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Abstract:

Social networking applications such as blogs, instant messengers, podcasts, social networking websites (e.g., Renren in China, Vkontakte in Russia, Facebook), professional networking websites (e.g., LinkedIn), Twitter, and virtual worlds (e.g., Second Life) have become increasingly popular in the last few years. Because these applications have substantial implications for users, organizations, and society, social networks (SNs) have gained attention from information systems (IS) researchers and grown steadily as a research area since 2004. However, to organize the accumulated research and encourage researchers to examine new and pressing issues in SNs, available knowledge needs to be synthesized and research gaps need to be addressed (Bandara et al., 2011). Therefore, we systematically reviewed publications about SNs published in major IS journals between January 2004 and August 2013 and, in this paper, overview the state of IS research regarding SNs. We show the evolution of the existing IS research on SNs to build a common nomenclature and taxonomy for this area of research, to identify theories used, and to provide a useful roadmap for future research in this area.

Keywords: Social Networks (SNs), Social Networking Applications (SNAs), Social Media, Literature Review, Systematic Review, Social Networking, Social Network Analysis, Social Computing, Information Systems (IS).

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I. INTRODUCTION

A social network (SN) is “a specific set of linkages among a defined set of persons, with the additional property that the characteristics of these linkages as a whole may be used to interpret the social behavior of the persons involved” (Mitchell, 1969, p. 2). Social science research about SN was conducted long before the invention of the Internet. However, it is in the last several years that social networking applications (SNAs) such as blogs, instant messengers, social networking websites (e.g., Renren and Wechat in China, Vkontakte in Russia, Facebook), professional networking websites (e.g., LinkedIn), microblogging (e.g., Twitter, Weibo in China), and virtual worlds (e.g., Second Life) have become increasingly popular and caused the booming of online social networks (OSNs). Such SNAs usually include communication tools that allow users to capture, store, and present information/communications among users and interactive tools that facilitate interactions among users. Using these tools provided in SNAs, individuals can share information in the online setting and form SNs based on transactions, interests, or relationships (e.g., Boyd & Ellison, 2007). The resulting OSNs are collections of individuals who share information regarding a common interest in an online setting over the Internet (Kumar, Raghavan, Rajagopalan, & Tomkins, 1999).

More importantly, SNAs have the ability to extend beyond physical boundaries and connect billions of users¹. Consequently, SNAs have a strong impact not just on business but also on societies. Because SNAs are fundamentally forms of global information exchange, they are quickly transforming society by creating a pervasive technical infrastructure that changes the nature of traditional social relationships (Subrahmanyam, Reich, Waechter, & Espinoza, 2008). Although some SNs are enabling (i.e., augmenting, catalyzing, or supporting solutions to complex social problems), others are constraining (i.e., worsening existing social problems or creating new issues). For instance, SNs have been shown to build bonds among individuals (Ren et al., 2012) and impose negative consequences on society, such as security and privacy concerns (Shin, 2010), cyberbullying (Smith et al., 2008), inefficient time management, and interference with traditional work (Skeels & Grudin, 2009). Therefore, acknowledging the complexity of SNs and conducting a systematic analysis is crucial.

Given their impact, SNs represent an interesting area for information systems (IS) researchers that has been growing steadily since 2004, and there have been academic paper calls from various outlets for more research on them. In 2007, major IS conferences such as the International Conference on Information Systems and the Americas Conference on Information Systems for the first time included tracks or minitracks about SNs. Top journals publishing IS content—such as *MIS Quarterly (MISQ)*, *Information Systems Research (ISR)*, *Journal of Management Information Systems (JMIS)*, *European Journal of Information Systems (EJIS)*, *Journal of the Association for Information Systems (JAIS)*, *Journal of Strategic Information Systems (JSIS)*, *Journal of Information Technology (JIT)*, *Communications of the AIS (CAIS)*, and *Communications of the ACM (CACM)*—have all published multiple papers (and even some special issues) related to SNs.

Understanding the SN construct is complex and difficult and researchers have called for more research related to SNs in the IS field (e.g., Agarwal, Gupta, & Kraut, 2008; Wasko, Teigland, Leidner, & Jarvenpaa, 2011). As a result, contributions to journals in this area are growing. However, few studies have systematically reviewed the research in the field. Systematic reviews are important endeavors for any field (Webster & Watson, 2002) because they support the creation of taxonomies and common nomenclatures for a field, the identification of areas that have been thoroughly investigated and those that need more attention, and the discovery of new research opportunities. In addition, to encourage researchers to examine new and pressing issues concerning SNs, available knowledge needs to be synthesized and research gaps need to be addressed (Bandara, Miskon, & Fielt, 2011).

In this study, we respond to the above issues by systematically reviewing publications about SNs published in major IS journals between January 2004 and August 2013 and overview the state of IS research regarding SNs. We use an approach similar to Zhang and Li's (2005) and Zhang, Li, Scialdone, and Carey's (2009) to categorize and summarize the publications. By developing a systematic review, we identify the current research focus, comment on the progress of the research, and highlight areas that require further investigation. To that end, we answer the following research questions: (1) what subject topics are studied the most?, (2) what research methods are most

¹ For instance, in 2013, Facebook had 1.26 billion users; Twitter had 500 million; Google+ had 343 million; Renren had 178 million; and LinkedIn had 238 million (Smith, 2013).

commonly used? (3) what are the contexts of the studies?, (4) what are the theories used in social network research, and what are the dependent variables they seek to explain? By answering these questions, we contribute to the IS field by bringing conceptual clarity to the rather complex and difficult to understand SN construct and, thus, build a foundation for future research.

The paper is organized as follows. In Section 2, we present background information on SNs. In Section 3, we describe the methodology we used to collect and analyze the publications, including a set of categorization schemes we adapted from Zhang et al. (2009). In Section 4, we describe the coding process. In Section 5, we present the categorized papers based on the schemes we adapted, discuss patterns that emerged from this categorization, and summarize the current status of IS research on SNs. Finally, in Section VI, we present opportunities for future researchers and conclude the paper.

II. BACKGROUND

Defining Key Terms Used in SN Research

We collected all the keywords listed in the papers in our collection and sorted these keywords to identify the most frequently used ones. The key terms most frequently used in SN research were: social network(s), online social networks, virtual worlds, online communities, virtual communities, social network analysis, social media, Web 2.0, and social computing. Surprisingly, although the papers we collected used these terms frequently, most did not provide clear definitions of the terms, and many terms were used interchangeably. Thus, we feel it is necessary to clarify these terms' definitions.

Social network(s) was by far the most frequently used keyword in the collection. A social network is "a specific set of linkages among a defined set of persons, with the additional property that the characteristics of these linkages as a whole may be used to interpret the social behavior of the persons involved" (Mitchell, 1969, p. 2). Sociologists first used this term in the 60s and 70s, and a great deal of social science research about social networks was conducted long before the Internet's invention. In fact, some studies in our collection still focused on investigating offline social networks and their effects on certain forms of IS usage (Bruque, Moyano, & Eisenberg, 2008; Sykes, Venkatesh, & Gosain, 2009). However, most of our collected papers study OSN, which are social networks in online environments.

Virtual worlds, online communities, and virtual communities represent another set of key terms used frequently in our target papers, but, again, they were poorly distinguished from one another. Virtual world environments such as Second Life are classified in the broad domain of massively multiplayer online games (Mennecke et al., 2008) and are 3D-immersive, computer-simulated environments in which users are represented by avatars through which they interact in real time with other avatars, objects, and the environment (Wasko et al., 2011). Conversely, the terms online communities and virtual communities refer to more general concepts, and many researchers use them interchangeably. Virtual communities refer to "social aggregations that emerge from the Net when enough people carry on those public discussions long enough, with sufficient human feeling, to form webs of personal relationships in cyber-space" (Rheingold, 1993, p. 5). Similarly, an online community is:

a large collectivity of voluntary members whose primary goal is member and collective welfare, whose members share a common interest, experience, or conviction and positive regard for other members, and who interact with one another and contribute to the collectivity primarily over the Net. (Sproull & Arriaga, 2007, p. 733)

Both definitions focus on the social and community aspects of the concept and do not limit the technology to any specific type of Web platform.

Social network analysis, another commonly used term, is used most frequently in the research method sections of the papers in our collection. Social network analysis was originally developed and used in sociology research to observe the nodes that make up social worlds (social or other types of units such as persons, teams, and organizations, or their combinations) and the ties among them (connections such as communications, dependence, or vicinity), analyze patterns of relationships, and discover the underlying social structures (Hu & Zhao, 2008).

Social media is a term used mostly in marketing-related papers. Social media originally referred to "the production, consumption and exchange of information through online social interactions and platforms" (Pergolino, Miller, & Incorporated, 2010, p. 5). However, researchers later extended it to emphasize the aspects of *engagement of* and *collaboration with* customers and it is, thus, better defined as "the technological component of the communication, transaction and relationship building functions of a business which leverages the network of customers and prospects to promote value co-creation" (Andzulis, Panagopoulos, & Rapp, 2012, p. 308).

Web 2.0 and social computing represent another set of terms that many publications use but do not clearly define. The term Web 2.0 is used mostly as an umbrella term for the many different newer applications/services that constitute the main elements of the Web today (Kim, Yue, Hall, & Gates, 2009). It includes many technologies in its scope and does not emphasize social factors (O'Reilly, 2007). Social computing, on the other hand, describes computing technologies whose scope ranges from corporations to social organizations and those highly scalable systems that provide rich content that are enhanced by dissemination structures and peer-influence mechanisms (Parameswaran & Whinston, 2007).

