

## Social media and e-commerce: A scientometrics analysis

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### CHRONICLE

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### ABSTRACT

The purpose of this research is to investigate the status and the evolution of the scientific studies on the effect of social networks on e-commerce. The study seeks to address the status of a set of scientific productions of researchers in the world indexed in Scopus based on scientometrics indicators. In total, 1926 articles were found and the collected data were analyzed using quantitative and qualitative indicators of scientometrics with bibliometrix *R* software package. The findings show that researches have grown exponentially since 2009 and the trend has continued at relatively stable rates. Thematic analysis shows that the subject had a significant but not well-developed research field. There is a high rate of cooperation with a rich research network among institutions in United States, European and Asian countries. Studies also show that research interest in this area is prevalent in developed countries. In addition, the lack of funds and complex analytical tools may be due to lack of studies in developing countries, especially in Africa. The study of the global trend of research through scientometrics helps managers and researchers in identifying countries and institutions with the greatest potential for scientific production, which allows them to develop their professions.

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## 1. Introduction

E-commerce is a transaction in which the purchase and sales of goods and services is carried out by the Internet and leads to the import or export of the products. This means that Internet networks act as intermediaries between consumers and manufacturers. Web stores are operating at the heart of the business, and internet users are also buyers and customers. Electronic commerce can also be called “Internet Business”. Since the advent of e-commerce, it has undergone many changes with the advent of advanced hardware and software technologies and has grown significantly in recent years. As a result, the desire to buy and sell electronic and virtual exchanges has increased throughout the world and even in the less developed countries. On the other hand, social networks have started moving quickly to serve companies. Their social networks and their growing influence among different users around the world have made them the tools for advertising and e-commerce.

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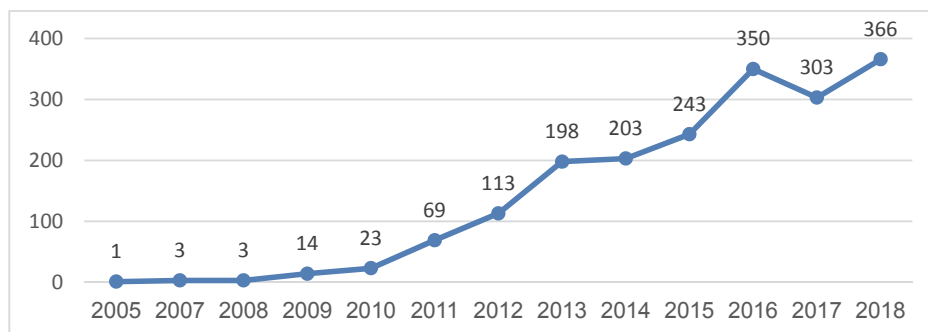
In recent years, the boundaries between e-commerce and social networking have become increasingly blurred. Many e-commerce websites support the mechanism of social login where users can sign on the websites using their social network identities such as their Facebook or Twitter accounts. Users can also post their newly purchased products on microblogs with links to the e-commerce product web pages (Zhao et al., 2016). Recent studies demonstrate that 93% of social media users think that companies should engage social media in their businesses, while 85% of them believe that companies should interact with customers via social media websites (Michaelidou et al., 2011). The increased popularity of social networking sites, such as LinkedIn, Facebook, and Twitter, has opened opportunities for new business models for electronic commerce, often referred to as social commerce. Social commerce involves using Web 2.0 social media technologies and infrastructure to support online interactions and user contributions to assist in the acquisition of products and services. Social media technologies not only provide a new platform for entrepreneurs to innovate but also raise a variety of new issues for e-commerce researchers that require the development of new theories. This could become one of the most challenging research arenas in the coming decade (Liang & Turban, 2011). Crowdfunding as a new way of financing in the web 2.0 has increased over the last years, but only little is known how project initiators increase their chances of successful fundraising through on-page and off-page communication activities. media richness in the project presentation and a high frequency of project updates leverage fundraising success (Beier & Wagner, 2015). Consumer-generated social referrals regarding deals significantly boost sales in social commerce (Kim & Kim, 2018). All this has led companies to adopt their business strategy. Culnan et al. (2010) state that to gain full business value from social media, firms need to develop implementation strategies based on three elements: mindful adoption, community building, and absorptive capacity. Social commerce in this regard represents a shift in consumer's thinking from inefficient individual consumption to collaborative sharing and shopping (Chen et al., 2014). In general, small and large organizations have entered social networks and are trying to discover its benefits. However, nobody can claim that in the field of e-commerce in social networks only advantages and benefits lies. But as with all dimensions of life, there are disadvantages and virtues of the same, and along with each other.

