SHARING KNOWLEDGE INSIDE SOCIAL NETWORK SITES

Georgeta DRULĂ[*]

Abstract

 (1) The virtual communities are increasingly numerous. The understanding of virtual community structure, functionalities and dynamics show us how to act in the sense of practice and in the benefit of organization and own person. The practice directions are creation the communities-of-practice, the virtual collaboration, and knowledge management. The purpose of this paper is to identify a model of a virtual community used in Romania and the activities in the social networks sites that are important to generate knowledge and information sharing and to develop new relationships, as well. (2) The research outcomes provided on a model used in the virtual community show us whether knowledge sharing has a support in the reality. One of the objectives of this paper is to verify that the intense activities in communities equates with knowledge sharing. This paper presents a comparative analysis of social networks sites, the most commonly used in the Romanian space: Hi5, MySpace, FaceBook and LinkedIn. The study uses several independent input variables and follows as output two factors: sharing knowledge and developing new relationships in the virtual community. The input variables are: information identifying the person and degree of trust in the social network site and in the community members. The information identifying the person suggests the relationship public – private, different self-presentation styles and the identification of behaviour in cyberspace.

Keywords: *social network sites, knowledge management, virtual communities, knowledge sharing activity, social browsing,*

Introduction

(1) – The issues covered by the paper

Issues covered by the paper refer to the model and the characteristics of the social network sites used by the Romanian users. The paper makes a comparison between social network sites (SNS) used by certain criteria, and aims to answer questions about the importance of virtual communities and social networks, identifying the characteristics and practices used by them. Research is focused on:

- Identification and analysis of social network sites used in Romania (or in Romanian);
- Identify the reasons for adherence to a social network site;
- Identifying opportunities to increase online visibility, create or strengthen an online reputation using SNS,
- Determining how to develop new relationships in the virtual environment.
- Sharing of knowledge.

(2) – The important issues.

Sites social networking (SNS) is a type of virtual community with a specific trend. Web 2.0 technologies have facilitated the development of virtual communities, even speaking community 2.0. Communities such as Flicker, Facebook, Myspace or Del.icio.us are famous today. These communities have rules and a culture of its own. They involve the participation of the members and a specific behavior to change or share information and knowledge between them. Using social networks sites for academic and research is a new way of communication. It is based on different technological conditions, different interests, diverse cultures and, own practices. Diversity provided by the technological support allows the use of information and various communication

tools such as: blogging, video and photo sharing. These opportunities have attracted millions of users around the world.

Increased recognition by defining personal online profile and reputation is an end in itself for some members of the community participating in the virtual social networking sites. Reputation is measured by the community and is consistent with the sharing of knowledge and value-add information. Getting a sense of efficacy is another reason that urges users to participate in an online community. They can participate by adding information or use this information for future research. All these are related to several factors taken into consideration by different authors in the analysis of SNS, such as: "trust" in the SNS, "trust" in the community, privacy, motivation and barriers to participating in a virtual community, sharing information within the community, the density of activities in the community.

(3) – How to respond to these issues?

When people participate in such a site, they build a profile and make connections to other network members. Profile is a list of identification information. It may include real or imagined data, as they are provided by the author. Members connect with each other by sending messages with multimedia content. The connection is established only after the other party accepts the invitation. The connection provides access to the "friend" profile and then build the own social network. The main reasons of using the SNS are those: to communicate, to send invitations to events, pictures, to launch various social campaigns or to make you known. Finding answers to problems studied are based on observation of virtual communities from social networks sites Hi5, FaceBook, MySpace and, LinkedIn, most used in Romania, collect data through a questionnaire and analysis of data correlations. The model used for data collection and their analysis, consider the variables:

- Privacy,
- trust in the members,
- trust in the SNS,
- Density of activities in the SNS,
- Motivation to participate in the SNS,
and obtaining the outputs:
- Knowledge sharing and
- Developing new relationships.

