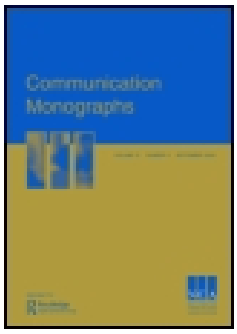

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Social Media Research: An Assessment of the Domain's Productivity and Intellectual Evolution

Wietske van Osch & Constantinos K. Coursaris

The purpose of this study is to conduct a bibliographic investigation and meta-analysis of the full body of social media scholarship produced over eight years, since the domain's emergence in 2004. A total of 610 journal and conference papers were carefully reviewed and subjected to bibliometric and meta-analysis techniques. A number of research questions pertaining to country, institutional, and individual productivity, as well as research design and data practices in the social media field, were proposed and answered. Our results reveal two main challenges faced by the field. First, the social media domain displays limited intellectual diversity in terms of productive and impactful actors—individual, institutions, and countries—as well as publications that have hitherto skewed the domain's focus in a limited direction. Second, the research design approaches and data practices characterizing the domain seem to reflect methodological singularity characterized by a strong tendency for cross-sectional, individual-level, survey or case-based studies. Furthermore, speculative and anecdotal evidence, based on personal opinions and armchair hypotheses, is extremely widespread and stand in the way of the domain's methodological and theoretical advancement. These challenges not only help to improve one's understanding of the identity and intellectual core of social media as a distinct scientific field but can also further prompt academic debate and careful (re)examination of the domain's scholarly practices and assumptions to ensure its future advancement in the most productive manner.

Keywords: Social Media; Social Network Sites; Online Social Networks; Bibliographic Analysis; Research Productivity; Meta-analysis; Literature Review; Data Practices; Research Design

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Even though core questions and concepts as studied by social media researchers have been puzzling communication researchers for many years, the relatively recent emergence and growing popularity of social network sites and other Web 2.0 technologies have made the social media domain an attractive area of research. Although the domain has not yet established its own theories and refereed journals, the social media research field is characterized by a proliferation of scholarship and has become critical to many different academic disciplines' courses and discourses.

Over nearly a decade, there has been a remarkable increase in papers, books, and job titles all related to social media. In fact, it was the publication of Donath and Boyd's (2004) paper on social network sites that marked the birth of and provided the initial impetus for this novel research and practitioner domain. The term *social media* has become rapidly incorporated into the new lexicon of academia, industry, and government institutions.

This initial momentum was supported by a string of popular books, endorsements by respected scholars, such as Joseph Walther (Michigan State University) and Caroline Haythornthwaite (University of British Columbia) as well as practitioner icons, such as Clay Shirky and James Surowiecki, and frequent media attention for big social media corporations such as Facebook, all of which helped place the social media phenomenon at the heart of academic and mundane debates alike. Social media's unprecedented popularity and reach, combined with its repercussions on many socio-psychological phenomena of interest to the academic community—including interactions, dating, identity, and harassment—and public concerns over privacy and security, provided the perfect ingredients for a new field with a promising future.

Why, then, is it important to establish the identity of social media as a research domain rather than letting it evolve on its own? To answer this question, we draw on two sets of literature—bibliometrics/scientometrics (cf., Garfield, 2009; Leydesdorff, 1989; Leydesdorff & Besselaar, 1997; Serenko & Bontis, 2009) and organizational identity (Sidorova, Evangelopoulos, Valacich, & Ramakrishnan, 2008)—as the underpinning for three important motivations. First, an understanding of the identity, evolution, and dominant research practices of a particular scientific domain affects the subsequent behavior and decisions of scientists and practitioners operating in the same domain. It may influence their selection of topics and questions, research methods, collaboration patterns, mentors, or even doctoral supervisors (cf., Serenko, Bontis, Booker, Sadeddin, & Hardie, 2010). Second, identity is directly correlated with the overall image of a domain among important external stakeholders, including research grant agencies, university administrators, tenure and promotion committees, and prospective students. The lack of a clear or positive image could negatively affect funding, hiring, or tenure decisions (Serenko & Bontis, 2004). Third, in each scholarly domain, there are multiple individuals who shape the state and development of a field through their role as journal editors, reviewers, conference organizers, influential scholars, or practitioner experts. Their decisions immediately affect the field's potential for future advancement. Providing a clear understanding of the field's identity—its past, present, and possible future—may help these central actors

examine and reexamine the core practices and assumptions of the social media domain to ensure that it progresses in the most beneficial manner with respect to impact, overall viability, and future prospects.

Consequently, the identity of the social media research domain is a critical issue that embraces the field's overall state and intellectual core by aggregating hundreds of individual works at a higher level of abstraction. The purpose of this study is to conduct a bibliographic analysis and meta-analysis of the body of social media literature as published since October 2004 in refereed journals and conference proceedings.

Before doing so, it is important to outline briefly our perceptions of social media as a research field. First, we purposely label social media as a "domain" rather than a "discipline" as it lacks certain necessary features of being a stand-alone discipline. Specifically, it does not have its own place in academic curricula and department structures (Bontis, Serenko, & Biktimirov, 2006; Pierce, 1991; Ruth, Shaw, & Frizzell, 2003), and although it has started publishing a few of its own peer-reviewed outlets, social media has not yet become a reference discipline that offers theoretical or practical impact on other disciplines (Serenko & Bontis, 2013a, 2013b).

Second, although social media is treated in this study as a domain, we do not view it as a scientific fad (Abrahamson, 1991, 2009) or short-lived academic hype, as the domain is both characterized by a continuous increase—indeed explosion—in relevant published works (see Figure 1). Furthermore, social media represent a specific subset of information (and communication) technologies (IT/ICT) with their own unique characteristics and affordances (Leonardi, Huysman, & Steinfield, 2013; Treem & Leonardi, 2012) that warrant analysis and consideration as a discrete component of a greater IT strategy or implementation, which translates to a long lifetime both in academia and in practice.