III. METHODOLOGY

Our methodology involved performing a systematic review, a standard social science research method that is frequently used to identify the structure of a topic of research and related research opportunities. Although such reviews are less common in IS studies than in other areas of social science research, they are increasingly used in IS (e.g., Barlow et al., 2011; Crossler et al., 2013; Zhang & Lowry, 2008) and related fields. To develop the annotated bibliography, which serves as the foundation for a systematic review, we surveyed 10 highly respected IS journals and searched for papers from online indices and databases using a set of keywords, such as "social networks". We then categorized the papers according to topic, method, and context using a set of classification schemes. Because theories help researchers accumulate knowledge in a systematic manner and offer insight into practice (Gregor, 2006), we also identified the theories used in the SN research along with the dependent variables they sought to explain. We describe the details regarding the criteria we used to select journals, the approach we used for searching for papers, and the classification schemes we used to categorize them in the following subsections.

Journal-Selection Criteria

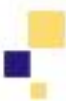
To ensure the quality of the journals, we chose the following eight journals recommended by senior scholars of the Association for Information Systems (AIS) and bibliometrics (Lowry et al., 2013): *MISQ*, *ISR*, *JMIS*, *J AIS*, *EJIS*, *ISJ*, *JSIS*, and *JIT*. We then included two additional journals, *CAIS* and *CACM*. Although *CAIS* is a relatively new journal designed as the communications journal for the AIS, over the years, it has published many papers and been consistently highly ranked by IS scholars (Lowry, Romans, & Curtis, 2004; Mylonopoulos & Theoharakis, 2001; Peffers & Ya, 2003; Rainer & Miller, 2005). Similarly, *CACM* publishes many technical and practical IS papers and has been consistently highly ranked among IS journals (Lowry et al., 2004).

Approach to Searching for Papers

We used keywords such as social networks, social networking, social network applications, social network analysis, social network applications, social media, social computing, social software, online communities, Web 2.0, and the names of major SNAs, such as Facebook and Twitter, to search for papers published between January 2004 and August 2013. We started the initial search using keyword "social networks" and then expanded the search to include new keywords listed in the papers that we found as the collection of papers grew. Some of the new keywords, such as Web 2.0, social software, social computing, and online communities, are popular terms closely related to social networks. We mainly conducted the search using Google Scholar, a Web search engine that targets scholarly literature. Google Scholar is integrated with the library at the university where one of the authors works and, therefore, provides thorough coverage of all common databases, such as Business Source Premier, the most popular business research database.

Table 1 lists the number of publications we identified in each of the selected journals. After identifying these publications, we used classification schemes adapted from Zhang et al. (2005) to code and categorize them.

Journal	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
<i>MISQ</i>	0	0	0	0	0	1	1	9	3	0	14
<i>ISR</i>	0	0	0	0	9	0	4	1	4	9	27
<i>JMIS</i>	0	1	0	0	3	2	2	7	2	0	17
<i>J AIS</i>	1	0	0	1	1	1	2	3	7	0	16
<i>EJIS</i>	0	0	0	1	0	0	3	1	1	0	6
<i>ISJ</i>	0	0	0	0	0	0	0	1	0	1	2
<i>JSIS</i>	0	0	0	0	0	0	0	0	1	0	1
<i>JIT</i>	0	0	0	1	0	0	11	0	0	0	12
<i>CAIS</i>	0	0	1	3	1	3	3	2	0	1	14
<i>CACM</i>	0	0	0	0	3	1	9	9	4	1	27
Total	1	1	1	7	17	8	35	34	22	12	136



Topic Classification Scheme for SN Research

Following the approach that Zhang and Li (2005) and Zhang et al. (2009) use to classify human-computer interaction (HCI) studies, we classify the research topics based on the IT artifact lifecycle, which includes two main stages: during artifact development and after artifact development (Whitten, Bentley, & Dittman, 2004). In this study, we take a rather broad view of the artifact and focus on SNs formed through SNAs because most SNAs used today are commercially developed and have long passed the development stage. Therefore, we looked for issues investigated during the development of SNs, including the development not only of SNs (the artifact itself) but also of the algorithms and tools used to analyze and visualize them. We also looked for issues occurring after the development of SNs, including mainly the applications and impacts of SNs. Consistent with other existing literature assessment studies, we included a general category for papers that cannot be classified into the two stages but cover general research issues, such as literature reviews and research comments. Table 2 presents the topic classification scheme that we adapted from Zhang and Li (2005) and Zhang et al. (2009)². TP1 and TP2 are concerned with issues investigated during the development of SNs. TP3 and TP4 are concerned with issues investigated after the development of SNs. We derived the topic subcategories partly from Zhang and Li (2005) and Zhang et al. (2009) and partly from our review of the papers.

Method Classification Scheme for SN Research

Table 3 presents descriptions of the research method categories that we adapted from Zhang and Li (2005) and Zhang et al. (2009). Following these studies, we use two main categories: non-empirical and empirical. Non-empirical papers are based mainly on ideas, theoretical frameworks, and speculations, whereas empirical articles deal mostly with systematic observations. However, we consolidated and changed several subcategories based on our review of the collected papers.

² Some categories in Table 2, 3, and 4 directly re-use the established categories in (Zhang & Li, 2005) and (Zhang et al., 2009). The detailed citations and page numbers are available in each table's caption.

Table 2: Topic Classification Scheme
(Adapted from Zhang & Li, 2005, p. 240; Zhang et al., 2009, p. 61)

ID	Category		Description
TP1	Factors influencing social networks		Concerned with factors/issues that influence the development/use of social networks in various technology platforms
	TP1.1	Development of social networks	Concerned with factors/issues that influence the development (formation) of social networks in various technology platforms
	TP1.2	Use of social networks	Concerned with various technical or social/behavioral factors that influence the use (adoption) of social networks
	TP1.3	Other	Other topics related to the factors influencing social networks
TP2	Analysis of social networks		Concerned with the development of algorithms, tools, and techniques for analyzing and visualizing social networks
	TP2.1	Algorithm/component development	Development of algorithms, tools, and techniques
	TP2.2	Visualizing social networks	Network visualization
	TP2.3	Other	Other topics related to the analysis of social networks
TP3	Application programs of social networks		Concerned with specific application programs (implementations) of social networks, such as wiki, virtual worlds, and Facebook; discusses their implications, introduce relevant business models or outlines possible challenges of such application programs
TP4	Impact of social networks		Concerned with the effects of social networks on individuals, teams, or organizations; examines the impact of social networks on users, such as users' attitudes, emotions, trust, and knowledge sharing, and the impact on the performance of teams and organizations
	TP4.1	Cognitive belief, attitude, and behavior	Self-efficacy, perception, belief, intention, behavior, attitude, satisfaction, acceptance, adoption, resistance, and use
	TP4.2	Performance	Performance, productivity, effectiveness, and efficiency
	TP4.3	Trust and interpersonal relationship	Trust, risk, privacy, security, conflict, norms, and influence
	TP4.4	Emotion	Emotion, affect, hedonic quality, enjoyment, and intrinsic motivation
	TP4.5	Learning	Learning and training
	TP4.6	Knowledge management	Knowledge creation, knowledge storage/retrieval, knowledge transfer, and knowledge application
	TP4.7	Other	Other topics related to the impact of social networks
TP5	General topics		Concerned with general research issues on social networks and SNAs
	TP5.1	Citation analysis	Research papers that use social network analysis method to analyze references/citation network
	TP5.2	Literature review, overview, and research comments	Conceptual papers that review, comment on, and discuss research on social networks
	TP5.3	Other	Other topics concerning general issues in social networks and SNAs

Table 3: Method Classification Scheme
(Adapted from Zhang & Li, 2005, p. 241; Zhang et al., 2009, p. 62)

ID	Category		Description	
ME1	Non-empirical			
	ME1.1	Conceptual orientation	Propose, present, or describe frameworks, conceptual models, conceptual overviews, or theories	
	ME1.2	Illustration	Present opinions supported by examples or personal experiences, and describe specific tools, techniques, methods, or models technically or methodologically	
	ME1.3	Mathematical model	An analytical (e.g., formulaic or econometric) model or a descriptive model developed for the phenomenon under investigation	
	ME1.4	Other	Other non-empirical methods	
ME2	Empirical			
	ME2.1	Quantitative		
		ME2.1.1	Social network analysis	Observe and analyze structural features of a social network; no manipulation of variables
		ME2.1.2	Experiment	Manipulate independent variables either in a lab setting or in a natural setting
		ME2.1.3	Field study	Involve experimental design but no experimental controls; carried out in natural settings; no manipulation of independent variables
		ME2.1.4	Survey	Involve a large number of observations with no manipulation of variables
		ME2.1.5	Instrument development	Develop instrument/measurement or classification scheme; validate instruments
		ME2.1.6	Simulation	Execute and test artifact (model) with artificial data
	ME2.1.7	Secondary data	A study that uses existing organizational and business data (e.g., financial and accounting reports, archival data, published statistics)	
	ME2.2	Qualitative		
		ME2.2.1	Case study	Investigate one or a few cases in detail from either a positivist or an interpretive perspective
ME2.2.2		Interview	Conducted on an individual basis	
ME2.3	Other		Empirical methods not described above	

Context Classification Scheme for SN Research

Table 4 describes the research context categories that we adopted from Zhang and Li (2005) and Zhang et al. (2009). We use the five categories in the table to classify the papers based on the setting or environment where the study was conducted.

Table 4: Context Classification Scheme
(Adopted from Zhang & Li, 2005, p. 238; Zhang et al., 2009, p. 60)

ID	Category	Description
C1	Organization/workplace	Organizational or workplace setting. This category includes colleges or universities if students are subjects and the tasks are related to the students' studies or schoolwork. It can also include teams created for collaborative tasks.
C2	Marketplace	Commerce, banking, and marketing.
C3	Social environment	A general setting in a less organizationally constrained environment that facilitates interpersonal interactions and relationships.
C4	Cultural, national, and geographical setting	Any specifically relevant cultural, national, and geographical settings.
C5	Other	Context of papers whose contexts do not belong to any of the above four categories; no context.