The model used in the paper shows how to link these variables with the results in the SNS, and how to measure these results.

(4) – The relation between the paper and the already existent specialized literature

Issues of trust and privacy in the SNS are addressed by many papers published in specialized journals. And many interesting studies related to the SNS due to Boyd. Until now, researches conducted on sites of social networking and sharing of knowledge pursue the matters of network relations performance, the models of communication within SNS and the problems of privacy and user profile.

All these aspects are related to researches on certain social networks sites which are representative on a virtual space, and on some users who live in a real space (country, continent, geographical area). The paper pursues Romanian cyberspace and users from Romania, using specific criteria.

Literature Review

Increasing the number of sites of social networks shows some changes on virtual communities. Thus, while virtual communities are grouped together by certain interests (themes,

topics), sites of social networks are primarily organized around people and not interests. Online communities are organized more as discussion forums, well-structured after a certain theme or in accordance with a hierarchy of topics. Social networks are built from nodes (individuals or organizations) that are linked with each other in different interdependencies, such as friendship, etc. In the sites of social network, structured as a network of people, the individual is the center of the community. Figure 1 shows this relationship. The characteristics of sites social networks have introduced a new organizational framework for online communities and a new context for researches.

Community -------------------> interests (themes, topics)

Social networks sites (SNS) --------------------------> (persons, individuals)
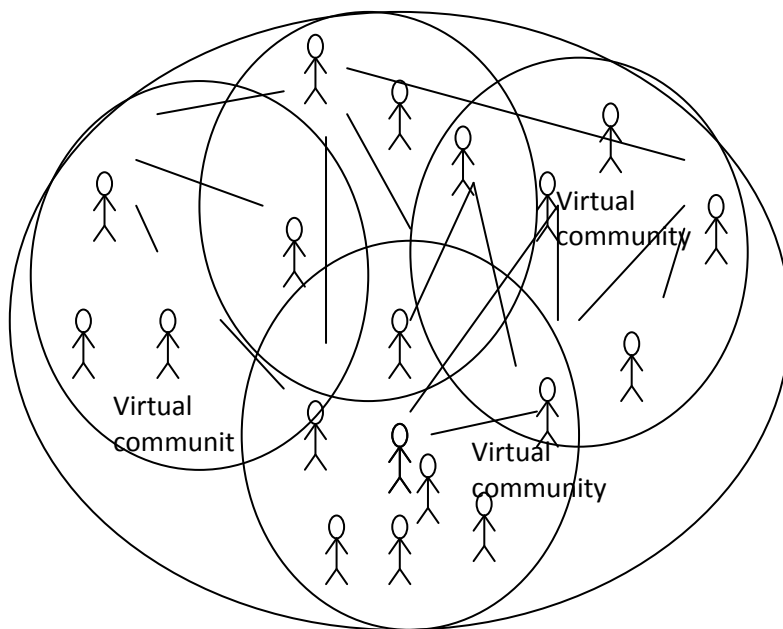

Fig. 1 Virtual communities and sites of social networks

The definition reference used for studying social network sites is given by Boyd (2007). This defines the social networking sites (SNS) as Web services that have the following characteristics:

(a) - allow users (individuals) to build a profile within a system,

(b) - establish a list containing other users with whom to communicate,

(c) - view and scroll through lists of connections in the system. Nature and name of the connections may vary from system to system.

Until now, researches conducted on sites of social networks pursue some aspects, such as:

- performance of relations within the network;
- networks and structures of networks;
- online and offline connections in the social network;
- Problems related to private data and to data of user profile;

- social searching vs. social browsing;
- creation and management of tags (social tagging) to record and classify a particular content. Tags are metadata, descriptive words (keywords) assigned to a particular content (photo, web page, article, book, email, post, theme, bookmark, etc.).