Consistent with previous bibliographic and meta-analytical studies, a number of research questions pertaining to country, institution, and individual productivity, as well as research design and data practices, are proposed and answered (cf., Serenko, 2013; Serenko & Bontis, 2013a, 2013b; Serenko et al., 2010). Although recent editorial notes have anecdotally reflected on the atheoretical nature of social media research (cf., Walther & Jang, 2012), this study is the first data-driven and most

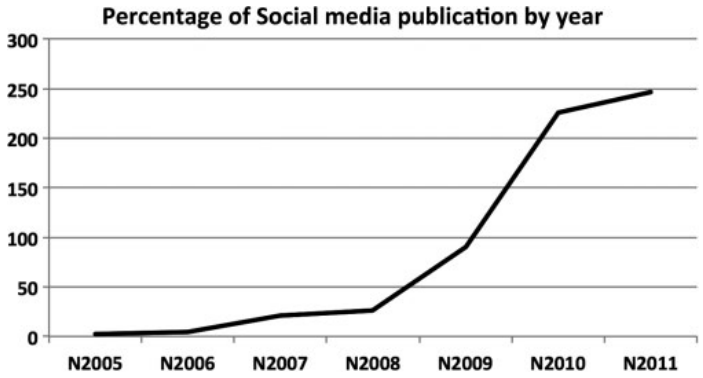

Figure 1 Published social media articles per ABI/Inform index (since 2005).

comprehensive bibliographic analysis of the social media domain to date. Based on the findings, a set of conclusions and challenges will be presented that not only improve our understanding of the identity of the social media domain, but may also inform its future progression toward desirable goals.

Literature Review and Research Questions

The concept of bibliometrics was first established by Pritchard (1969), who viewed it as "the application of mathematical and statistical methods to books and other media of communication" (p. 348). Yet, the use of bibliometrics—often used interchangeably with the term scientometrics—as a tool for analyzing science became popularized primarily through the works of Price (1963), Garfield (1972, 2009), and Merton (1973).[1]

With the establishment of bibliometrics as a self-sustained field (Garfield, 2009), two basic approaches to bibliometric analysis have emerged (Neufeld, Fang, & Huff, 2007). The first approach, referred to as the *descriptive* approach, involves the observation and numerical reporting of scholarly activities in the field with a focus on productivity and impact. The second, referred to as the *normative* approach, establishes norms, rules, and heuristics to inform desirable intellectual advancement of the domain. Based on the above classification, this study belongs to the type of bibliographic studies referred to as *descriptive* and thus focuses on the quantitative rather than normative assessment of the performance within the social media research domain.

Given that the quantitative analysis of scientific communications, citation impacts, and productivity rankings of individual researchers, publications, and institutions is particularly relevant for scientific domains that are in an embryonic stage (Serenko et al., 2010), this study aims to provide a comprehensive analysis of the social media domain by combining three levels of analysis, namely macro (i.e., countries), meso (i.e., institutions), and micro (i.e., individual authors and publications). As such, this study aims to provide broader, more reliable insights into this domain than can be achieved by addressing one level of analysis alone.

Most bibliographic studies in the social and management sciences over past two decades have targeted a very specific area of interest, such as knowledge management (Serenko & Bontis, 2009), industrial–organizational psychology doctoral programs in North America (Gibby, Reeve, Grauer, & Mohr, 2002; Surrette & College, 2002), computer science (Goodrum, McCain, Lawrence, & Lee Giles, 2001), technology innovation management (Cheng, Kumar, Motwani, Reisman, & Madan, 1999), operations research (Vokurka, 1996), or management information systems (Grover, Segars, & Simon, 1992; Im, Kim, & Kim, 1998), usually through the analysis of a specific subset of journals or conference proceedings within the overall knowledge domain (e.g., Cocosila, Serenko, & Turel, 2011; Serenko & Bontis, 2004). Our study, based on the abovementioned aim of offering a comprehensive view of the social media research domain, targets a single research domain, but without restricting itself to a specific subset of journals given the nascent and interdisciplinary nature of the

domain and the popularity of conferences as a vehicle for social media research dissemination. By so doing, this study addresses nine key research questions pertaining to two sets of analyses, namely a research productivity analysis through bibliometric techniques and a research design analysis through meta-analytic procedures.

Country-, institutional-, and individual-level research productivity has been a traditional focus of bibliographic research (Manning & Barrette, 2005). In particular, in the competition for research funding, a bibliographic analysis of productivity becomes critically important. Understanding which countries, institutions, and individuals develop and display strong competencies in the social media domain may influence the funding decisions of national and international grant agencies or private sector companies. Furthermore, it may affect career and educational choices by new faculty and students, respectively. Consequently, we propose the following research questions:

RQ1: What is the country productivity ranking in the social media domain?

RQ2: What is the institutional productivity ranking in the social media domain?

RQ3: What is the individual productivity ranking in the social media domain?

These questions are important insofar as country-level research productivity (i.e., a nation's scientific output) has been linked to its wealth and growth in gross domestic product (GDP) (cf., Hart & Sommerfeld, 1998; Ruiz, Navarro, & Pena, 2011). Similarly, institutional and individual productivity rankings affect the ability of institutions and individuals to compete successfully for external funding (Serenko & Bontis, 2004).

A major challenge in determining individual faculty productivity involves assigning credit for multiauthored papers. A review of previous research productivity studies (cf., Serenko et al., 2010) revealed four basic approaches to assigning scores to a multiauthor article: (1) straight count, (2) author position, (3) normalized page size, and (4) equal credit. In line with previous suggestions (cf., Serenko et al., 2010), we found that for an embryonic and exploding field such as social media, the equal credit approach is best suited for (1) appreciating the influence of sole authorship and (2) grasping the diversity of authorship practices across the social media literature, while (3) avoiding the deflation of coauthorship and research cooperation. Using the equal credit approach, each author received an equal portion of the score regardless of authorship order. Thus the author of a solo-authored paper received 1 credit, both authors of a two-authored paper received 0.5 credits, and so on. Also, evidence exists that the straight count, author position, and equal credit methods produce comparable results (Serenko, Cocosila, & Turel, 2008). Hence, we employed the equal credit approach in this study.

Researchers can use the findings of this bibliographic analysis for a variety of purposes, such as identifying research trends, discovering un(der)studied topics, and exploring novel research design directions or data practices. Preferred research design and data practices differ across disciplines and may be subject to change over

time. Given the multidisciplinarity of the social media domain, one would anticipate a diversity of research design and data practices in its scholarship.