IV. CODING AND ANALYSIS

The first three authors conducted the coding. To ensure consistency (i.e., high inter-rater reliability) in coding, we used the same coding scheme as the one in Tables 2–4. We used Microsoft Excel to perform the coding and analyze the data. At the beginning of the coding process, we initially coded the same 15 papers independently and resolved differences through discussion and consensus. We then each coded one third of the remaining papers. As stated above, we created the classification schemes based on Zhang and Li (2005) and Zhang et al. (2009), and we refined them by reviewing the papers. Therefore, we started out with the initial classification schemes mainly adopted from Zhang and Li (2005) and Zhang et al. (2009) and changed/added categories and subcategories as we progressed with the coding process. Whenever new codes were included, one of us (a different coder whenever possible) re-coded the previous papers. In addition, after we finalized the classification schemes, at least one of the three coders reviewed all papers again during the pattern-construction phase and reviewed them for accuracy. Thus, we coded most papers at least twice, and at least two coders resolved discrepancies. In the pattern-construction phase, we also recorded the theories used in the papers along with the dependent variables they sought to explain.

Appendix 1 overviews all the papers that we coded and included in our analysis.

V. DISCUSSION OF SYSTEMATIC REVIEW RESULTS

After classifying the papers based on the topic, method, and context schemes, we conducted frequency analysis to show the trend of each category across the January 2004–August 2013 time period and carefully reviewed all the papers to show common patterns in current research to identify opportunities for future research. We now summarize and discuss our findings for each topic subcategory and for the method, context, and theory categories.

Tables 5–7 summarize the frequency of the topics, methods, and contexts in our collection of papers. We allowed individual papers to be assigned to multiple categories because it is possible for a study to focus on more than one major subject topic, use more than one research method, and address different contexts. In each table, the last two columns represent the relevant percentages. For example, in Table 5, the percentage of papers considering each particular topic is represented by “percent by # of papers” (frequency of that specific topic divided by 136 (the total number of papers)), and the frequency of each topic among the overall topics studied is represented by “percent by # of topics” (frequency of that specific topic divided by 207 (the total number of topics); note that the total number of topics is greater than the total number of papers because individual papers could examine multiple topics and, therefore, could be assigned to multiple topic categories).

Table 5: Topic Classification Results

Topics		04	05	06	07	08	09	10	11	12	13	Total	% by # topics	% by # papers
TP1	Factors influencing social networks	0	0	0	2	7	1	15	13	11	2	51	25%	38%
	TP1.1 Development of social networks	0	0	0	0	3	0	3	2	1	0	9	4%	7%
	TP1.2 Use of social networks	0	0	0	2	1	1	9	9	9	2	33	16%	24%
	TP1.3 Other	0	0	0	0	3	0	3	2	1	0	9	4%	7%
TP2	Analysis of social network	0	0	0	0	1	0	2	4	2	0	9	4%	7%
	TP2.1 Algorithm/component development	0	0	0	0	0	0	2	3	2	0	7	3%	5%
	TP2.2 Visualizing social networks	0	0	0	0	1	0	0	0	0	0	1	0%	1%
	TP2.3 Other	0	0	0	0	0	0	0	1	0	0	1	0%	1%
TP3	Application programs of social networks	0	0	0	0	2	3	12	9	1	3	30	14%	22%
TP4	Impact of social network	2	1	0	4	17	4	23	17	19	8	95	46%	70%
	TP4.1 Cognitive belief, attitude, and behavior	1	0	0	1	6	1	9	4	6	4	32	15%	24%
	TP4.2 Performance	0	0	0	0	6	1	6	2	5	4	24	12%	18%
	TP4.3 Trust and interpersonal relationship	0	0	0	1	2	1	3	3	2	0	12	6%	9%
	TP4.4 Emotion	0	0	0	0	1	0	0	2	1	0	4	2%	3%
	TP4.5 Learning	0	0	0	0	0	0	2	1	1	0	4	2%	3%
	TP4.6 Knowledge management	1	1	0	2	2	1	2	4	2	0	15	7%	11%
	TP4.7 Other	0	0	0	0	0	0	1	1	2	0	4	2%	3%
TP5	General topics	0	0	1	4	4	3	4	3	2	1	22	11%	16%
	TP5.1 Citation analysis	0	0	0	1	1	1	0	0	0	0	3	1%	2%
	TP5.2 Literature review, overview, and research comments	0	0	1	2	3	1	1	1	2	1	12	6%	9%
	TP5.3 Other	0	0	0	1	0	1	3	2	0	0	7	3%	5%
	Total	2	1	1	10	31	11	56	46	35	14	207	100%	152%

As Table 5 shows, of all the topics in our topic category, the most dominant was TP4 (impact of social networks). This topic relates to the impact of social networks on individual users, such as their attitudes, emotions, trust, and knowledge sharing, and impact on teams' and organizations' performance. Ninety-five papers investigated the impacts of social networks (or 70% of the papers collected). TP1 (factors influencing social networks) followed with 51 papers (38%). TP3, TP5, and TP2 were less studied than TP4 and TP1.

In the following subsections, we discuss the common patterns in each topic category to identify opportunities for future research.

Patterns and Opportunities for TP1: Development of Social Networks

TP1.1: Factors That Influence the Development (Formation) of Social Networks

General patterns: papers classified in this category show three different patterns for factors that influence social networks' development. The first pattern involves papers focusing on specific attributes that enhance the development of social networks. For instance, papers have investigated the impact of moderation on reputation systems and the incentive it creates to generate more useful information (Chen, Xu, & Whinston, 2011), the influence of social networks' reputation systems (user and content oriented) on collaborative content (De Alfaro, Kulshreshtha, Pye, & Adley, 2011), and the effect of incentives on content contribution in social media (Tang, Gu, & Whinston, 2012).

The second pattern, mainly reflected in earlier papers, involves papers that explained social network formation in a more general and holistic manner. For instance, an exploratory analysis of OSN (e.g., Facebook, Flickr, LinkedIn) focused on what makes them successful, how they differ from physical networks, and predictions regarding their future (Howard, 2008). Moreover, a case analysis investigated factors such as participation, collaboration, rich user experience, SN, semantics, and interactivity responsiveness of various Web 2.0 sites (e.g., Facebook, Flickr) (Kim et al., 2009).

The last pattern involves papers that investigated factors specifically relevant to social networking success in social and organizational environment settings, such as the importance of rewards and reputation (Tang et al., 2012) and reputation systems (De Alfaro et al., 2011) for content contribution in social media, the importance of ties in open-source software networks for performance (Hahn, Moon, & Zhang, 2008), and the importance of project attractiveness for source code contribution, software maintenance, and usage (Santos, Kuk, Kon, & Pearson, 2012).

TP1.2: Technical or Social/Behavioral Factors That Influence the Use (Adoption) of Social Networks

General patterns: the major trend we observed in this line of papers was a heavy emphasis on investigating factors that explain the continued use of social networks. Here, we found two major patterns. The first includes papers investigating context-specific factors that explain continued use. For instance, IM use in social network facilitated teams was examined in a context that highlighted gender differences as a determinant in intentions to participate in social networks (Škerlavaj, Dimovski, & Desouza, 2010). Another study about continued music sharing behavior showed that getting continued benefits from the network (e.g., music downloads) played a stronger role as compared to giving music to the network in terms of retaining members (Xia, Huang, Duan, & Whinston, 2012). Furthermore, a study examining social media use in hospitals highlighted the importance of the active management of social media in boosting user-generated content (Miller & Tucker, 2013).

The second pattern includes papers that examined interpersonal factors influencing use/continued use, such as commitment, relational capital, bonds, culture, cognitive absorption, and so forth. For instance, usage was linked to the community features (e.g., information about group activities and activities of individual members) that created and strengthened identity-based bonds (e.g., communication tools or group activities) and interpersonal bonds (e.g., information about others or interpersonal similarity) (Ren et al., 2012). Similarly, psychological bonds (e.g., need, affect, and obligation) to a community were examined to observe members' behavior (Bateman, Gray, & Butler, 2011). Moreover, commitment, including capital commitment (being locked in a relationship due to costs associated with discontinuance) and relational commitment (level of trust, respect, and friendliness in a relationship), was another factor influencing usage (Zhou, Fang, Vogel, Jin, & Zhang, 2012). Furthermore, cognitive absorption (i.e., deep involvement experienced by users as they perform an activity) was identified as a significant factor in the adaptive use of virtual worlds (Goel, Johnson, Junglas, Ives, 2011).

TP1.3: Other Topics

General patterns: this narrow category of papers used attributes of social networks to clarify their dynamics and working mechanisms. For instance, the speed of messages (rumor spread) in social media was used to observe the structural and algorithmic properties of social networks (Doerr, Fouz, & Friedrich, 2012). In a different context, contracts used for gaming companies in virtual worlds were examined to determine whether they constituted a sustainable business model for these companies (Roquilly, 2011).

Opportunities: the existing research on social network formation offers a narrow and a more exploratory focus, so theoretical work is needed to explain factors that influence the development of SNs. Communication theories could be applied to explain the underlying causal mechanisms. For instance, social identity theory (Hogg, 1996) can be used to investigate individuals' social identities related to their values, attitudes, and behavioral intentions that lead to their contributing to social media. In addition, given the emphasis on exploratory research, research has yet to identify external factors (beyond social network-related ones) that affect network formation. For instance, instead of

examining social network formation in an isolated manner, the influence of firm culture and management support could be taken into account.

Moreover, existing research has revolved around a narrow spectrum of factors that explain the influence, continued use and adoption, and development of social networks. Moreover, emphasis seems to be on quantitative research. The only exception was the action research conducted to provide guidance on design features of hedonic, pragmatic, and design element details related to usability and sociability for co-creation systems (Kohler, Fueller, Matzler, & Stieger, 2011). In terms of the analysis level, despite the prevalence of multiple-level group interactions in SNS, few studies have focused on multilevel analysis. Moreover, most research concentrated on analyzing existing users' behavior. Only one paper (Schwarz, Schwarz, Jung, Pérez, & Wiley-Patton, 2011) investigated factors that are crucial for non-adopters in the early stages of their adoption, such as the risk of sharing information publicly and the perceived amount of effort.