Other studies are designed to study motivations and barriers that determine participation in a virtual community. Obstacles or barriers to knowledge sharing in the SNS are determined by ownership of knowledge and that people get credit for the production of knowledge, not because they change with others. Thus, a study of Alexander Ardichvili, Vaughn Page and Tim Wentling (2003) shows those participants in a community will be better motivated and will share knowledge, if they see this knowledge as a public good that belongs to the entire organization. However users (whether employees of an organization) have hesitation in this regard (to share knowledge) for fear of criticism or fear of misleading the community members because they are not sure that the information is important or relevant. To lift these barriers, the authors suggest that it takes a certain "trust" between community members. On the other hand, the most important reasons why users participate in these networks, given from different studies are:
- Inviting people to special events,
- Posting of advertisements,
- The performance of daily activities or work, such as communities of specialists, for example sciencestage.com,
- Campaigns for social causes, environmental, or philanthropic,
- For fund raising events,
- Participation in professional communities (online community college).

Issues of "trust" and "privacy" in the SNS are addressed by several papers published in specialized journals. Thus, "trust" is defined by Mayer, Davis, and Schoorman (1995) as a desire of a part to be accessible to the other. To communicate face-to-face and online as well, and to have a successful interaction, the "trust" factor is determinant to share information and to develop new relationships, most authors argue. This problem belongs to e-commerce networks and online marketing. Of time, the SNS has faced numerous problems of "trust" published in the press or even checked for its members. It is possible to trust hundreds, thousands or millions of people in an online network? A research made by Dwyer et.al. (2007) for two well-known SNS, Facebook and MySpace, compare features private / public and modes of interaction in order to share information and develop new relationships with members of an online community. Results of this research suggest that in the online interaction, the "trust" factor is not absolutely necessary to build a new virtual relationship. The same comparison shows that in the SNS, "trust" and a willingness to share information are not automatically transformed in new social interactions.

The problem of "privacy" in the SNS is not clearly defined. Thus, SNS record all interactions and keep them for their use in the social data mining. Thus, these sites should have explicit policies on data protection. Studies made on the Facebook show that its members give lots of information about their very real life and are not concerned with "privacy" (Acquisti and Gross, 2006). Other studies show that (Awad and Krishnan, 2006) users are more concerned about the privacy of their personal information and less of the protection of information.

Numerous studies related to SNS due to Danah Boyd (2004, 2006, 2007, 2008). Thus, in his research, Boyd has used an ethnographic method to demonstrate how SNS members create a profile with the intention to communicate. A SNS focused on the students, Facebook, has a large expansion to the organizations, in the present. Facebook has enjoyed numerous studies until now present (Acquisti and Gross, 2006, Lampe, Ellison, and Steinfield, 2007). These studies have

collected data about profiles of members through a web crawler or directly from network members.

Theoretical Background
• **Selecting SNS for comparative study**
Comparative study was based initially on identifying the significant SNS for Romanian cyberspace.

According to data provided by the traffic site Alexa.com, in March 2009, at the "Social Networking" category, using "popularity" criterion, the ranking for Romania is as follows: FaceBook, MySpace, Hi5, Tagged.

Table 1: Most used SNS in Romania

SNS	URL	Alexa.com, traffic rank	Number of users
1. Facebook	www.facebook.com	**5**	- with a number of users in Romania less than 0.5%
2. Myspace	www.myspace.com	**8**	- with a number of users in Romania less than 0.5%
3. Hi5	www.hi5.com	**17**	-number of users in Romania - 5,2% - number of users in USA - 5,3%
4. Flickr	flickr.com	**33**	- with a number of users in Romania less than 0.6%
5. Skyrock	www.skyrock.com	**44**	
6. Friendster	www.friendster.com	**47**	
7. Tagged	www.tagged.com	**72**	- number of users in Romania - 0,9% -number of users in Germany - 0,8% -number of users in Italy - 0,7%
8. LiveJournal	www.livejournal.com	**87**	
9. Orkut	www.orkut.com	**98**	
10. Fotolog	www0.fotolog.com		
11. Bebo.com	www.bebo.com	**124**	
12. LinkedIn	www.linkedin.com	**146**	
13. Multiply	multiply.com		
14. Ning	www.ning.com	**181**	

Each SNS have certain geographical areas where they are used mainly. Compared with other countries, according with the data from Alexa.com, we can notice that SNS are not very much used in Romania. Most used SNS in Romania include: Facebook, MySpace, Hi5, Tagged and LinkedIn. The same preferences of the users have resulted from analysis of the questionnaire.