Assessing the overall quality of the field's repository of research data and instruments in terms of intrinsic—let alone external—validity is an ambitious undertaking that is outside the scope of this study. However, in line with the objectives of this study, we opt to examine the type and complexity of the overall body of knowledge and corpora of data in the social media domain as an indication for the available data resources and the means to its production. Furthermore, data type and complexity also provide an indication for the kind of phenomena under investigation, the extent of the possible knowledge claims, and the alignment between the scope of overall research outputs and the intended scope of the body of knowledge being sought.

With that in mind, the meta-analytic portion of this study aims to disentangle the following aspects of research design and data practices in the social media field:

RQ4: What is the relative proportion of conceptual and empirical papers?

RQ5: What is the relative proportion of quantitative, qualitative, and mixed-method studies?

RQ6: What is the proportion of cross-sectional to longitudinal studies?

RQ7: What is the most frequently applied (i.e., dominant) unit of analysis?

RQ8: What is the sample size of social media studies and how often is it reported?

RQ9: What methods of data collection are most frequently applied?

The investigation of these six questions regarding research design and data practices allows for further consolidation of social media research in order to develop recommendations for future social media researchers and to better understand the identity of the domain (Serenko, 2013). Research design and data practices are the strongest indicators of the scientific rigor of a research domain. They affect the image of a research domain held by influential stakeholders and therefore affect the future success or failure of the domain's academic progression and recognition (Serenko, 2013; Serenko & Bontis, 2013a, 2013b). Answering these questions may therefore provide all stakeholders with a realistic and valid description of the social media domain—including anomalies and deficiencies—in order to support them in their future decision-making and corrective actions if necessary (Straub, 2006).

In order to answer our nine research questions, we collected, reviewed, and systematically analyzed 610 social media papers from a variety of journals and conferences. The next section outlines the data collection and analysis process.

Method

The data collection and analysis were independently performed by a pair of research associates and subsequently reconfirmed by the authors of this study. The following

is a summary of the steps that were completed as part of the data collection and analysis process.

Data Collection

To understand the state of social media research, an extensive bibliographic analysis was conducted in the spring of 2012. Hereto, we conducted a broad search for papers containing social media-related search terms, as further discussed below, regardless of the primary domain and outlet type. Given the embryonic and interdisciplinary nature of the social media domain, a focus on journal articles alone would provide an incomplete and erroneous view of the field. Thus, when we discuss social media research, we are referring to the entire body of knowledge from a broad set of outlets rather than a narrow subset of communication and IT journals. Our final data-set included all 610 journal and full-text conference papers[2] published from the origination of the domain in October 2004 to December 2011.

The starting point of October 2004 was selected for two reasons. First, after carefully reviewing five articles that used the term "social media" before this date, we found that none of these articles used the term to refer to Internet-based tools that are founded on the principles of Web 2.0 (Kaplan & Haenlein, 2010). Second, the first paper using social media to refer to this specific subset of ICTs was the paper by Donath and boyd (2004) on social network sites that provided the initial impetus for this novel research domain.

In our search, we used all ProQuest databases and conducted an advanced search using the following keywords: social medium, social media, social network site(s), social networking site(s), and online social network(s). We limited our search to full-text, peer-reviewed papers written in English and published in one of three sources (conference papers, conference proceedings, and scholarly journals) and/or as three document types (articles, conference papers, and conference proceedings).

This search resulted in a total of 1,920 papers, out of which a total of 1,050 unique scholarly papers[3] were identified. The 1,050 unique papers were identified after a careful data cleansing process, wherein all manuscripts were manually reviewed for matching titles and any duplicates were removed. In the very few cases when a matching title appeared both as a conference and as a journal publication, we preserved the journal publication only and considered the conference paper to be an earlier version for which author(s) were not given double credit.

Before proceeding to the actual bibliographic and meta-analysis, the two research assistants first independently judged the relevance of individual papers (interrater agreement score = 92%). The main criterion for the inclusion of an academic paper in this analysis was the use of the term "social media" or any of the related search terms as either the core technology analyzed or part of the core argument developed in the paper rather than merely as a self-identified keyword by the authors of the paper. All disagreements were discussed and reconciled prior to proceeding with the analysis. After removing irrelevant papers, our data-set included 688 research papers. From these 688, we were unable to retrieve 78 papers from the Internet[4] or after

personally requesting a copy from the authors via email. Hence, our final data-set for analysis included 610 papers.

Data Analysis

Research productivity. Computing the *research productivity rankings* of individual authors, institutions, and countries involved three consecutive steps. First, a list of all authors who published at least one scholarly journal or conference paper published between October 1, 2004 and December 31, 2011 was created. Editorials, book reviews, and interviews were excluded from the analysis. Second, the final list of names was validated and revised when needed by cross-checking references to identify potential double entries, misspelled authors' names, and inconsistent nomenclature of author names and/or affiliations, as these would impede and invalidate the automatic generation of productivity rankings. Third, the actual publication rankings for individual authors were calculated per paper as well as for the sum of all publications for any given author. The same calculation was computed for every academic institution or organization as well as for every country based on the sum scores of all authors associated with that institution, organization, or country. For authors associated with more than one institutional affiliation, we captured only the primary affiliation as listed by each author.

Research design and data practices. In addition to the calculation of productivity rankings at the macro, meso, and micro levels, all 610 papers were subjected to an in-depth review and coded by two independent research associates with respect to important research design and data practices, including article type, methodological approach, and unit of analysis.

Before commencing the data analysis process, the two coders were trained using a coding manual that offered definitions and examples of each of the components in the coding scheme (see Appendix). The coding manual also offers the detailed operationalizations of all the research design and data practices, such as article type, methodological approach, research method, unit of analysis, and sample size.

Following the training, a pilot study of an unrelated data-set (including human–computer interaction papers) was used to assess the validity of the coding scheme. An initial interrater reliability coefficient of 0.75 (omnibus Cohen's kappa value[5]) and 94% (percentage agreement) provided an adequate assessment of the coding scheme validity and the coding process reliability. Any remaining disagreements were discussed and reconciled.

Following the assessment of adequate interrater reliability and the reconciliation of findings, the final results of the various components of the coding scheme were summarized in separate tables for further analysis of the intellectual core of the social media domain and the assessment of dominant research design and data practices.