Patterns and Opportunities for TP2: Analysis of Social Networks

General pattern: Overall, relatively few papers (only 10 in total) fell into this category, and most of the papers (seven in total) were in the TP2.1 (algorithm/component development) subcategory.

TP2.1: Algorithm/Component Development

Although this subtopic involves the “development of algorithms, tools, and techniques for analyzing social networks”, we found that the algorithms and tools described in the papers in this subcategory are not just an extension of SNA but analyze social networks for special purposes, such as customer relationship management (CRM) (García-Crespo, Colomo-Palacios, Gómez-Berbis, & Ruiz-Mezcua, 2010) or information diffusion/discovery/recommendations (Chau & Xu, 2012; Cheng, Sun, Hu, & Zeng, 2011; Garg, Smith, & Telang, 2011). For example, one study (García-Crespo et al., 2010) illustrated the development and evaluation of an analyzer of emotions expressed by users in social networks for CRM. Another study (Chau & Xu, 2012) proposed a framework for gathering business intelligence from blogs by automatically collecting and analyzing blog content and bloggers' interaction networks. Almost all the algorithms, tools, and frameworks developed were evaluated in a field setting with large volumes of trace data collected from social network sites.

TP2.2: Visualizing Social Networks

We only found one paper in the TP2.2 subcategory because, perhaps, the visualization techniques for social networks are already highly standardized and provided in most SNA software packages. The paper in this subcategory (Trier, 2008) presented an approach that disaggregates relationships into their constitutive events and suggests event-based dynamic network analysis and visualization with animated graphs.

TP2.3: Other Topics

Finally, the one paper in the TP2.3 (“other”) subcategory focused on methodological issues. This study (Howison, Wiggins, & Crowston, 2011) examined validity issues deriving from the use of trace data and SNA techniques in IS studies of online communities.

Opportunities: because so few studies have addressed this topic and most of them were published recently, we have reason to believe this area of study is still in its early stages and holds many research opportunities. Although SNA techniques and tools are already very mature, more specific tools for analyzing social networks for special purposes are still needed. In addition, the studies we reviewed also identified several areas for future research. For example, many of the studies tested their algorithms or tools with a specific type of SN or even a specific site. They called for generalizing the work to other types of SNS (García-Crespo et al., 2010), other sites or other domains (Chau & Xu, 2012), different tasks (Cheng et al., 2011), and/or different samples (Park, Huh, Oh, & Han, 2012). We also observed a trend of advancing SNA toward social network intelligence and further opportunities for doing so (Chau & Xu, 2012; Trier, 2008).

Patterns and Opportunities for TP3: Application Programs of Social Networks

General patterns: many papers in this category described unique SNA programs for various purposes and in different contexts. For example, Sun and Poole (2010) described and classified various emerging wireless communities applications and proposed an activity-based design perspective. Jabeur, Zaedally, and Sayed (2013) discussed mobile social networks and their architectural considerations, and trends, challenges, and opportunities for mobile social networking applications. In addition to describing the applications, these papers also discussed the implications of innovative SNAs, such as using such applications for emergency rescue (Majchrzak & More, 2011), gaming (Chang, 2010), and predicting political outcomes (Gayo-Avello, 2011). Some papers in this category followed design science. For example, Chaturvedi, Dolk, and Drnevich (2011) examine the design, development,

validation, and use of virtual worlds. Cheng et al. (2011) introduced an information diffusion–based recommendation framework for microblogging and used the H1N1 flu dataset collected from Twitter to illustrate and evaluate the approach. Kim et al. (2010) described a mobile Web 2.0 application with multi-display buttons and provide empirical evaluation results.

Opportunities: This stream of research has focused on innovative SNAs and their applications and implications in various use contexts. As technology evolves, more SNAs will become available. Future research can continuously explore such applications, evaluate their advantages and disadvantages, and discuss their applications and implications for various contexts, such as the workplace, the marketplace, and even various cultural, national, political, and geographical settings.

In line with this stream of research, future studies can adopt the design science approach by proposing new design features for current or new SNAs. Researchers can also evaluate the effectiveness of the new designs. Future research can also focus on the social/collective nature of the SNAs and explore group, organizational, and cultural factors that influence the use and adoption of social networks. For example, Shen, Lee, Cheung, and Chen (2010) conceptualized the use of instant messaging in social network–facilitated team collaboration as an intentional social action and investigated the effect of gender differences on the development of we-intention (i.e., collective intention) to engage in such collaboration.

Patterns and Opportunities for TP4: The Effect of Social Networks

A total of 95 papers fell into this category and most of them were in TP4.1 (32 papers), TP4.2 (24), TP4.3 (12), and TP4.6 (15). Because the TP4.4, TP4.5, and TP4.7 subcategories include only four papers each, patterns in these subcategories are difficult to discern. Consequently, we summarize patterns only for TP4.1, 4.2, 4.3, and 4.6 in this section and discuss papers in the other three subcategories in the opportunity section.

TP4.1: Cognitive Belief, Attitude, and Behavior

General patterns: most papers in this subcategory focused on the structural or macro-structural features of a social network and investigated these features' impact on users' attitude or behaviors. The structural or macro-structural features range from the single-tie level, such as tie strength (Hahn et al., 2008; Hinz & Spann, 2008; Zeng & Wei, 2013), to the network level, such as network size, density, and centrality (Bruque et al., 2008; Chi, Ravichandran, & Andrevski, 2010; Sykes et al., 2009). The users included individuals (Li & Hitt, 2008) and groups (Hahn et al., 2008). The attitudes or behaviors investigated were highly diverse and included system use (Sykes et al., 2009), bidding behavior (Hinz & Spann, 2008), adaptation to IT-induced change (Bruque et al., 2008), and so forth.

Many other papers focused on the various factors that are unique in a social network setting and their effects on issues such as behavior and adoption (Hildebrand, Häubl, Herrmann, & Landwehr, 2013; Kim, Chan, & Kankanhalli, 2012; Vannoy & Palvia, 2010). These factors are not directly related to social network structures but are more general social, behavioral, and psychological factors. For example, one study (Kim et al., 2012) proposed that the desire for online self-presentation is a key driver for purchases of digital items in online social networking communities.

Several papers examined effects on behaviors, including the use or continuous use of or contribution to the social network itself. Therefore, these papers also fell into category TP1.2. For instance, Wattal, Racherla, and Mandviwalla (2010) examined the impact of network externalities on the use of blogs in an organization and especially the extent to which others' actual usage and positive feedback from others can influence an individual's use of technology.

An interesting trend is that an increasing number of papers have used large, real datasets collected from OSN to test the proposed models empirically. Many of them have investigated adoption or information diffusion in social networks (Fang, Hu, Li, & Tsai, 2013; Susarla, Oh, & Tan, 2012; Xia et al., 2012; Zeng & Wei, 2013). Other papers used large datasets to examine social network effects on behaviors in different national cultures and political settings (Ameripour, Nicholson, & Newman, 2010; Tiselli, 2010), whereas the rest of those papers used large dataset to test the general frameworks for analyzing social behavior in online networks and communities (Kleinberg, 2008; Skågeby, 2010).

TP4.2: Performance

General patterns: existing research has primarily investigated social network characteristics that influenced performance by focusing on analyzing the working mechanism and effectiveness of social networks. For instance, different social structures were analyzed for effective campaigns (Bampo, Ewing, Mather, Stewart, & Wallace, 2008), the importance of centrality was mapped to students' course performance (Barbagallo, Francalenei, & Merlo, 2008),

and the team climate (i.e., user proximity) effect was analyzed to understand IT use (Liang, Xue, Ke, & Wei, 2010) and how types of user embeddedness influence users' performance in networks of practice (van den Hooff, van Weenen, Soekijad, & Huysman, 2010).

In addition to these social network characteristics, some studies have dealt with the impact of other personal or behavioral factors on performance in the social networking settings (Busquets, 2010; Goh & Wasko, 2012; Rishika, Kumar, Janakiraman, & Bezawada, 2013; Sarker, Ahuja, Sarker, & Kirkeby, 2011; Venkatesh & Windeler, 2012). For instance, one study (Busquets, 2010) investigated the impact of commitment on orchestrating social networks to enhance innovation, and another (Venkatesh & Windeler, 2012) examined the relationship between a team's disposition toward IT, their general disposition (personality), and virtual world use in influencing team cohesion and performance.

Moreover, in terms of application context for performance studies, we observed a wide spectrum of topics and performance measures, such as the ability to deliver trust in market competition (Bolton et al., 2008), efficiency and quality in health care (Kane & Alavi, 2008), and the speed of viral messages in marketing (Lee, Lee, & Lee, 2009).

TP4.3: Trust and Interpersonal Relationships

General patterns: a major stream of SN research that emerged around 2010 has focused on users' information privacy concerns and their self-disclosure behaviors in OSN (Bulgurcu et al., 2010; Krasnova et al., 2010; Tow, Dell, & Veneable, 2010; Xu, Dinev, Smith, & Hart, 2011). However, most of the factors proposed have not been directly related to social network structure. For example, Posey et al. (2010) proposed an online community self-disclosure model that included factors such as social influence to use an online community, reciprocity, online community trust, and privacy risk beliefs and tested the model in a cross-cultural setting.

Other studies categorized under this subtopic varied considerably. They were focused mainly on social networks' effect on interpersonal relationships but, in some cases, investigated their effect on other issues, such as performance (TP4.2) and behavior (TP4.1) (Bolton, Loebbecke, & Ockenfels, 2008; Goh & Wasko, 2012; Huang & Güney, 2012; Lee et al., 2009). We think that such multiple-topic coverage is normal because the effects on issues such as performance and behavior are normally achieved by affecting interpersonal relationships first. For example, one study (Bolton et al., 2008) investigated whether greater market competition in strangers' networks associated with Internet markets increased gains from trade by promoting trust and trustworthiness.