A Romanian traffic site, trafic.ro, put in the better position the Hi5.ro site with 110.000 members.

Sites of social networking explored in this paper are: **Facebook, MySpace, Hi5, LinkedIn and Tagged.** User profiles on SNS sites in Romania shows a population between 20 and 40 years. The sites chosen for Romania have similarities and differences, and are addressed to the same type of audience, and as concerns age.

- **The model used**

The theoretical model chosen allowed the collection of data and their analysis. This model takes as input variables, the following factors:

- privacy,
- trust in the community members
- trust in the SNS,
- type of SNS,
- density of the SNS activities,
- motivations to communicate in the SNS,
- barriers to communication in the SNS,

seeking to obtain as outputs the following results:

- knowledge sharing,
- developing new relationships within the community and the site of social networks,
- defining how the variables affect the sharing of knowledge and the developing of new relationships. Measurement of variables consistent with sharing knowledge and developing new relationships.

This model was supported and the application of a questionnaire for users of social networks sites in Romania. The questionnaire included questions that have led to conclusions about the variables and the outputs of the model.

The questionnaire applied users includes questions related to variables:

- Which type of SNS is used?,
- **(motivation, type and density of activity)** motivations to work with a SNS,
- **(motivation, privacy, users)** affiliation with an institution of higher education,
- **(trust in the members of SNS)** motivating the trust in the community members to which it belongs,
- **(trust in the members of SNS)** type of information released in profile: pictures, real name, home address, email address, mobile number, marital status,
- **(trust in the members of SNS)** the type of connexion with people from SNS (strangers, persons known from face to face communication, email, or phone)
- **(trust, privacy)** declaration the information in SNS is real or fictitious,
- **(density of activities)** frequency of use of SNS in each day, week, month,
- **(type and density of activities)** topics treated in SNS,
- **(type and density of activities)** to resolve issues and to communicate with colleagues, students use SNS more/less then groups or discussion forums,
- **(trust in SNS)** users prefer: face to face communication, email, phone, or SNS?,
- **(trust in SNS)** the users' connexion on SNS (which SNS) is initiated in reality?,
- **(obstacles to communicate in a SNS)** reasons for limited or no use of SNS.

CHARACTERISTICS OF USING SNS
Outputs of the model used

The questionnaire subjects were students, users of the SNS. Analyzing data and the correlations between them in this paper have the following result:

- Tagged and MySpace are two SNS, not much used by students. The most popular are Hi5 (percent majority), Facebook and LinkedIn.

- Absolutely all persons stated that "above all read messages in SNS than writing messages". This variable indicates that the density of activities in the SNS is low. The participation is shy, being stopped often, only with creating the profile. Creating the list of connections and effective communication is off.

- In SNS used, 66% of users say they have create real profile, at least with their real name.

- Network access is done in most situations, especially weekly. The frequency of use does not show a density of activities in SNS.

- Over 50% of answerers, whatever the network used, say that they do not prefer the SNS instead of email or communication through group discussions with friends. This variable shows little trust in using the SNS.

- The answerers also say that participating in the SNS both for sharing information and developing new relationships. For all SNS used the situation is the same.

- As a barrier to communication in the SNS, the predominant motivation which is brought is lack of trust in the community members. Conclusion drawn from the fact that most users establish connections especially with people they know initially outside the SNS, from reality.

In terms of outputs followed by the model, this research shows that members of the Hi5 network share more information, and Facebook and LinkedIn networks are better for developing new relationships between community members. The outputs suggest that "trust" is required to develop new relationships in the online environment. In all SNS used by the students, are managed relationships initiated face-to-face.