Results

This section reports results pertaining to the productivity rankings of authors, institutions, and countries based on the bibliographic analysis as well as the dominant research design and data practices of publications based on a meta-analysis. Before discussing the findings of this study in detail, we want to highlight a few critical issues pertaining to their interpretation. First, research productivity is operationalized in terms of the number of publications. Although other measures of productivity may be employed (e.g., total grant funding acquired, teaching, and participation in committees or editorial boards, all of which may also advance the state of social media research), the quantity of publications is the most frequently used measure of research productivity, given its fundamental importance to academia.

Second, in this project, we included all social media publications as retrieved through ProQuest. Although we tried to be as comprehensive in our search as possible, through the inclusion of conference papers and proceedings in addition to journal articles, social media scholarship may also appear in nonincluded outlets, including books, nonarchival conference proceedings, or conference proceedings for which no full text is available. Third, research productivity should not be viewed as a proxy for research quality. To evaluate research quality, the research design and data practices are critically reviewed; however, additional qualitative and cognitive measures need to be employed, as will be further elaborated in the Discussion section.

Fourth, institutional productivity and country productivity rankings favor larger faculties and more populated countries that produce more publications in general. This issue applies not only to the social media domain but also to all scientific areas (Serenko et al., 2010). Fifth, despite extensive and repeated effort to remove inconsistencies and errors in names and/or affiliations, minor errors may remain. Consequently, we strongly suggest that readers be cognizant of these issues when interpreting the results.

General Trends

During the period under investigation (October 2004 to December 2011), 610 journal and conference papers were published by a total of 1,355 authors (i.e., including double-counting), out of which 1,249 unique authors were identified (i.e., excluding double-counting). In addition to overall authorship, the level of author contribution for the social media domain reveals an average of 2.0 unique authors per article. This authorship contribution was high when compared to other domains—for instance, 1.73 in knowledge management (Serenko, Bontis, & Grant, 2009) and 1.97 in information systems (Bapna & Marsden, 2002)—highlighting the highly collaborative nature of social media research.

Further investigation demonstrates that 37.3% of papers (n = 228 papers) were written by a single author, whereas 27.2% (n = 166) had two authors, 19.4% (n = 118) had three authors, and 16.1% (n = 98) had four or more authors. Thus, about one-third

of the domain's papers are solo-authored and two-thirds are multiauthored papers. This finding is consistent with those reported for knowledge management (34% solo-authored papers; Serenko et al., 2009) and slightly higher than those for information systems (25% solo-authored papers; Bapna & Marsden, 2002).

Productivity Rankings

To investigate individual productivity rankings, we created a list of the top academics and practitioners with an individual productivity score exceeding 1 (Table 1). We selected this threshold as it produces a relatively short list of the 78 top academics and practitioners, which is in line with the recommended minimum of 60 (Serenko & Bontis, 2004) for bibliographic studies so as to incentivize continued scholarship (i.e., avoid the "one-off") by new researchers.

Exploring the relative contribution by the most active scholars in the social media domain, our findings show that the top three researchers in the social media domain produce 2.1% of all scholarship. The next 25 researchers and the remainder of all scholars contributing to the social media domain (i.e., 1,221 researchers) produce an additional 10.2% and 87.7%, respectively. Hence, it is encouraging to observe that the social media scholarship stream emerges out of a wide base of active researchers rather than from a narrow band of social media investigators.

To investigate institution productivity rankings, 1,305 institutional affiliations associated with the reviewed social media scholarship were identified. Of those, 493 institutions were unique, indicating an average productivity of 2.65 publications per institution. As with the abovementioned ranking of scholars, we wanted to highlight a relatively short list of institutions that are most active in the social media domain, so we selected a cut-off of 2 (i.e., a score that would correspond to two solo-authored publications produced by a contributor affiliated with the institution), which resulted in the top 67 unique institutions as shown in Table 2.

Table 2 includes three metrics: the total (normalized[6]) score of each institution (accounting for multiauthor papers), the total number of contributors, and the average individual researcher contribution score (which is the ratio of the total score and the number of individual contributors in a particular organization).

Five additional findings are worth mentioning. First, if we assess the contribution of the 5 most productive institutions relative to the remaining 62 institutions, we see that the University of Texas at Austin, University of Maryland, Harvard University, Michigan State University, and the University of Arizona generate 5.0%, 4.8%, 3.4%, 3.0%, and 2.8% of all social media scholarship, respectively, with the remainder of all institutions (n = 62) accounting for 81.1% of all scholarship.

Second, among the top 67 institutions in the social media domain, only 2 were nonacademic, Microsoft Research and Mayo Clinic, whereas a third one, IBM, appeared in the top 100 (89th place). Third, out of the top 67 institutions, 42 (63.6%) are from the USA, followed by 7 (10.6%) from the UK, 5 (7.6%) from Australia, 4 (6.1%) from Canada, 3 from the Netherlands (4.5%), and 1 (1.5%) each from South Korea, China, Sweden, New Zealand, and Ireland. These findings suggest that

Table 1 Individual productivity scores[a] for social media researchers (2004–2011).