TP4.6: Knowledge Management

General patterns: a majority of the papers corresponding to this topic focused on how the structural features (tie structure, core/periphery structure, or dyad structure) of a social network affect different aspects of knowledge management, such as knowledge contribution (Wasko, Faraj, & Teigland, 2004), knowledge exchange (Whelan, 2007), knowledge sharing (Chai, Das, & Rao, 2012), and knowledge integration (Robert et al., 2008). Some papers focused on factors affecting knowledge contribution in social networks and, therefore, were also related to TP1 (Arazy, Nov, Patterson, & Yeo, 2011; Tang et al., 2012). For example, Tang et al. (2012) proposed that exposure and reputation are the major incentives for content contribution in social media.

Several other papers focused on collaboration networks, such as describing coauthorship networks of IS researchers (Oh, Choi, & Kim, 2005) and examining how interaction processes such as initiating and sustaining dialogue in a collaboration network affect the effectiveness of collaboration (Kudaravalli & Faraj, 2008). Von Krogh (2012) drafted a strategic research agenda consisting of five fundamental issues that should reinvigorate research on the use of social software to support knowledge management.

Opportunities: we found several common patterns of limitations and future research opportunities across the topics. These patterns may be due to some of social networks' unique features. A large number of studies mentioned the need for longitudinal studies. Many of them pointed out that, because social networks and the network structure are dynamic and change over time, we need long-term observations of how the networks themselves evolve over time (Bruque et al., 2008; Hildebrand et al., 2013) and of individuals' dynamic behavior in social networks (Kleinberg, 2008) and studies of the long-term implications of social media for performance (Posey, Lowry, Roberts, & Ellis, 2010; Škerlavaj et al., 2010; Wu, 2013). To ensure generalizability, there is a need for multiple contexts, such as different samples consisting of subjects other than students (Goh & Wasko, 2012; Krasnova, Spiekermann, Koroleva, & Hildebrand, 2010; Nah, Eschenbrenner, & DeWester, 2011), different social networking sites or platforms (other than Facebook) (Bulgurcu et al., 2010; Ransbotham & Kane, 2011; Rishika et al., 2013; Tow et al., 2010), different industries/organizations (Ransbotham & Kane, 2011; Rishika et al., 2013), and different cultures (Bulgurcu et al., 2010). Many studies also called for different research methods (Bolton et al., 2008;

Goh & Wasko, 2012; Koch, Gonzalez, & Leidner, 2012; Lee et al., 2009; Wattal et al., 2010), especially qualitative methods (Bulgurcu et al., 2010; Fang et al., 2013; Xia et al., 2012).

Some studies called for different levels of analysis: individual, group, or, in particular, dyadic (Sarker et al., 2011). Because social networks involve both online and offline relationships, several papers mentioned the need to study different types of (and overlapping) relationships (e.g., collaboration vs. friendship) in both online and offline settings (Bolton et al., 2008; Goh, Heng, & Lin, 2013; Škerlavaj et al., 2010). Many papers also suggested that future research should investigate other individual characteristics or factors that play a role in the SN mechanism (Animesh, Pinsonneault, Yang, & Oh, 2011; Fang et al., 2013; Goel et al., 2011; Nah et al., 2011; Susarla et al., 2012; Zeng & Wei, 2013). Interestingly, one paper (Sykes et al., 2009) discussed future directions for social network research related to the following areas: (1) conceptualizations and constructs related to social networks; (2) hierarchy and boundary spanning; (3) individual characteristics—that is, demographic and personality variables; (4) different types of use, long-term use, and changing social networks; (5) exploring distributed contexts; (6) the business value of IT; and (7) software development. These directions for future research are very similar to what we summarize above.

Patterns and Opportunities for TP5: General Research Issues on Social Networks

TP5.1: Citation Analysis

General pattern: despite SNAs' ability to provide objective justification on issues, we failed to find papers that used it to conduct citation analysis. Only a single study combined citation analysis with SNA, and it did so to examine 120 journals for the purpose of exploring CACM's position (centrality and prestige) in the IS journal network (Polites & Watson, 2009).

TP5.2: Literature Review, Overview, and Research Comments

General pattern: Several papers have pursued this approach, and they exhibit three patterns. The first pattern involves the development of a roadmap for future research by means of a relatively focused application context. For instance, to expand the research agenda on open source software research, applicable referent field theories were investigated (Niederman, Davis, Greiner, Wynn, & York, 2006). Similarly, Second Life's impact on activities such as socialization, SN, entertainment, collaboration, and business development was investigated to draw a roadmap for research on virtual worlds (Mennecke et al., 2008).

The second pattern involves an emphasis on the importance of new methodologies such as innovative computing research (Shneiderman, Preece, & Pirolli, 2011) and poststructuralist interpretivist research (Kreps, 2010).

The third and final pattern involves general overviews of current research on social media (for various contexts, such as organizations, social environments, and markets) conducted to identify future research agendas. Different types of social networks in organizations and the value of these networks (short term and long term) were examined along with the strategic potential of networks in organizations (Smith & McKeen, 2006). The paper also suggested ways of developing and facilitating social networks in organizations and how knowledge management might help realize this value. Another study provided a research overview and agenda for social commerce (defined as a type of commerce that is mediated by social media and merges online and offline environments, such as Facebook, Twitter, and Google) via chronologically examining social commerce practice evolution using people, management, technology, and information dimensions (Deng, Zhang, & Zhou, 2011).

TP5.3: Other Topics

This subcategory involves papers that implemented and studied social networks from unique and unexpected angles, such as using virtual worlds to study sensemaking (Berente, Hansen, Pike, & Bateman, 2011) and improving democracy by suggesting a new voting system for Facebook that allows people to delegate their decision making power to people they trust (Boldi, Bonchi, Castillo, & Vigna, 2011).

Opportunities: any topic that is starting to mature and has a reasonable number of citations can benefit from citation analysis. There is certainly a sufficient number of SN papers to enable effective citation analysis. Such scientometric use of bibliometrics has long been used in IS with a high degree of success. For example, citation analysis has the ability to uncover subtle, unrecognized relationships between journals and can demonstrate a journal's interdisciplinary nature. Papers in our sample used citation analysis to not only rank journals (Lowry et al., 2013) but also find authorship patterns, evaluate research productivity (Dean, Lowry, & Humphreys, 2011), evaluate the effect of certain topics (Karuga, Lowry, & Richardson, 2007), and determine a field's structure (Lowry, Karuga, & Richardson, 2007).

In terms of literature review, future research can provide a more current overview because there has been tremendous growth in SN research. Moreover, research has yet to synthesize social media research outside of Western cultures and take into account cultural factors when offering a roadmap for future research.

Patterns and Opportunities for Methods in SN Research

Table 6 summarizes the research methods used in the collected publications. Like the last two columns in Table 5, the last two columns in Table 6 represent the frequency of each method among all the methods used (“percent by # of methods”—the frequency of that specific method divided by 203) and the percentage of papers using each particular method (“percent by # of papers”—the frequency of that specific method divided by 136). Note that the total number of methods is greater than the total number of papers because individual papers could use multiple methods and, therefore, could be assigned to multiple method categories.

Currently, SN research seems to be strongly dominated by quantitative empirical research methods (68%), such as conducting surveys and using secondary data, which has been a trending method since 2010. This observation is consistent with other findings that indicate the continued dominance of empirical, quantitative methods in the MIS field in general (e.g., Zhang et al., 2009). Even though qualitative empirical research has the potential to offer unique insights, the results show that only a small number of papers used case studies and interviews. Regarding non-empirical research (32%), conceptual orientations and illustrations were prevalent, followed by mathematical modeling, which has gained more attention since 2011.

Table 6: Method Classification Results

Methods		04	05	06	07	08	09	10	11	12	13	Total	% by # of methods	% by # of papers
ME1	Non-empirical	1	0	1	3	9	4	14	16	10	7	65	32%	48%
ME1.1	Conceptual orientation	1	0	1	3	3	3	8	4	3	1	27	13%	20%
ME1.2	Illustration	0	0	0	0	5	1	6	9	2	1	24	12%	18%
ME1.3	Math model	0	0	0	0	1	0	0	3	5	5	14	7%	10%
ME1.4	Other	0	0	0	0	0	0	0	0	0	0	0	0%	0%
ME2	Empirical	0	1	0	3	17	6	41	27	30	13	138	68%	101%
ME2.1	Quantitative	0	1	0	3	15	5	31	20	23	11	109	54%	80%
ME2.1.1	Social network analysis	0	1	0	2	1	2	4	1	2	0	13	6%	10%
ME2.1.2	Experiment	0	0	0	0	3	1	4	3	1	2	14	7%	10%
ME2.1.3	Field study	0	0	0	1	6	0	5	1	4	1	18	9%	13%
ME2.1.4	Survey	0	0	0	0	3	2	7	8	8	2	30	15%	22%
ME2.1.5	Instrument development	0	0	0	0	1	0	5	0	0	0	6	3%	4%
ME2.1.6	Simulation	0	0	0	0	0	0	0	1	2	0	3	1%	2%
ME2.1.7	Secondary data	0	0	0	0	1	0	6	6	6	6	25	12%	18%
ME2.2	Qualitative	0	0	0	0	2	1	9	3	7	0	22	11%	16%
ME2.2.1	Case study	0	0	0	0	1	0	5	0	4	0	10	5%	7%
ME2.2.2	Interview	0	0	0	0	1	1	4	3	3	0	12	6%	9%
ME2.3	Other	0	0	0	0	0	0	1	4	0	2	7	3%	5%
Total		1	1	1	6	26	10	55	43	40	20	203	100%	149%

Especially in terms of understanding the impact of SN and factors that influence human or organizational behavior, research seems to favor a behavioral-science paradigm. Future research can benefit from pursuing the design-science paradigm in which knowledge and understanding of social networks and their effects comes from building and applying the designed artifact (Hevner, March, Park, & Ram, 2004). In addition, as many authors have suggested, multiple research methods (Bolton et al., 2008; Goh & Wasko, 2012; Koch et al., 2012; Lee et al., 2009; Wattal et al., 2010), especially qualitative methods (Bulgurcu, Cavusoglu, & Benbasat, 2010; Fang et al., 2013; Xia et al., 2012), are needed for future research. Finally, we believe that, with the availability of technologies for collecting and analyzing large sets of trace data, empirical methods such as secondary data analysis will become the key research methods for investigating SN in the future.