Analysis of correlations put highlights the link between inputs and outputs.

SNS	Number of users	Real profile, real name	Density of activities - Read more messages than write.	Frequency of access	Trust in the SNS - especially use mail and discussion group, not SNS	Communication is initiated in reality.	Information and knowledge sharing	Developing new relationships in SNS	Mistrust in SNS	Mistrust in the SNS members
Hi5.com	79%	66 %	100%	20% - daily, 40% weekly, 26% monthly.	60%	66%	57%	40%	40%	72%
Myspace.com	-	-	-	-	-	-	-	-	-	-
FaceBook.com	32%	66 %	100%	30% daily, 30% weekly, 16% monthly	47%	62%	52%	68%	64%	66%

SNS	Number of users	Real profile, real name	Density of activities - Read more messages than write.	Frequency of access	Trust in the SNS - especially use mail and discussion group, not SNS	Communication is initiated in reality.	Information and knowledge sharing	Developing new relationships in SNS	Mistrust in SNS	Mistrust in the SNS members
LinkedIn.com	52,60%	100%	100%	10% - daily, 50% weekly, 10 % monthly.	43%	58%	40%	62%	38%	80%
Tagged.com	-	-	-	-	-	-	-	-	-	-

Although they have an account SNS, most answerers said that they have not trust in this mode of one-to-many communication, explaining that this conversation seems to be not addressed them directly, and that do not obliges them to respond as mail or in discussions groups. Others have made more SNS accounts, between 2 and 6, but their frequency of use shows that users are only at the stage of creating the profile and creating a connections database, the work itself, the message sharing practically don't exist.

The most important reasons for choosing and connecting to a SNS, checked in the questionnaire are: communicating with friends, finding a job, sharing impressions and hobbies. Although, many statements say that participation in a SNS is due to "knowledge sharing", there is a small stream of information to justify this. At this time, students use social networks as an own experiment, but they seek a connection, a strong reason to work with them. These facts indicate that is a low trust in SNS, but also in community members, most members reading messages passively without reply or start a topic of discussion. There is a small percent of students who said that they did not have any account in a SNS, they do not know what is it and they were not interested in taking up this issue as a means of communication, until now. Others said they were an account on a SNS, but some incidents have led them to close the account: data profile changed, topics lightly treated, slow loading files, lack of feedback from "friends" who remain just a list of connections. The conclusion of this approach shows that SNS websites are now a hobby for the students, in which talk about other hobbies. Others give as examples of other SNS used other categories of sites with collaborative and participatory activity, as Twitter and LastFM. The fact that a majority percent of answerer say that they more read than write messages in SNS, show us that this method of communication is very "passive", "superficial", "devoid of interactivity", and that the facilities offered by these sites are not operated enough. These issues show us that the knowledge sharing and developing new relationships through SNS are not seen as advantages by the users - students interviewed.

Conclusions

(1) – General results.

The findings show that only some of SNS can do sharing of knowledge and information based on trust and can develop specific topics of interest. The SNS may have success if they are used in academia. In students' community, Hi5 is a structure open to the public, without rules of behaviour and with a wealth of tools that members use them to leave clues. LinkedIn has small work spaces and interactions are less intense. SNS with greater trust of the public are: Hi5, FaceBook and LinkedIn. All sites have reported similar levels regarding privacy, and all members said that "trust" is very important for online communication.

(2) - The implications of the results.

Topics of SNS are not always relevant, are more exchanges of mail messages without adding value to the initial information. Issues of "trust" and "privacy" are not completely understood, and motivations for communication in a SNS are not very relevant. Professionalizing the using of SNS is still at the beginning. Reduced activity on the SNS in the Romania is caused by a lack of motivations and this is an important factor that does not allow to share knowledge and to develop new relationships.

(3) - Suggestions for future research.