Authors	No.	NPI[b]	Authors	No.	NPI	Authors	No.	NPI	Authors	No.	NPI
Thelwal, Mike	5	2.58	Barnes, Michael	2	0.31	Kramer, Nicole C	2	1.00	Rose, Chris	2	2.00
Chen, Hsinchun	4	2.00	Bottles, Kent	2	1.50	Kunz, Michelle	2	0.75	Ross, Craig	2	0.33
Greenhow, Christine	4	2.33	Brockman, Libby	2	0.58	Lackaff, Derek	2	0.67	Russo, Angelina	2	0.58
Berthon, Pierre	3	0.87	Cheung, Christy MK	2	0.83	Lampe, Cliff	2	0.50	Sams, Steven	2	0.45
boyd, danah	3	2.00	Choi, Sejung Marina	2	0.75	Lariscy, Ruthann	2	0.50	Segerberg, Alexandra	2	1.00
Cain, Jeff	3	1.83	Christakis, Dimitri A	2	0.42	Lazaroiu, George	2	0.40	Siibak, Andra	2	1.25
Chretien, Katherine C	3	0.92	Christofides, Emily	2	0.67	Ledbetter, Andrew	2	0.67	Simmering, Mary G	2	0.33
Ellison, Nicole B	3	1.00	Chu, Shu-Chuan	2	1.50	Lee, Matthew KO	2	0.83	Sisic, Mia	2	0.33
Hsiao, Kuo-Lun	3	1.70	Conole, Grainne	2	0.83	Lehavot, Keren	2	1.33	Sohn, Dongyoung	2	0.58
Kim, Yoojung	3	0.83	Culver, Juliette	2	0.83	Light, Ben	2	0.83	Stefanone, Michael A	2	0.67
Kind, Terry	3	0.92	Desmarais, Serge	2	0.67	McIntyre, Emily	2	0.31	Sweetser, Kaye D	2	1.33
Moreno, Megan A	3	0.75	Gilpin, Dawn	2	1.33	Muise, Amy	2	0.67	Tokunaga, Robert S	2	2.00
Robelia, Beth A	3	1.33	Greysen, Ryan S	2	0.92	Neiger, Brad	2	0.31	Tufekci, Zeynep	2	2.00
Rosen, Devan	3	1.00	Hackworth, Brittany	2	0.75	Orr, Emily S	2	0.33	Tynes, Brendesha M	2	1.50
Trusov, Michael	3	1.00	Hanson, Carl	2	0.31	Orr, Robert R	2	0.33	Utz, Dr. Sonja	2	1.50
White, Katherine M.	3	1.17	Hargittai, Eszter	2	1.50	Parks, Malcolm R	2	1.17	Waters, Richard D	2	0.83
Wilkinson, David	3	1.33	Hogan, B	2	1.25	Peng, Gang	2	1.00	Watkins, Jerry	2	0.58
Avery, Elizabeth	2	0.50	Hsi-Peng, Lu	2	0.75	Pitt, Leyland F	2	0.53	Wiederhold, Brenda K	2	2.00
Baker, Rosland K	2	0.83	Johnson, Thomas J	2	0.75	Qin, Li	2	1.25			
Bann, Carla M	2	0.42	Joinson, Adam N	2	0.83	Quan-Hasse, Anabel	2	1.00			

[a]List of the top academics and practitioners with a raw individual productivity score (i.e., raw count of articles authored or coauthored) exceeding one.
[b]NPI, normalized productivity index calculated according to the equal credit approach.

Table 2 Top institutions ranked by social media research productivity.

Rank	Institution name	Score	Author count	Contribution per author
1	University of Texas—Austin	10.70	29	0.37
2	University of Maryland	10.17	17	0.60
3	Harvard University	7.25	16	0.45
4	Michigan State University	6.30	24	0.26
5	University of Arizona	6.00	11	0.55
6	University of London	5.50	7	0.79
7	Pennsylvania State University—University Park	5.42	16	0.34
8	University of Washington	5.08	11	0.46
9	University of Wolverhampton	5.00	12	0.42
10	Arizona State University	4.83	10	0.48
11	Massachusetts Institute of Technology	4.70	7	0.67
12	University of Wisconsin—Madison	4.55	10	0.46
13	George Washington University	4.50	12	0.38
14	University of Oxford	3.92	7	0.56
15	University of Southern California	3.80	8	0.48
16	University of California—Los Angeles	3.67	7	0.52
17	Rutgers University	3.50	4	0.88
18	Erasmus University Rotterdam	3.00	6	0.50
19	Indiana University–Purdue University	3.00	8	0.38
20	Northwestern University	3.00	4	0.75
21	Queensland University of Technology	3.00	8	0.38
22	The Open University	3.00	6	0.50
23	University of Amsterdam	3.00	7	0.43
24	University of Hawaii—Manoa	3.00	9	0.33
25	Brigham Young University	3.00	15	0.20
26	University of California—Berkeley	2.83	6	0.47
27	Yonsei University	2.83	11	0.26
28	University of Tennessee—Knoxville	2.83	8	0.35
29	Youngstown State University	2.83	6	0.47
30	Ryerson University	2.75	7	0.39
31	University of Minnesota	2.67	5	0.53
32	Florida State University	2.67	6	0.44
33	University of Kentucky	2.67	5	0.53
34	University of Melbourne	2.50	5	0.50
35	University of New Hampshire	2.50	6	0.42
36	University of North Carolina	2.50	5	0.50
37	University of Plymouth	2.50	5	0.50
38	VU University Amsterdam	2.50	4	0.63
39	Ohio State University	2.42	8	0.30
40	University College Dublin	2.33	4	0.58
41	*Microsoft Research*	2.30	6	0.38
42	Chinese Academy of Sciences	2.25	6	0.38
43	Kent State University	2.17	8	0.27
44	University of Georgia	2.17	5	0.43

Table 2 (*Continued*)

Rank	Institution name	Score	Author count	Contribution per author
45	University of North Texas	2.17	5	0.43
46	University of Toronto	2.17	6	0.36
47	Fairleigh Dickinson University	2.00	5	0.40
48	Griffith University	2.00	3	0.67
49	Long Island University	2.00	3	0.67
50	*Mayo Clinic*	2.00	2	1.00
51	Montclair University	2.00	2	1.00
52	Morehead State University	2.00	6	0.33
53	RMIT University	2.00	3	0.67
54	San Jose State University	2.00	2	1.00
55	Stockholm University	2.00	3	0.67
56	University of Cambridge	2.00	3	0.67
57	University of Connecticut	2.00	2	1.00
58	University of Windsor	2.00	12	0.17
59	Victoria University of Wellington	2.00	4	0.50
60	Walden University	2.00	2	1.00
61	York University	2.00	4	0.50
62	Boise State University	2.00	5	0.40
63	London School of Economics	2.00	4	0.50
64	Swinburne University of Technology	2.00	7	0.29
65	Texas Tech University	2.00	7	0.29
66	University of Illinois Urbana—Champaign	2.00	5	0.40
67	University of Pennsylvania	2.00	4	0.50

although the thought leadership on social media scholarship may be concentrated in the USA, there are key scholarly entities all over the world that should not be discounted.

Fourth, social media scholarship associated with the two nonacademic organizations (Microsoft Research and Mayo Clinic) was actually produced in collaboration with scholars at academic institutions, thus suggesting the importance of public–private partnerships when exploring the social media domain. Finally, the more productive institutions were associated with a greater number of contributors rather than greater productivity per individual author. This hints at the importance of a research culture, collaborator networks, and supportive infrastructure to maintain an active social media research stream.