Patterns and Opportunities for Context in SN Research

Table 7 shows the frequencies of various contexts studied in the collected publications.

Contexts		04	05	06	07	08	09	10	11	12	13	Total	% by # contexts	% by # papers
C1	Organization/workplace	1	1	1	4	7	1	10	6	7	3	41	29.50%	30.15%
C2	Marketplace	0	0	0	0	6	1	2	3	1	6	19	13.67%	13.97%
C3	Social environments	1	0	0	0	0	2	12	9	10	2	36	25.90%	26.47%
C4	Cultural, national, and geographical setting	0	0	0	0	0	0	3	3	1	0	7	5.04%	5.15%
C5	Other	0	0	0	2	4	4	8	13	4	1	36	25.90%	26.47%
Total		2	1	1	6	17	8	35	34	23	12	139	100.00%	102.21%

Most of the studies were conducted with no specific context or just one context, and few had multiple contexts. The organization/workplace context (C1) dominated the collection (30%), meaning that many studies are investigating SN-related issues in an organizational setting. Among them, many studies had dependent variables (DVs) related to the intention to use or to the use behavior of SNAs. However, we labeled more than 26 percent of the papers with C5 ("other"), meaning that these papers had either no specific context or a context that differed from any of the four contexts we identified. During our coding, we found that most of these papers did not have a specific context, such as conceptual overviews. Following these two categories is the social environments context (C3; 25%), which includes studies conducted in a setting that focuses on interpersonal interactions and relationships. Although many of the studies conducted in such a context continued to use different kinds of behavior intention as their DVs, they are normally not utility driven but place greater emphasis on the social aspects of the results. The other two contexts, marketplace (C2; 14%) and cultural, national, and geographical setting (C4; 5%) were less commonly utilized. This is somewhat surprising because social networks with many commercial applications have been reported and are now commonly used for marketing and sales. A possible reason for the underrepresentation of C2 and C4 is that we reviewed only IS journals that emphasize technologies over marketing strategies, and papers about social networks in a marketplace setting are most commonly published in marketing journals. The less-studied contexts may provide opportunities for future research.

Patterns and Opportunities for Theory Development in SN Research

Because theories support the systematic accumulation of knowledge and offer insight into practice (Gregor, 2006), we also identified the theories used in social network research along with the DVs they sought to explain. The appendix lists the theories used and the DVs investigated in the collected papers.

Among the papers with a theoretical basis, we found that social and behavioral theories were predominant. For instance, there were papers using social science theories, including social capital theory (Robert, Dennis, & Ahuja, 2008), social exchange theory (Lowry, Cao, & Everard, 2011), and social presence theory (Schwarz et al., 2011). Other papers have used behavioral science theories, such as the theory of planned behavior (Mann, von Walter, Hess, & Wigand, 2009), the technology acceptance model (Hu, Poston, & Kettinger, 2011), and the theory of self-presentation (Kim et al., 2012). A large portion of the papers used theories about networks and especially about network structures, such as the theory of network externalities (Wattal et al., 2010), the network relation model (Montazemi, Siam, & Esfahanipour, 2008), and network classifications (Bruque et al., 2008), to name a few.

In a maturing research stream, theory-based research is critical for explaining the rationale behind research findings and for allowing future researchers to develop an cumulative literature. However, there was little use of theories in SN research. Therefore, it may be difficult not only to understand why different factors lead to similar outcomes, but also to develop a systematic understanding of the dynamics in SNs.

In this sense, we found a clear correlation between the number of papers grounded in theories and the publication outlets. This is understandable and determined by the journals' mission or scope. Among the papers we collected, 13 of the 14 *MISQ* papers had a clear and strong theoretical basis. Even the paper without a clear theory base (Chau & Xu, 2012) was built on the design science framework. *MISQ* has historically required a significant theoretical contribution in its published research papers. This tradition is clearly evident in our survey. Similarly,

among the *JMIS* papers, 15 out of 17 had a clear theory base. Another top IS journal, *ISR*, however, exhibited a different trend: only about half of the collected papers (14 out of 27) were grounded in theory. The rest were mainly papers that empirically examined IS phenomena. Many of them were published recently (2012 and 2013) and used very large datasets and advanced mathematical modeling and data analysis methods (Claussen, Kretschmer, & Mayrhofer, 2013; Goh et al., 2013; Zeng & Wei, 2013). Despite lacking a theoretical basis, they all had clearly defined DVs. We believe this represents a new trend for IS research and that data-oriented research should be considered as rigorous as traditional theory-based research. With the availability of large datasets and the advent of the “big data” era, we can directly record and observe social relations and human behavior and, therefore, discover issues that cannot be explained by existing theories. Another exceptional case occurred with the journals *CACM* and *CAIS*. Both journals had very few theory-grounded papers (2 out of 27 in *CACM* and 3 out of 14 in *CAIS*)³. Many of the papers we collected were either conceptual, overview, or research agenda types of papers and, therefore, had no clear theoretical basis.

VI. CONCLUSION

In this paper, we systematically review IS publications about SNs to show the evolution of the existing IS research on SNs, to build a common nomenclature and taxonomy for this area of research, and to provide a useful roadmap for future research in this area.

In this systematic review, we found that most publications about SNs in the IS journals focused on two major topics: factors influencing SNs, especially the continuous use of SNs, and SNs’ effect on issues such as behavior, performance, and knowledge management. Empirical, quantitative methods (especially survey) continue to be the dominant methods used in these publications, whereas secondary data analysis using large datasets seems to be becoming a new trend. Most research was conducted with no specific context or just one context, such as the organization/workplace or social environment. Whereas most papers published in top journals such as *MISQ* and *JMIS* had a solid theory base, many other publications lacked a theoretical foundation.

As a result, we also see many opportunities in this research area. In terms of methodology, big data and analytics may be the new and promising method for studying social networks. In terms of topic, we used a categorization that explains any human-computer interaction. Given that we could not detect a trend in the “other topics” category, it seems SN has yet to develop a unique area of investigation. In addition, we observed that SN research closely follows research in other streams (e.g., trust, virtual teams, and technology adoption) and tries to replicate such studies. Even though this approach seems to open an initial window to understanding the dynamics in SN, future research may need to conduct more research on SN-specific construct validation and theory development. Therefore, we also call for more papers with solid theoretical foundations because such studies are critical to developing cumulative research and identifying research gaps. In line with the seven directions proposed by (Sykes et al., 2009), we believe that future SN research needs to focus on (1) SN-specific construct validation and theory development; (2) individual characteristics or factors that play a role in SN research; (3) multiple research methods, especially qualitative methods and data analytics; (4) multiple research contexts such as different platforms, industries, and cultures; and (5) different types of use, long-term use, and changing social networks.

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Editor’s Note: The following reference list contains hyperlinks to World Wide Web pages. Readers who have the ability to access the Web directly from their word processor or are reading the paper on the Web, can gain direct access to these linked references. Readers are warned, however, that:

1. These links existed as of the date of publication but are not guaranteed to be working thereafter.
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³ According to the *CACM* website (<http://cacm.acm.org/about-communications/author-center/author-guidelines>), “the format and editorial structure of the Communications magazine underwent a significant change in 2008. A new editorial model was developed to broaden its appeal to both practitioners and researchers in industry and academia in all fields of computing and information technology.” Therefore, *CACM* is strongly practical, so our result is not surprising. Similarly, *CAIS* publishes “articles on a wide range of subjects of interest to the membership beyond research results” (<http://aisel.aisnet.org/cais/>).

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APPENDIX A: SUMMARY OF ALL SOCIAL NETWORKING ARTICLES INCLUDED IN OUR REVIEW

Citation	Journal	Topic	Methodology	Context	Dependent variable(s) predicted	Theory/theories used
Polites & Watson (2009)	CACM	TP5.1	ME 2.1.1	C5		
Kleinberg(2008)	CACM	TP4.1 TP5.2	ME 1.2	C5		
Howard (2008)	CACM	TP1.2 TP5.2	ME 1.2	C5		
Mann et al. (2009)	CACM	TP4.6	ME 1.1 ME 2.1.4	C3	Intention to use open-access publishing	Unified theory of acceptance and use of technology, theory of planned behavior
Chang(2010)	CACM	TP3	ME 1.2	C5		
Andriole (2010)	CACM	TP3 TP4.7	ME 2.1.4 ME 2.2.2	C1		
De Hertogh, Viaene, & Dedene (2011)	CACM	TP3	ME 1.2	C5		
Denning, Flores, & Luzmore (2010)	CACM	TP1.2	ME 2.1.2	C4		
(Häsel (2011)	CACM	TP3	ME 1.2	C5		
Sun & Poole (2010)	CACM	TP3	ME 1.2	C5		
Rhee, Sanders, & Simpson (2010)	CACM	TP2.1	ME 2.1.1 ME 2.1.4	C5	Strengths of real ego, virtual ego	