These studies encourage further research about the motivations of participation in an SNS, the choice of SNS, and of using it in a professional environment where initial information receives an added value.

A challenge in research could be creating and sharing of knowledge in a professional virtual community, such as teachers or researchers or business people. It is interesting to follow the flow of knowledge between community members from different organizations and how to change the knowledge in a professional virtual community. A future direction is to identify what particular kinds of knowledge are changing in the virtual professional communities.

Another direction of interest is linked to the motivations and barriers that determine participation in a virtual community. Linked to this problem is discussed how to promote knowledge sharing and how to remove obstacles to knowledge sharing in a SNS. An intuitive answer is that, through discovery and innovation, but these things must be proved.

Relationship between social networking - social browsing - social bookmarking observed in the SNS can be researched in detail to share knowledge on various communities.

References

1. Acquisti, A. and Gross, R. (2006), „*Imagined Communities: Awareness, Information Sharing and Privacy on the FaceBook*", Proceedings of the 6th Workshop on Privacy Enhancing Technologies, Cambridge, UK, 2006
2. Adamic, L., Buyukkokten, O., and Adar, E. (2003). *A Social Network Caught in the Web*. First Monday, 8(6). http://firstmonday.org/issues/issue8_6/adamic/index.html
3. Adamic, L. and Adar, E. (2005). *How to Search a Social Network*. Social Networks, 27(3), 187-203.
4. Adamic, L. and Adar, E. (2003). *Friends and Neighbors on the Web*. First Monday, 8(6).
5. Alemán, AMM, and Wartman, KL, (2008), *Online Social Networking on Campus: Understanding what Matters in Student Culture*, http://books.google.com/books?hl=en&lr=&id=GH4KOM3MS-sC&oi= fnd&pg=PR9&dq=%22SHARING+KNOWLEDGE%22+%2B+%22social+networks+sites%22&ots=g hpJnrkdQO&sig=vMu_p4f-sP9wPa0wPjamas8-htM, accesat, march 10, 2009
6. Ardichvili, A.; Page, Vaughn and Wentling, Tim (2003), *Motivation and Barriers to Participation in Virtual Knowledge-Sharing Communities of Practice*, Journal of Knowledge Management, volume 3, issue 1, page 64 – 77, http://www2.warwick.ac.uk/fac/soc/wbs/conf/olkc/archive/oklc3/papers/id78.pdf, accessed June 12, 2008
7. Awad, N. F. and Krishnan, M. S. (2006), *The Personalization Privacy Paradox: an Empirical Evaluation of Information Transparency and the Willingeness to be Profiled Online for Personalization*, MIS Quarterly, Volume 30, Issue 1, http://www.misq.org/archivist/vol/no 30/issue1/AwadKrishnan.html, accessed November 25, 2008
8. Boyd, D. (2006), „*Friends, Friendster and MySpace Top 8: Writing Community Into Being on Social Network Sites*", First Monday 11:12, December. http://www.first monday.org/issues/ issue11_12/boyd/index.html
9. Boyd, D, M., Ellison, N. B. (2007). *Social network sites: Definition, history, and scholarship*, Journal of Computer-Mediated Communication, volume 13, issue 1, article 11, pages 210 – 230, published online, December 17, 2007, http://jcmc.indiana.edu/vol13/issue1/boyd.ellison.html, accessed April 20, 2008
10. Boyd, J. (2002), In community we trust: Online security communication at eBay, Journal of Computer Mediated Communication, volume 7, issue 3
11. Dosh Dosh blog, *48 Social News Websites: A List of General and Niche Social Media Communities*, http://www.doshdosh.com/list-of-social-media-news-websites/, accessed, May 12, 2008
12. Dwyer, C. Hiltz, S. R., Passerini, K., (2007) *Trust and privacy concern within social networking sites: A comparison of Facebook and MySpace*, Proceedings of the Thirteenth Americas Conference on Information Systems, Keystone, august 2007
13. Fu-ren Lin, Sheng-cheng Lin and Tzu-ping Huang , (2008) *Knowledge sharing and creation in a teachers' professional virtual community*, Computers & Education, Volume 50, Issue 3, Pages 742-756, http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VCJ-4N7Y86Y-1&_user=10&_orig Udi=B6V03-4902YYY-1&_fmt=high&_coverDate=04%2F30%2F2008&_rdoc=1&_orig=article&_acc t=C000050221&_version=1&_urlVersion=0&_userid=10&md5=358b3a921aecf9806253d3daec2bf7f8, accessed march 10, 2009
14. Halvey, M. and Keane, M. T. (2007). *Exploring Social Dynamics in Online Media Sharing*. In Proceedings of WWW 2007.
15. Heer, J. and Boyd, D. (2005). *Vizster: Visualizing Online Social Networks*. In Proceedings of the IEEE Symposium on Information Visualization (InforViz 2005).
16. Huberman, B. and Adamic, L. (2004). *Information Dynamics in the Networked World*. In Ben-Naim, E., F. H. and Toroczaki, Z. (Eds.), Complex Networks (pp. 371-398). Berlin: Springer-Verlag.
17. Jones, Q. (1997), *Virtual-communities, virtual-settlements and cyber-archaeology: A theoretical outline,* Journal of Computer Mediated Communications, volume 3, issue 3, http://jcmc.indiana.edu/vol3/issue3/jones.html, accessed May 1, 2007
18. Koh, J, and Kim, Z., G., (2004). *Knowledge sharing in virtual communities: an e-business perspective*, Expert Systems with Applications, volume 26, issue 2, page 155 – 166, http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V03-4902YYY-1&_user=10&_rdoc