Building on the earlier point of a global contribution to social media scholarship, Table 3 reports on country productivity rankings, in which 25 countries were identified. All countries where the associated institutions are located were accounted for. The top five countries were the USA (61.3%), the UK (11.2%), Canada (4.5%), Australia (3.8%), and China (2.8%). According to this ranking, the USA leads by a formidable margin. Whereas the USA and UK jointly account for more than 70% of the total social media research papers published since 2004, the top 10 countries

Table 3 Top countries ranked by research productivity.

Rank	Country	Absolute score	% Score	Cumulative score (%)
1	USA	340.91	61.3	61.3
2	UK	62.52	11.2	72.5
3	Canada	25.15	4.5	77.0
4	Australia	21.08	3.8	80.8
5	China	15.55	2.8	83.6
6	Netherlands	11.93	2.1	85.8
7	Taiwan	9.13	1.6	87.4
8	Germany	8.90	1.6	89.0
9	Spain	6.67	1.2	90.2
10	South Korea	6.43	1.2	91.4
11	Belgium	5.53	1.0	92.4
12	Sweden	5.33	1.0	93.3
13	New Zealand	5.00	0.9	94.2
14	Italy	4.03	0.7	94.9
15	Ireland	4.00	0.7	95.7
16	Finland	3.50	0.6	96.3
17	Denmark	3.33	0.6	96.9
18	Romania	2.60	0.5	97.4
19	Japan	2.50	0.4	97.8
20	Singapore	2.17	0.4	98.2
21	Greece	2.00	0.4	98.6
22	Malaysia	2.00	0.4	98.9
23	Norway	2.00	0.4	99.3
24	South Africa	2.00	0.4	99.6
25	Turkey	2.00	0.4	100.0

(including The Netherlands [6], Taiwan [7], Germany [8], Spain [9], and South Korea [10]) produced more than 91% of all social media scholarship.

Research Design and Data Practices

To investigate research design and data practices in the social media domain, we determined and summarized the relative proportion of conceptual and empirical papers; the relative proportion of quantitative, qualitative, and mixed-method studies; the proportion of cross-sectional to longitudinal studies; and the dominant units of analysis in the social media scholarship from October 2004 to December 2011.

To investigate article type, we looked at the proportion of conceptual to empirical papers. Empirical papers focusing on activities and processes may take a number of methodological research approaches or they may involve the development of instruments or design methodologies. Nonempirical or conceptual papers are those that are primarily based on ideas, frameworks, theories, and argumentative reasoning, in lieu of systemic observation. From the total of 610 social media papers reviewed, 343 papers used data to substantiate their knowledge claims (i.e., 56.2% of

all papers represented empirical papers). The remaining 267 papers (43.8% of all papers) are nonempirical papers.

If we longitudinally examine the relative proportion of empirical and nonempirical papers, a gradual increase in the proportion of empirical papers is evident from 50% in 2005 to 60% in 2011 (with the exception of 2007 and 2008, where there were more nonempirical than empirical papers; Figure 2). It should be noted that statistics pertaining to the first three years of the data collection period (2004, 2005, and 2006) are deceiving considering that these two years collectively account for 1% of all 610 papers.

Regarding the use of longitudinal or cross-sectional approaches, the findings show that all empirical papers (N = 343) except two were cross-sectional (i.e., only two longitudinal studies were identified).

Furthermore, from the 343 empirical papers, the small majority is quantitative (51.3% or 176 papers), with qualitative papers accounting for the additional 44.3% (152 papers) of all empirical papers. The remaining 15 empirical papers included both mixed-method[7] studies (10 papers in total) and studies that did not report the method of data collection (i.e., papers that included anecdotal evidence but lacked methodological or empirical grounding). A longitudinal assessment of the proportion of quantitative to qualitative studies shows that there is a leveling trend in which quantitative studies comprise approximately 58% of social media-related empirical research.

With respect to the unit of analysis, the vast majority of empirical papers reviewed used the individual as the unit of analysis (90.4%), followed by groups (3.5%), organizations (2.9%), and other entities such as blog posts or tweets (5.5%). In this context it is important to note that this item was coded not only by searching for explicit references to the unit of analysis—which was generally absent from reporting—but also by examining the overall article for information that could help to determine the unit of analysis.

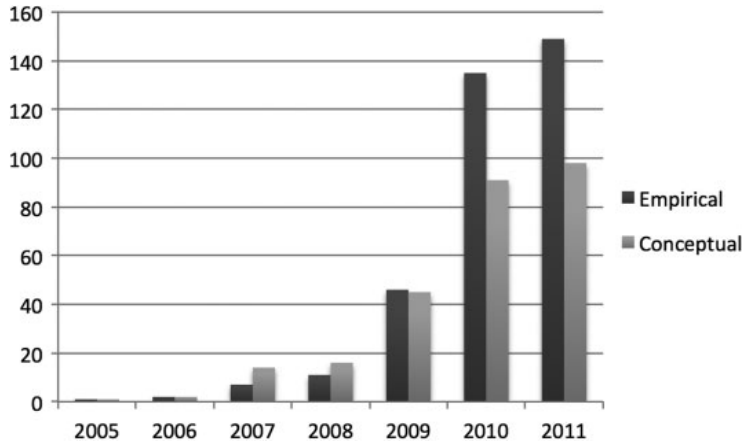

Figure 2 Proportion empirical/conceptual social media papers.
Source: Due to their low count, 2004 papers were summed with 2005 for Figure 2.

With respect to the number of observations (*N*), it is interesting to note that we were able to identify *N* for only 327 (95.3%) of the 343 empirical papers, even though all full papers were scanned to identify (or in some instances calculate the total *N*), above and beyond searching for explicit references to the number of observations in the text.