Citation	Journal	Topic	Methodology	Context	Dependent variable(s) predicted	Theory/theories used
Savage (2011)	<i>CACM</i>	TP3	ME 1.2	C5		
Kim et al. (2010)	<i>CACM</i>	TP3	ME 2.1.2 ME 1.2	C5	Perceived usefulness, perceived ease of use, perceived enjoyment, satisfaction, behavioral intention	
Szabo & Huberman (2010)	<i>CACM</i>	TP4.1 TP4.6	ME 2.1.1 ME 2.1.3	C3	Long-term popularity of online content	
Tiselli (2010)	<i>CACM</i>	TP3 TP4.1	ME 2.1.7	C3		
Vannoy & Palvia (2010)	<i>CACM</i>	TP4.1 TP1.2	ME 1.1	C3		Social influence model of technology adoption
De Alfaro et al. (2011)	<i>CACM</i>	TP2.1	ME 2.3	C3		
Backstrom, Dwork, & Kleinberg (2007)	<i>CACM</i>	TP2.3	ME1.3 ME2.1.7	C5		
Boldi et al. (2011)	<i>CACM</i>	TP 5.3	ME 2.1.6 ME 1.2	C3		
Chi (2012)	<i>CACM</i>	TP 1.2	ME 1.1	C3		
Choudhary, Hendrix, Lee, Palsetia, & Liao (2012)	<i>CACM</i>	TP 1.2	ME 2.1.7	C4		
Cusumano (2011)	<i>CACM</i>	TP 1.1 TP 1.2	ME 1.1	C3		
Doerr et al. (2012)	<i>CACM</i>	TP 1.3 TP 4.7	ME 1.3 ME 2.1.6	C3		
Gayo-Avello (2011)	<i>CACM</i>	TP 4.7 TP3	ME 2.1.7 ME1.2	C4		
Shneiderman et al. (2011)	<i>CACM</i>	TP5.2	ME1.1	C5		
Kearns (2012)	<i>CACM</i>	TP4.2 TP5.2	ME2.1.2	C5		
Majchrzak & More (2011)	<i>CACM</i>	TP3	ME1.2	C4		
Jabeur et al. (2013)	<i>CACM</i>	TP3	ME1.2	C5		
De Hertogh et al. (2011)	<i>CACM</i>	TP 1.2	ME 1.2	C1		
Cucchi & Fuhrer (2007)	<i>CAIS</i>	TP1.2 TP4.3	ME 2.1.3	C1	Centrality indexes	
Kim et al. (2009)	<i>CAIS</i>	TP5.2 TP3	ME 1.1	C5		
Lee et al. (2009)	<i>CAIS</i>	TP4.2 TP4.3	ME 2.1.2	C2	Viral speed, viral volume	
Smith & McKeen (2007)	<i>CAIS</i>	TP4.6 TP5.2	ME 2.1.1	C1		
Niederman et al. (2006)	<i>CAIS</i>	TP5.2	ME 1.1	C1		
Steiny (2009)	<i>CAIS</i>	TP3	ME 1.2	C5	Success of persuasive messages	



Citation	Journal	Topic	Methodology	Context	Dependent variable(s) predicted	Theory/theories used
Parameswaran & Whinston (2007)	CAIS	TP5.2	ME 1.1	C5		
Andreas, Minocha, & Christoph (2010)	CAIS	TP3 TP4.5	ME 1.2	C1		
Bryant (2010)	CAIS	TP5.3	ME 1.1	C5		
Carroll (2010)	CAIS	TP3	ME 1.2	C5		
Mennecke et al. (2008)	CAIS	TP3 TP5.2	ME 1.2	C5		
Hu et al. (2011)	CAIS	TP 1.2	ME 2.1.4	C3	Individuals' intention to use online social network services	Innovation diffusion theory, technology acceptance model
Huang & Güney (2012)	CAIS	TP 4.5 TP 4.3	ME 1.1	C1	Organizational learning	Social capital theory
Wang & Zhang (2012)	CAIS	TP 5.2	ME 1.1	C2		
Vidgen, Hennenberg, & Naudé (2007)	EJIS	TP1.2 TP5.1	ME 2.1.1	C1		
Busquets (2010)	EJIS	TP3 TP4.2	ME 2.2.1	C1	Innovation outcomes	
Kreps (2010)	EJIS	TP 5.3	ME 1.1	C3		
Posey et al. (2010)	EJIS	TP4.1 TP4.3	ME2.1.4	C4	Self-disclosure in online communities	Social exchange theory, social penetration theory, cross-cultural theory
Koch et al. (2012)	EJIS	TP 4.4 TP 4.2	ME 2.2.1 ME 2.2.2	C1	Emotional response to organizational SN sites	Boundary theory, theory of positive emotions
Schwarz et al. (2011)	EJIS	TP 1.2	ME 2.1.4 ME 2.2.2	C5	Virtual world intention to use	Hedonistic IS theory, social presence theory.
Mueller, Hutter, Fueller, & Matzler (2011)	ISJ	TP 4.6	ME 2.2.2 ME 2.1.7	C1 C3		
Goel et al. (2011)	ISJ	TP 1.2	ME 2.1.4 ME2.1.2	C3	Intention to return to virtual world	Spatial model of interaction and awareness-attention theory
Hahn et al. (2008)	ISR	TP1.1 TP4.1	ME 2.1.3	C1	Developers' decision to join project	Social network perspective
Forman, Ghose, & Wiesenfeld (2008)	ISR	TP4.3 TP4.4	ME 2.1.3	C2	Reviewers' disclosure of identity-descriptive information, helpfulness rating	Social identity theory, identity disclosure
Feller et al. (2008)	ISR	TP1.1 TP3	ME 1.1 ME 2.1.4 ME 2.2.1	C1	Network effectiveness (access to and transfer of strategic resources)	Multi-method theory building approach (based on business networks and communities)
Trier (2008)	ISR	TP1.1 TP2.2	ME 2.1.7 ME 1.2	C1		

Citation	Journal	Topic	Methodology	Context	Dependent variable(s) predicted	Theory/theories used
Hinz & Spann (2008)	<i>ISR</i>	TP4.1 TP4.2	ME 1.3 ME 2.1.2 ME 2.1.3	C2	Bidding behavior	
Kane & Alavi (2008)	<i>ISR</i>	TP4.2	ME 2.1.4	C1	Efficiency of care, quality of care	
Li & Hitt (2008)	<i>ISR</i>	TP4.1	ME 1.1 ME 2.1.3	C2	Product sale	
Bampo et al. (2008)	<i>ISR</i>	TP4.2	ME 1.2 ME 2.1.3	C2	Viral marketing campaign performance	
Robert et al. (2008)	<i>ISR</i>	TP4.2 TP4.6	ME 2.1.2	C1	Team decision quality	Social capital
Chellappa & Saraf (2010)	<i>ISR</i>	TP4.2	ME 2.1.3 ME 2.1.5	C1	Firm performance	Social network theory, resource dependence theory
Chi et al. (2010)	<i>ISR</i>	TP4.1	ME 2.1.7	C1	Firms' competitive action volume, action complexity, action heterogeneity	Awareness motivation-capability framework
Gnyawali, Fan, & Penner (2010)	<i>ISR</i>	TP4.2	ME2.1.7	C1	Firm performance	
Chang, Oh, Pinsonneault, & Kwon (2010)	<i>ISR</i>	TP4.2	ME 2.1.2 ME 2.3	C2	Intention to purchase	Stimulus-organism-response (S-O-R) framework
Miller & Tucker (2013)	<i>ISR</i>	TP1.2	ME2.1 .7	C1	Firm equity value (risk and stock return)	Information symmetry in the stock market
Xia et al. (2012)	<i>ISR</i>	TP4.1	ME 2.1.7	C3	Continued music sharing	Reciprocity, altruism theory
Bateman et al. (2011)	<i>ISR</i>	TP1.2	ME2.1.4	C3	Participating in online communities (reading, posting, moderating)	Commitment theory
Claussen et al. (2013)	<i>ISR</i>	TP3 TP1.3	ME2.1.7 ME1.3	C1	Application success	
Zeng & Wei (2013)	<i>ISR</i>	TP3 TP4.1	ME2.1.7	C3	Similarity in content (pictures) posted	
Aggarwal, Gopal, & Sankaranarayanan (2012)	<i>ISR</i>	TP3 TP4.7	ME2.1.7 ME1.3	C1	Readership of employee blogs	Attribution theory
Oh, Susarla, & Tan (2008)	<i>ISR</i>	TP4.1	ME1.3 ME2.1.1 ME2.1.7	C5	Rate of video diffusion	Social contagion, diffusion of technological innovations
Fang et al. (2013)	<i>ISR</i>	TP4.1	ME1.3 ME2.1.7	C2	Social network adoption probability	Relies on social information processing model, comparison theory, social influence network theory
Goh et al. (2013)	<i>ISR</i>	TP4.1	ME1.3 ME2.1.7 ME2.3	C2	Consumer purchase behavior	