=1&_fmt=&_orig=search&_sort=d&view=c&_acct=C000050221&_version=1&_urlVersion=0&_useri
d=10&md5=c749eda2b8b2ea5d1ce14f415180f1c1, accessed march 10, 2009

19. Kumar, R., Novak, J., and Tomkins, A. (2006), Structure *and Evolution of Online Social Networks*. In Proceedings of KDD 2006 (pp. 611-617).

20. Lampe, C.; Ellison, N.; Steinfield, C., (2006). *A Face(book) in the Crowd: Social Searching vs. Social Browsing,* Proceedings of the 20th anniversary Conference on Computer supported cooperative work, http://www.msu.edu/~steinfie/CSCW_Facebook.pdf, accessed may 10, 200

21. Liben-Nowell, D. and Kleinberg, J. (2007). *The link-prediction problem for social networks*. Journal of the American Society for Information Science and Technology, 58(7), 1019-1031.

22. Liu, G. Z. (1999), *Virtual community presence in internet relay chatting*, Journal of Computer Mediated Communication, volume 5, issue 1

23. Mayer, R.C., Davis, J.H., Schoorman F.D. (1995). *An integrative model of organizational trust*, The Academy of Management Review, volume 20, issue 3, http://douglas karalis.com/files/An_inte gration_model_of_organizational_trust.pdf, accessed, September 25, 2008

24. Nocera, J. L. A. (2002), *Ethnography and hermeneutics in cybercultural research accessing IRC virtual communities*, Journal of Computer Mediated Communication, volume 7, issue 2

25. Preece, J., and Maloney-Krichmar, D. (2005). *Online communities: Design, theory, and practice*, Journal of Computer-Mediated Communication, volume 10, issue 4, article 1, http://jcmc.indiana.edu/vol10/issue4/preece.html, accessed, may 1, 2007

26. Spertus, E., Sahami, M., and Buyukkokten, O. (2005). Evaluating Similarity Measures: A Large-Scale Study in the *Orkut* Social Network. In Proceedings of KDD 2005.

27. Thelwall, M. (2008). How are Social Network Sites Embedded in the Web? An Exploratory Link Analysis. Cybermetrics: International Journal of Scientometrics, Informetrics and Bibliometrics, ISSN 1137, 5019(12), 1.