Methodological appropriateness and diversity are eminent topics of concern and discussion within science, specifically in the context of the social sciences (Orlikowski & Baroudi, 1991). Especially in academic domains that draw on and offer a nexus for many different disciplinary influences, such as the social media domain, methodological diversity can be anticipated. Given this paradigmatic plurality, we may expect a similar multiplicity of research methods. Particularly in a research domain that is still in its infancy and deals with real-world complexities, disciplined methodological pluralism can provide a wider range of knowledge traditions upon which to base research and theory (Landry & Banville, 1992; Robey, 1996). In the 343 empirical papers, the most popular data collection method between October 2004 and December 2011 was the survey method, used in 155 papers or 45.2% of the sample. Case studies accounted for 18.9% (a total of 53 papers) of the sample, with document (i.e., content) analysis accounting for an additional 13.7% of the sample (a total of 47 papers). The remainder of the papers included mainly interviews (5.5%). Other less frequently applied and nonstandard research methods used included simulation or the secondary analysis of data (a total of nine papers or 2.6% of the sample). Interestingly, no study used laboratory experimentation as a research method.

Discussion and Conclusion

The purpose of this study was to conduct a bibliometric and a meta-analysis of the social media scholarship to date to understand the current state of the social media domain, its intellectual core, and its evolution over the past nearly eight years.

Combining the bibliographic findings from the productivity rankings and the assessment of research design and data practices, two important conclusions and associated challenges are derived which warrant further exploration and intellectual discussion to track the evolution and advancement of the social media domain as well as to delineate areas requiring more attention and future research.

Conclusion I: The Social Media Domain Displays Limited Intellectual Diversity

During the project, 1,249 unique authors from 493 unique institutions were identified. Despite the embryonic nature of the social media domain, an exploding body of scholarship that continues to grow is evident. Although the domain has attracted the attention of a tremendous number of individual contributors from a variety of academic and practitioner institutions, a small number of highly productive and impactful actors—individuals, institutions, and countries—and publications have been identified that have skewed the domain's focus in a limited direction. Hence, although there appears to be diversity—based on the large number

of unique contributors and institutions—this does not necessarily imply diversity in investigation lenses. Indeed, as the findings appear to suggest, the research design approaches and data practices as identified in the social media domain seem to lack diversity given a general tendency for cross-sectional, individual-level focused, and survey or case study-based studies.

The limited diversity in research design and data practices—in particular, the fact that the mixed use of quantitative and qualitative research methods does not seem to receive the same degree of attention as quantitative research and that the vast majority of papers rely on cross-sectional data and focus on the individual as a unit of analysis—points to some further issues. Although focusing on the individual as the unit of analysis is perhaps common across many disciplinary domains, it is somewhat surprising in the context of social media. By nature, social media represent interactive forums and technologies for communication and relationship building, thus supporting processes that occur on the supra-individual level (Kaplan & Haenlein, 2010; Leonardi, Huysman, & Steinfield, 2013).

Furthermore, given that the social media research field inherently deals with complicated processual phenomena unfolding over time and spanning multiple units of analysis, obtaining adequate understandings and developing valuable theoretical contributions require researchers to look for longitudinal data in lieu of convenient snapshots (Avital, 2000) and adopt a supra-individual or even multilevel focus in their analyses. Especially in domains with a preference toward quantitative research, more caution is warranted in not underweighting the theoretical contributions of quantitative data. Furthermore, the overreliance on survey methodologies is poorly suited for integrated theory development and confirmatory research with strong, generalizable results (Lyytinen, 2009; Van Osch & Avital, 2010).

Conclusion II: The Social Media Domain Is Far Removed from Academic Maturity

The academic maturity of a scientific domain can be established by analyzing three transformations, namely changes in (1) coauthorship patterns, (2) inquiry methods, and (3) the roles of practitioners. Maturing scientific domains show trends toward coauthorship preferences as opposed to single authorship (Inzelt, Schubert, & Schubert, 2009; Serenko et al., 2010), due to increased competition for journal space and declining acceptance rates. Although our data show a clear trend toward multiauthored papers, this was the only sign of academic maturation.

The proliferation of conceptual articles suggests a lack of academic maturity of this research domain indicative of overreliance on personal opinion and "armchair hypotheses" that has resulted in the atheoretical nature of social media research to date (Walther & Jang, 2012). Research design and data practices characterized by speculative and anecdotal evidence—but lacking empirical support or strong theoretical grounding—were extremely widespread (Walther & Jang, 2012). Others have made similar observations regarding the dominance of studies of social media features at the expense of theoretical explanations of correlational or causal effects (see Chong & Xie, 2011; Walther & Jang, 2012). Indeed, Van Osch and Coursaris

(2014) offer a meta-analysis of social media research pertaining to its theoretical foundations, which further confirms the lack of theoretical grounding and diversity in the social media domain.

Hence, it appears the social media is still far removed from establishing its theoretical foundations and from providing strong empirical tests of these theoretical principles.

Finally, in terms of the role of practitioners, their contribution to the social media domain has not shown a declining trend yet, which is generally considered a sign of academic maturity. To illustrate, danah boyd is the most impactful scholar in the social media domain—with nearly double the impact of the second most influential scholar—whose primary affiliation is with a practitioner institution (Microsoft Research). Although most publications on social media have thus far been produced by academic researchers, practitioners and practitioner institutions have made and continue to have a strong effect on the social media domain. Three institutions in particular are among the 100 most productive institutions: Microsoft Research, Mayo Clinic, and IBM.

In conclusion, two challenges confronting the social media domain have been observed, namely the lack of methodological diversity and the lack of maturity characterizing the social media domain. The first challenge, the popularity of a few authors, institutions, and countries combined with the lack of diversity in research design and data practices, contributes to the lack of theoretical grounding and scientific rigor in the domain through the recurring focus on similar topics and questions as well as the reuse of the same theories and methods. Hence, we hope that the awareness raised in this study will encourage influential stakeholders in the social media domain—such as editors and conference organizers—to embrace the involvement of current peripheral actors to support the advancement of the social media domain into new, broader, and more pertinent territory.

The second challenge, the lack of maturity of the social media domain, highlights the need for more theoretically grounded and more scientifically rigorous work. Although this study only provides insights into the maturity of the social media domain based on a bibliographic analysis of research productivity and a meta-analysis of dominant research practices, a deeper understanding of the research quality of the domain requires the use of additional qualitative and cognitive measures to examine its intellectual core vis-à-vis dominant research topics and concepts, theoretical perspectives, and reference disciplines.

Notes

[1] For a detailed historic overview of influential scholars in the domain of scientometrics, see Garfield (2009).