## 2. About Bibliometrix R package

Science mapping is complex and unwieldy because it is multi-step and frequently requires numerous and diverse software tools. Bibliometrix R package is a tool for quantitative research in scientometrics and bibliometrics. Bibliometrix package provides various routines for importing bibliographic data from Scopus, Clarivate Analytics' Web of Science, PubMed and Cochrane databases, performing bibliometric analysis and building data matrices for co-citation, coupling, scientific collaboration analysis and co-word analysis (Aria & Cuccurullo, 2017).

## 3. Annual scientific production

With the objective of ascertaining the international evolution of the subject, a broad range of study was carried out. A total of 1926 original articles and reviews were published on this subject (based on highest cited).



**Fig. 1.** The Scopus publications on the analysis of social media and e-commerce from 2005 to 2018

Fig. 1 shows the annual number of articles published in both the social media and e-commerce issues in the Scopus database for a period of 14 years, from 2005 to 2018. Production of articles was stable in the first years of this study (2005-2009). The growing trend in this issue since 2009 shows global attention to the impacts of social media on e-commerce.

#### 4. The most common keywords and Temporal Analysis

Table 1 demonstrates some of the most popular keywords used in studies associated with E-commerce. As we can observe from the results of Table 1, “social networking”, “Commerce” and “Social media” are three keywords known in the literature. Fig. 1 shows the most important words used over times.

**Table 1**

The most popular keywords used in studies associated with E-commerce on social media

Words	Occurrences	Words	Occurrences
social networking (online)	1016	female	36
commerce	998	information dissemination	36
social media	965	search engines	36
marketing	541	mobile commerce	35
electronic commerce	483	user-generated content	35
sales	223	word of mouth	35
data mining	209	data handling	34
information systems	158	human computer interaction	34
sentiment analysis	150	communication	33
social media marketing	134	trust	33
facebook	126	classification (of information)	32
big data	120	information use	32
internet	119	online social medias	32
social commerce	117	social sciences computing	32
world wide web	109	strategic planning	31
economic and social effects	105	marketing campaign	30
consumer behavior	96	purchase intention	30
financial markets	96	virtual reality	30
surveys	93	digital storage	29
forecasting	90	information science	29
websites	87	male	29
decision making	86	text mining	29
human	82	social aspects	28
information management	82	social media datum	28
finance	81	students	28
social media platforms	79	algorithms	27
behavioral research	75	design	27
learning systems	72	digital marketing	27
twitter	70	knowledge management	27
artificial intelligence	69	marketing communications	27
competition	66	societies and institutions	27
investments	66	innovation	26
economics	60	competitive advantage	25
public relations	57	planning	25
purchasing	53	research	25
recommender systems	51	social influence	25
humans	48	social interactions	25
marketing strategy	48	content analysis	24
natural language processing systems	48	customer satisfaction	24
semantics	46	ebusiness	24
industry	45	information analysis	24
commercial phenomena	44	motivation	24
costs	44	on-line social networks	24
web 2.0	44	social network	24
regression analysis	43	distributed computer systems	23
social networking sites	43	information technology	23
online systems	40	learning algorithms	23
article	39	social sciences	23
education	39	united states	23
social media analytics	39	adult	22



Fig. 2. The frequency of the keywords used in different project

As shown in Fig. 2, “commerce”, “social media”, “marketing”, “electronic commerce”, “data mining”, “sales”, “information systems”, “social media marketing” and “sentiment analysis” are the research hotspots with a high frequency of the keywords used in different project. The potential to extract actionable insights from Big Data has gained increased attention of researchers in academia as well as several industrial sectors. The ability to generate value from large volumes of data is an art which combined with analytical skills needs to be mastered in order to gain competitive advantage in business (Arora & Malik, 2015).