Citation	Journal	Topic	Methodology	Context	Dependent variable(s) predicted	Theory/theories used
Kim et al. (2012)	<i>ISR</i>	TP4.1	ME2.1.4 ME2.2.2	C3	Intention to purchase (digital) items, mediator (desire for online self-presentation)	Theory of self-presentation
Hildebrand et al. (2013)	<i>ISR</i>	TP4.1 TP4.2	ME2.1.3 ME2.1.2	C2	Consequences of community feedback (deviation from initial preference toward community feedback, satisfaction with self-design, variety of self-designs)	Social influence theory
Wu (2013)	<i>ISR</i>	TP4.2	ME2.1.7 ME2.3	C1	Productivity, job security	
Rishika et al. (2013)	<i>ISR</i>	TP4.2	ME2.1.7 ME2.1.4 ME1.3	C2	Customers' intensity of relationship with the firm, profitability	
Dou, Niculescu, & Wu (2013)	<i>ISR</i>	TP4.2	ME1.3	C2	Optimization of the network strength (right market seeding and pricing strategies)	
Parameswaran & Whinston (2007)	<i>J AIS</i>	TP5.3	ME 1.1	C5		
Wasko et al. (2004)	<i>J AIS</i>	TP4.1 TP4.6	ME 1.1	C3	Knowledge contribution	Theories of social networks and collective action
Polites & Watson (2009)	<i>J AIS</i>	TP5.1	ME 2.1.1	C5		
Kudaravalli & Faraj (2008)	<i>J AIS</i>	TP4.2 TP4.6	ME 1.1 ME 2.1.3	C1	Effectiveness of collaboration	
Putzke, Schoder, & Gloor (2010)	<i>J AIS</i>	TP1.1 TP4.2	ME 2.1.7	C3	Performance in the game	Theories of social selection and influence
(Ridings & Wasko, 2010)	<i>J AIS</i>	TP1.2 TP4.1	ME 2.1.3 ME 2.2.1	C3		
Goh & Wasko (2012)	<i>J AIS</i>	TP 4.2 TP 4.3	ME 2.1.4 ME 2.1.3	C3	Member performance	Leader-member exchange theory
Schmeil, Eppler, & de Freitas (2012)	<i>J AIS</i>	TP 4.5	ME 1.1 ME 2.2.1.	C3		
Chandra, Srivastava, & Theng (2012)	<i>J AIS</i>	TP 1.2 TP 4.3 TP 4.1	ME 2.1.4	C1 C3		
Nardon & Aten (2012)	<i>J AIS</i>	TP 1.2	ME 2.2.2 ME 2.2.1 ME 2.1.4	C1		
Venkatesh & Windeler (2012)	<i>J AIS</i>	TP 4.2 TP 4.1 TP 1.2	ME 2.1.3 ME 2.1.4	C1	Team performance	
Xu et al. (2011)	<i>J AIS</i>	TP1.2 TP4.3	ME2.1.4	C5	Privacy concerns	Communication privacy management theory

Citation	Journal	Topic	Methodology	Context	Dependent variable(s) predicted	Theory/theories used
Cheng et al. (2011)	<i>J AIS</i>	TP2.1 TP3	ME1.2 ME2.1.7 ME1.3	C5		
Howison et al. (2011)	<i>J AIS</i>	TP2.3	ME1.2	C5		
Chandra et al. (2012)	<i>J AIS</i>	TP 1.2	ME 2.1.4	C3	Adaptive intention to use the virtual world for workplace collaboration.	Social cognitive theory
Whelan (2007)	<i>JIT</i>	TP4.1 TP4.6	ME 1.1	C1		Social network theory
Skågeby (2010)	<i>JIT</i>	TP 5.3	ME 1.1	C3		
Shen et al. (2010)	<i>JIT</i>	TP1.2 TP3	ME 2.1.4	C5	We-intention	Theory of reasoned action, social influence theory
van den Hooff et al. (2010)	<i>JIT</i>	TP1.2 TP4.2	ME 2.1.4	C3	Performance	
Tow et al. (2010)	<i>JIT</i>	TP4.3	ME 2.1.4 ME 2.2.1 ME 2.2.2	C3		
Škerlavaj et al. (2010)	<i>JIT</i>	TP1.1 TP4.5	ME 2.1.1 ME 2.1.4	C1		Cognitive theory, theories of homophily and proximity, theories of social exchange, theory of generalized exchange, small worlds theory, social process theory
Khan & Jarvenpaa (2010)	<i>JIT</i>	TP3 TP1.2	ME 2.1.1 ME 2.1.7	C3		
Gonzalez-Bailon, Kaltenbrunner, & Branchs (2010)	<i>JIT</i>	TP1.1	ME2.1.7	C3		Deliberative theory
García-Crespo et al. (2010)	<i>JIT</i>	TP2.1	ME 1.2 ME 2.1.3	C2		
Krasnova et al. (2010)	<i>JIT</i>	TP4.1 TP4.3	ME 2.1.4	C5	Self-disclosure	Social exchange theory
Amrit & Van Hillegersberg (2010)	<i>JIT</i>	TP1.2	ME 1.1 ME 2.2.1	C1		
Ameripour et al. (2010)	<i>JIT</i>	TP3 TP4.1	ME 2.2.1 ME 2.2.2 ME2.1.7	C4		
Oh et al. (2005)	<i>JMIS</i>	TP4.6	ME 2.1.1	C1	Researchers' academic performance	Taxonomy of IS research, concept of social capital
Montazemi et al. (2008)	<i>JMIS</i>	TP4.1	ME 2.2.2	C2	Use of electronic trading systems	Network relation model
Bolton et al. (2008)	<i>JMIS</i>	TP4.2 TP4.3	ME 2.1.2	C2	Trust, trustworthiness, market efficiency	Theory of signaling from information economics



Citation	Journal	Topic	Methodology	Context	Dependent variable(s) predicted	Theory/theories used
Guo, Vogel, Zhou, Zhang, & Chen (2009)	<i>JMIS</i>	TP5.3	ME 1.1	C5		Chaos theory
Bruque et al. (2008)	<i>JMIS</i>	TP4.1	ME 2.1.4 ME 2.1.5	C1	Employees' adaptation to new technology in organizations	Individual adaptation, social networks framework, network classifications framework
Forte, Larco, & Bruckman (2009)	<i>JMIS</i>	TP1.2 TP3	ME 2.2.2	C3	Hidden order of Wikipedia	
Xu, Kim, & Kankanhalli (2010)	<i>JMIS</i>	TP1.2 TP4.6	ME 2.1.4	C1	Source preference, sourcing frequency in dyadic information seeking	Relational communication theory
Wattal et al. (2010)	<i>JMIS</i>	TP3 TP4.1 TP1.2	ME 2.1.7 ME2.2.2	C1	Employee blog usage	Theory of network externalities
Tang et al. (2012)	<i>JMIS</i>	TP1.1 TP4.6	ME 1.3 ME2.1.7s	C5	Contributors' content contribution behavior	Revenue sharing, reputation, content contribution theories
Zhou et al. (2012)	<i>JMIS</i>	TP1.2	ME2.1.4	C3	Social virtual world customers' continuance intention	Dedication-constraint framework of commitment
Lee & Chen (2011-12)	<i>JMIS</i>	TP1.2	ME2.1.4	C3	Use intention of virtual worlds	Website usability, psychological ownership
Chen et al. (2011)	<i>JMIS</i>	TP1.1	ME1.3	C5	Commentators' incentive to generate useful information, information quality	
Lowry et al. (2011)	<i>JMIS</i>	TP1.2	ME2.1.4	C4	Attitudes toward, intention to use, actual use of self-disclosure technologies	Social exchange theory, cross-cultural model
Arazy et al. (2011)	<i>JMIS</i>	TP3 TP4.6	ME2.1.7	C5	Quality of Wikipedia articles	Extensive organizational theory, group composition literature
Garg et al. (2011)	<i>JMIS</i>	TP4.1 TP2.1	ME1.3 ME2.1.7	C5	Diffusion of new music	
Sarker et al. (2011)	<i>JMIS</i>	TP4.2 TP4.3	ME2.1.3 ME2.1.1	C1	Individual performance as perceived by team members in global virtual teams	Networked individualism paradigm, trust and communication centrality
Chai et al. (2012)	<i>JMIS</i>	TP4.6	ME2.1.4	C3	Bloggers' knowledge-sharing behavior	Social capital and social role theory
Von Krogh (2012)	<i>JSIS</i>	TP 4.6 TP 5.2	ME 1.1	C1		
Sykes et al. (2009)	<i>MISQ</i>	TP4.1	ME 2.1.4 ME 2.1.1	C1	System use	Model of acceptance with peer support
Yoo (2010)	<i>MISQ</i>	TP5.2	ME 1.1	C3		Conceptual framework of experiential computing

Citation	Journal	Topic	Methodology	Context	Dependent variable(s) predicted	Theory/theories used
Ren et al. (2012)	<i>MISQ</i>	TP1.2	ME2.1.3	C3	Behavior outcomes including willingness to help the subgroup, participation, retention, and willingness to help individual members in online communities	Group identity, interpersonal bonds, attachment
Kohler et al. (2011)	<i>MISQ</i>	TP1.2	ME2.3 ME2.2.2	C1		Virtual customer environment experience framework
Goel et al. (2011)	<i>MISQ</i>	TP1.2	ME2.1.2	C1	Intention to return to virtual worlds	Interactionist theory of place attachment
Roquilly (2011)	<i>MISQ</i>	TP1.3	ME2.3	C2		
Berente et al. (2011)	<i>MISQ</i>	TP3 TP5.3	ME2.3	C1	Organizational value of virtual worlds	Deconstructing practical reasoning framework
Chaturvedi et al. (2011)	<i>MISQ</i>	TP3	ME1.2 ME1.1	C5		Information structure framework
Park et al. (2012)	<i>MISQ</i>	TP2.1	ME1.2 ME1.3 ME2.1.1 ME2.1.7 ME2.1.6	C2	Accuracy of self-reported user profile data	Data quality validation, homophilic ties in social networks, social network-based inference framework
Chau & Xu (2012)	<i>MISQ</i>	TP2.1	ME1.2 ME2.2.1	C5		
Animesh et al. (2011)	<i>MISQ</i>	TP4.1	ME2.1.4	C3	Intention to purchase virtual products	Symbolic consumption, S-O-R framework
Suh, Kim, & Suh (2011)	<i>MISQ</i>	TP4.1 TP4.4	ME2.1.2	C2	Intention to use avatar	Dual-congruity perspective, self-congruity, functional congruity
Nah et al. (2011)	<i>MISQ</i>	TP4.1 TP4.4	ME2.1.2	C2	Brand equity, behavioral intention	Theory of flow, theory of telepresence, theory of positive emotions, theory of brand equity
Ransbotham & Kane (2011)	<i>MISQ</i>	TP4.6 TP4.2	ME2.1.7	C5	Collaborative outcomes (knowledge creation and knowledge retention)	Three views of turnover in organizations

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