement for the traditional way of publishing is expected to continue. Considering the fact that the social networking application in research is yet in a nascent stage, it may be difficult to project the growth of the use of social networking tools. Moreover, the alternative uses of these technologies have not been explored. As more and more first movers adopt and promote the use of these technologies, and the technologies continue to be used for a range of research purposes, the chances of greater acceptance and its inclusion in the mainstream research methodology toolkit would increase. The limitation of this study includes that this research is more exploratory in nature.

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