Zhang et al. (2015), in their research on the Dynamic Topic Modeling for Monitoring Market Competition from Online Text and Image Data state: “One of key applications of our work is social media monitoring that can provide companies with temporal summaries of highly overlapped or discriminative topics with their major competitors”. There has also been a lot of studies on the analysis of emotions in social media for commercial purposes. For example, tock price prediction using linear regression based on sentiment analysis (Cakra & Distiawan Trisedya, 2016), deep sentiment analysis for analyzing business ads in social media (Jang et al., 2013) and senti-ment analysis of Hollywood movies on Twitter (Hodeghatta, 2013).

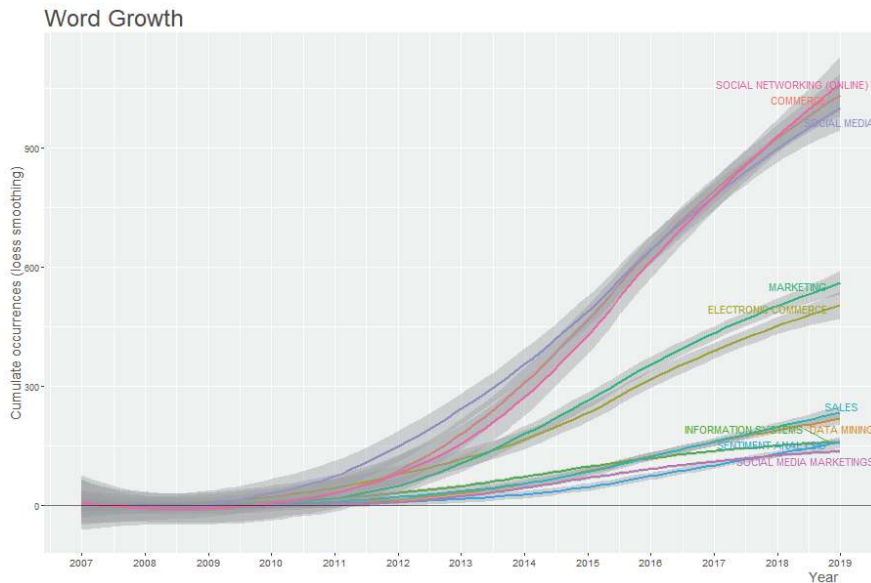


Fig. 3. Word dynamics





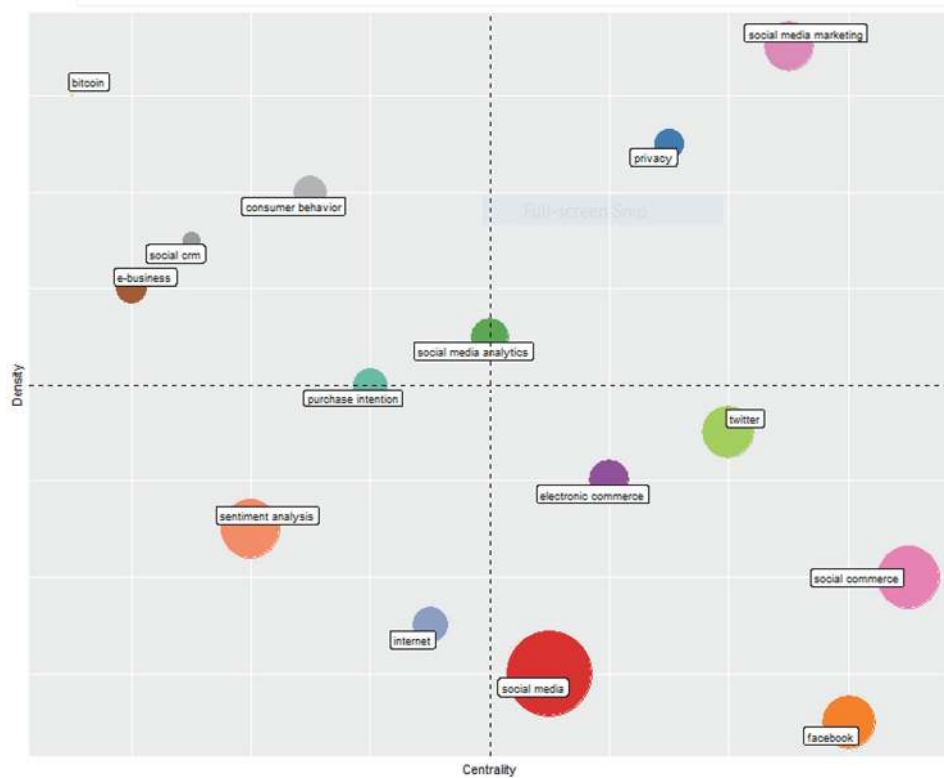


## 7. Thematic map

Co-word analysis draws clusters of keywords. They are considered as themes. In the strategic diagram presented in Fig. 7 the vertical axis measures the density – i.e., the