[2] From the 610 papers, 604 were journal articles and 6 were conference papers.

[3] The initial search resulted in 1,516 papers, of which 466 papers were duplicates. Therefore the 1,050 unique scholarly papers is the total count after removing the duplicate papers from our data-set.

[4] We had access to the e-resources of three large University libraries.

[5] Cohen's kappa coefficient is a statistical measure of interrater agreement and it is generally considered to be a more robust measure than simple percentage agreement because it takes into account the agreement occurring by chance. A Cohen's kappa coefficient of 0.75 is considered substantial agreement (Landis & Koch, 1977). The reported coefficient is a cumulative (omnibus) score computed across the six categories of the coding scheme. The Appendix reports Cohen's kappa coefficients per category of the coding scheme.

[6] Based on the normalized scores calculated through the equal credit approach of each author associated with a particular institution.

[7] Mixed method refers to the explicit combination of quantitative and qualitative methods in a single study, not to the combining of various quantitative methods or multiple qualitative methods in a single study.

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Appendix. Coding manual and coding scheme

Category	Code	Definition/example
Article type Cohen's kappa (.71)	Empirical (0)	Studies collecting, analyzing, and presenting empirical data to support the research questions, theoretical framework, or arguments made in the paper. Findings are based on knowledge of direct or indirect observation, analysis, or experience For example, the paper uses data from a survey (numbers/statistics) or excerpts from interviews or other texts to support arguments and further describes how these surveys/interviews were designed and distributed
	Conceptual (1)	Studies that do not collect, analyze, or present empirical data in support of research questions, theoretical framework, or arguments made in the paper. Findings are based on logic or theory
Research design (empirical papers only) Cohen's kappa (.80)	Cross-sectional (0)	Empirical studies that only collect data at a single point in time For example, one-off surveys, one-off interviews
	Longitudinal (1)	Empirical studies that collect data at multiple points in time (e.g., multiple surveys or interviews with the same respondent at different points in time) or collect data over an extended period of time (e.g., blog posts or Facebook content from a particular page for multiple weeks, months, or years). These studies involve repeated observations of the same variables or research subjects over time
Research methods (empirical papers only) Cohen's kappa (.80)	Quantitative (0)	Empirical studies that collect and analyze numerical data and report on statistics (e.g., surveys, experiments, or simulations). These were studies that involve the systematic empirical investigation of social phenomena via statistical, mathematical, or numerical data or computational techniques
	Qualitative (1)	Empirical studies that do not collect numerical data and instead aim to

Appendix (*Continued*)

Category	Code	Definition/example
		obtain and provide an in-depth understanding of human behavior through reporting informed assertions based on textual excerpts, perceptions, opinions, and observed actions from small samples (e.g., interviews, ethnography, participant observation, or focus groups)
	Mixed method (2)	Empirical studies that combine data collected and analyzed from both quantitative and qualitative methods (see definitions and examples above)
Unit of analysis (empirical papers only) Cohen's kappa (.73)		The unit of analysis is the major entity that is being analyzed in a study (i.e., it is the 'what' or 'who' that is being studied). Note: This unit of analysis is often not explicitly provided in the text, but can frequently be inferred by the reader based on the provided research design details
	Individual (0)	Individual people and their use or perceptions of social media are the focal entity. The individual tends to be the most common unit of analysis in social science research
	Group (1)	Groups of people or teams within an organization or community are the focal entity
	Organization (2)	Entire organizations, such as companies or institutions, are the focal entity
	Other (3)	Anything that does not fall into one of the above categories (individual, group, and organization). Most often this category included artifacts such as posts, messages, or tweets
N (number of observations) (empirical papers only) Cohen's kappa (.72)	Please specify the exact number	Also referred to as sample size is the number of observations collected and analyzed in an empirical study (e.g., how many individuals were surveyed or interviewed, how many posts/messages/tweets were analyzed). *N* was indicated by the exact number as

Appendix (*Continued*)

Category	Code	Definition/example
		referenced in or as inferred from the text. When not immediately apparent, this number was inferred from tables or other details about the data collection/analysis process
Research methods specifics (empirical papers only; multiple methods may be present in the same study, please indicate all that apply) Cohen's kappa (.74)	Surveys (0)	Survey methodology involves the sampling of individuals from a population and the distribution of a physical or digital questionnaire to these individuals for collecting data on their behaviors or opinions
	Experiments (1)	An orderly and controlled procedure carried out with the goal of verifying, refuting, or establishing the validity of a hypothesis by providing insight into cause-and-effect by demonstrating what outcomes occurs when a particular factor is manipulated
	Simulations (2)	Scientific (computer-assisted) modeling of natural systems or human systems to gain insight into their functioning.[a]
	Case studies (3)	A descriptive, exploratory, or explanatory analysis and account of a person, group, or event. A case study investigates a phenomenon within its real-life context
	Interviews (4)	A method that seeks to uncover and describe the meanings of central themes in the lifeworld of the subjects through asking questions from a structured or unstructured interview protocol. The main task in interviewing is to understand the meaning of what the interviewees say
	Document (content) analysis (5)	A method that involves studying the content of communication by collecting and analyzing recorded human communication, such as blogs, messages, or tweets
	Ethnography (6)	A method that intends to capture and provide a "thick description" of the

Appendix (*Continued*)

Category	Code	Definition/example
		social meanings and orderly activities of people (informants) in their naturally occurring setting (field). The goal is to collect data in such a way that the research imposes a minimal amount of their own bias on the data
	(Participant) Observation (7)	A method that aims to gain a close and intimate familiarity with a group of individuals (e.g., an organization or community) and their practices through an intensive involvement in and observation of their natural and cultural environment, usually over an extended period of time
	Focus groups (8)	A form of qualitative research in which a group of people are asked about their perceptions, opinions, beliefs, and attitudes towards a concept, idea, or product/technology
	Secondary data (9)	Data collected by someone other than the author. Common sources of secondary data include previous research articles, censuses, or organizational records
	Other (10)	If any other method was used, it was accounted for in this category

Note: All Cohen's kappa scores have been rounded to two decimal places.
All definitions and descriptions in the table have been adapted from Payne and Payne (2004).
http://en.wikipedia.org/wiki/Simulation#cite_note-2