strength of the internal links within a cluster represented by a theme –, and the horizontal vertical axis the centrality – i.e. the strength of the links between the theme and other themes in the map.

Thematic map is a very intuitive plot and we can analyze themes according to the quadrant in which they are placed:

- (Q1) upper-right quadrant: motor-themes;
- (Q2) lower-right quadrant: basic themes;
- (Q3) lower-left quadrant: emerging or disappearing themes;
- (Q4) upper-left quadrant: very specialized/ niche themes.

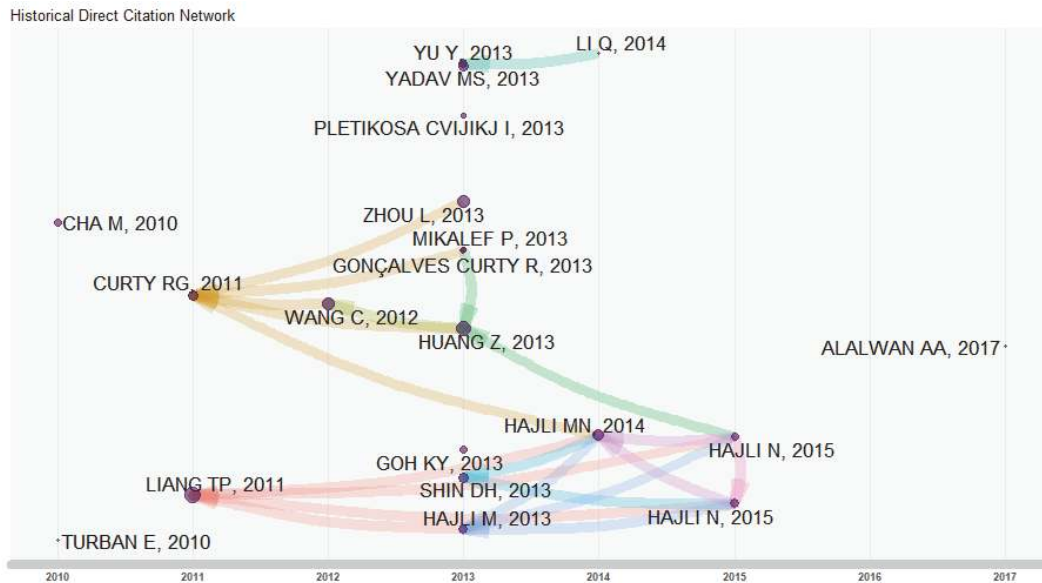


**Fig. 7.** Thematic Map

Hence, the themes with the highest internal coherence and closest relationship to other themes appear in the first quadrant (the upper right part of the graph). In the second quarter, the following topics can be found: social media, electronic commerce, social commerce, twitter and facebook. Themes in this quadrant are important for a research field but are not developed. This quadrant groups transversal and general, basic themes.

## 8. Intellectual Structure, Historiographic

The historiographic map is a graph proposed by E. Garfield to represent a chronological network map of the most relevant direct citations resulting from a bibliographic collection. The citation network technique does provide the scholar with a new modus operandi which may significantly affect future historiography.



**Fig. 8.** Historical direct citation network

Fig. 8, shows Curty, (2011), Liang, (2011) and Hajli, (2013) at their own time, were the beginner of new trends. The direction of the arrows in Fig. 8 explains the chronicle change of research trends from the past. Research of Curty (2011) was about qualitative longitudinal study which systematically examined technological features and tools in social commerce websites to illustrate their evolution and impacts on the formation of social commerce practice up to present and its potential future. Liang (2011) aims to provide a framework that will create several elements in social commerce research and summarizes articles in this particular topic. The framework consists of six key elements for classifying social research, the subject of research, social media, business activities, basic theories, results and research methods. The proposed framework has been valuable in determining the scope and identifying of potential research issues in the social commerce and then Hajli, (2013), Goh et al. (2013), Shin, (2013) and Hajli, (2014) provided more development. Hajli, (2013) in his research used social support theory and related theories on intention to use to propose a theoretical framework for the adoption of social commerce. Research of Goh et al. (2013) is about the social media brand community and consumer behavior, and quantifying the relative impact of user-generated and Marketer-Generated Content. Hajli, (2014) studied the role of social support on the quality of communication and social commerce.

## 9. Social structure, Contributions of countries

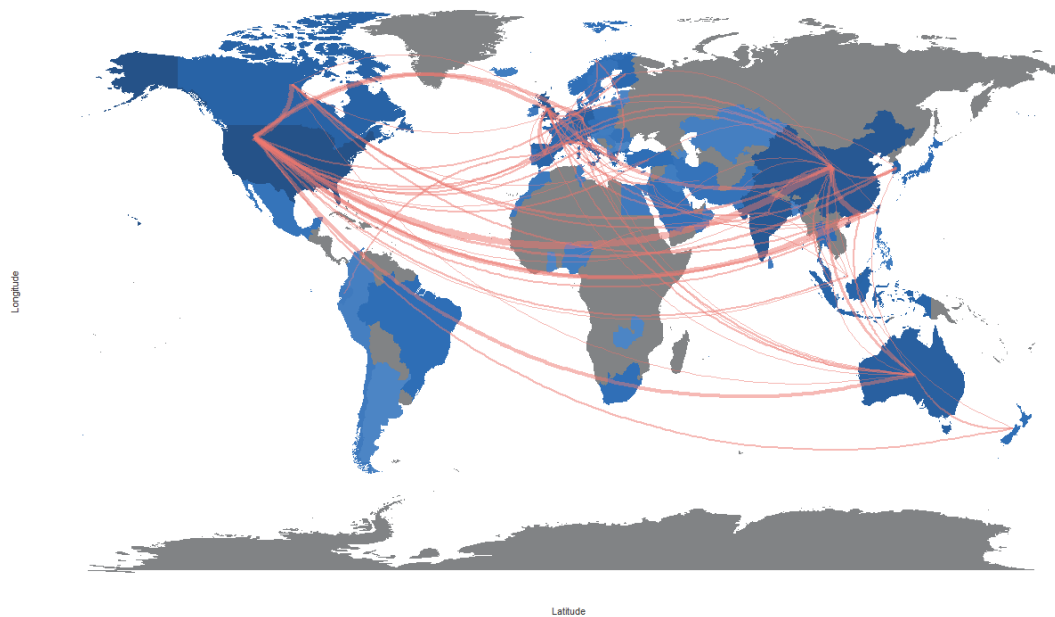
Our survey demonstrates that the United States with 3060 citations, has took about 30% of the total citation for e-commerce research on social media in the world and it was ranked first. After that, papers published by researchers in Germany have received the second highest citations (1762), followed by China (748) and Singapore with 487 citations. Table 2 shows details of our survey and according to this table, Germany with the average article citations of 36.708 is ranked first. Although Switzerland has ranked 2<sup>nd</sup> in total citations, its average article citations is 25.8. Singapore and Canada are ranked third and fourth respectively with 19.48 and 19.36 average article citations, respectively followed by the United States.



**Table 2**  
The summary of the contributions of different countries

Country	Total Citations	Average Article Citations	Country	Total Citations	Average Article Citations
USA	3060	13.909	UZBEKISTAN	37	37
GERMANY	1762	36.708	NEW ZEALAND	36	5.143
CHINA	748	7.262	OMAN	34	11.333
SINGAPORE	487	19.48	SWEDEN	34	6.8
CANADA	484	19.36	INDONESIA	29	0.763
UNITED KINGDOM	345	5.847	NETHERLANDS	27	2.455
FRANCE	337	17.737	CZECH REPUBLIC	23	3.286
KOREA	298	7.268	NORWAY	21	2.625
SWITZERLAND	258	25.8	POLAND	18	2.571
HONG KONG	239	6.829	TURKEY	16	2
ITALY	228	7.6	QATAR	14	2.8
INDIA	194	1.717	THAILAND	14	1.556
MALAYSIA	194	5.543	CHILE	11	3.667
TAIWAN	179	4.475	SLOVAKIA	10	1.25
FINLAND	153	10.929	AUSTRIA	8	0.8
AUSTRALIA	144	3.892	SOUTH AFRICA	8	0.8
GREECE	116	5.524	PAKISTAN	7	2.333
PORTUGAL	98	8.909	TUNISIA	7	7
JAPAN	77	4.529	ICELAND	5	2.5
BRAZIL	74	6.167	KUWAIT	4	1.333
DENMARK	73	14.6	MAURITIUS	4	2
ISRAEL	59	14.75	IRAQ	3	3
SPAIN	57	2.478	MOROCCO	3	0.75
JORDAN	55	6.875	PERU	3	1.5
MEXICO	48	6.857	SERBIA	3	1.5

Country Collaboration Map



**Fig. 9.** Country collaboration map

As Fig. 9 shows, the international cooperation of countries in the field of research is highly concentrated. For example, the largest link between the United States and China is described in the graph. The cooperation between China and Hong Kong, the United States with Canada, and the United States and Hong Kong are at the forefront. Also, overall overview of the map shows that in Africa only Nigeria and in the

South America only Ecuador collaborated with other countries and that other countries are in the lowest rankings. The network between the EU countries is very dense. Integration makes the United States act more than the EU member states. However, China is currently the first United States partner in terms of international cooperation.

## 10. Highly cited papers

The citations function generates the frequency table of the most cited references or the most cited first authors (of references) (Aria & Cuccurullo, 2017). Although usually articles' citation is considered as an indicator of the impact of papers, the impact of the article cannot be evaluated solely by considering the first influential articles. Newer articles that are truly influential have not yet been seen by more people and, therefore, they have not shown their influence.

Table 3 shows the summary of the most cited articles. As we can observe from the results of Table 3, the study by Cha et al. (2010) has received the highest citations. This paper analyzed the influence of Twitter users by employing three measures that capture different perspectives: indegree, retweets, and mentions. Indegree is the number of people who follow a user; retweets mean the number of times others “forward” a user’s tweet; and mentions mean the number of times others mention a user’s name. Authors believed that findings of this paper provide new insights for “Viral Marketing”.

The second highly cited work belongs to Boyd (2014) where he tried to show the impacts of social media on the quality of teens' lives. The book’s conclusions are essential reading not only for parents, teachers, and others who work with teens but also for anyone interested in the impact of emerging technologies on society, culture and commerce.

The third highly cited work is associated with Ghose and Ipeiritis (2011) where they reexamined the impact of reviews on economic outcomes like product sale. They focused on the differences between subjective and objective information and found that an increase in the average subjectivity of product reviews in social media is associated with an increase in sales. Further, a decrease in the deviation of the probability of subjective comments is associated with an increase in product sales. This means that reviews that have a mixture of objective, and highly subjective sentences are negatively associated with product sales, compared to reviews that tend to include only subjective or only objective information.

**Table 3**

The summary of the most cited articles

Paper	Total Citations	TC per Year
CHA M, 2010, ICWSM - PROC INT AAAI CONF WEBLOGS SOC MEDIA	1521	169
BOYD D, 2014, IT'S COMPLICATED: THE SOC LIVES OF NETWORKED TEENS	735	147
GHOSE A, 2011, IEEE TRANS KNOWL DATA ENG	435	54.375
HUANG Z, 2013, ELECT COMMER RES APPL	363	60.5
CULNAN MJ, 2010, MIS Q EXEC	352	39.1111
GOH KY, 2013, INF SYST RES	347	57.8333
LIANG TP, 2011, INT J ELECT COMMER	237	29.625
RAHIMI MR, 2014, MOBILE NETWORKS APPL	184	36.8
WANG C, 2012, COMMUN ASSOC INFO SYST	173	24.7143
PLETIKOSA CVIJKI I, 2013, SOC NETW ANALYSIS MIN	151	25.1667
YU Y, 2013, DECIS SUPPORT SYST	146	24.3333
KHADJEH NASSIRTOUSSI A, 2014, EXPERT SYS APPL	134	26.8
ZHOU L, 2013, ELECT COMMER RES APPL	129	21.5
GHOSE A, 2013, INF SYST RES	128	21.3333
YADAV MS, 2013, J INTERACT MARK	126	21
KAPLAN AM, 2009, BUS HORIZ	116	11.6
ZHANG H, 2014, INF MANAGE	114	22.8
SHIN DH, 2013, BEHAV INF TECHNOL	106	17.6667
HAJLI MN, 2014, TECHNOL FORECAST SOC CHANGE	103	20.6
HAJLI N, 2015, INT J INF MANAGE	99	24.75
HUANG J, 2014, TOB CONTROL	98	19.6
PÓYRY E, 2013, ELECT COMMER RES APPL	92	15.3333
PIOTROWICZ W, 2014, INT J ELECT COMMER	91	18.2
AMARO S, 2015, TOUR MANAGE	89	22.25
BIAN J, 2012, INT CONF INF KNOWLEDGE MANAGE	87	12.4286

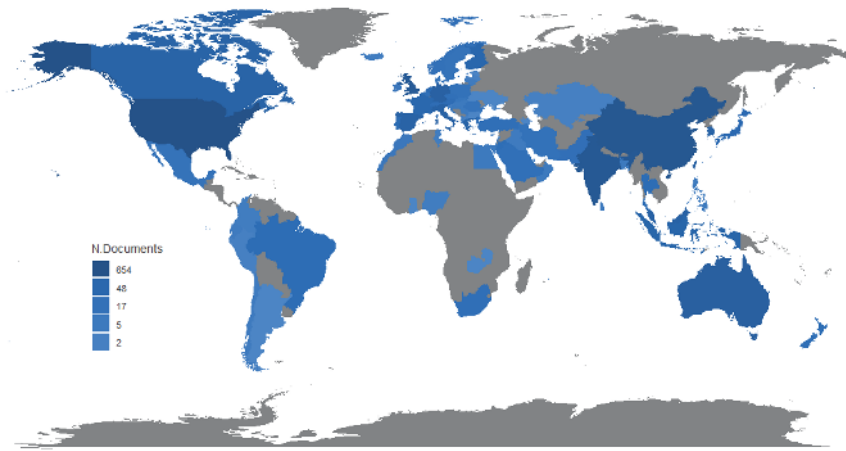
ROSARIO AB, 2016, J MARK RES	86	28.6667
PAGANI M, 2011, INT J ELECT COMMER	80	10
CURTY RG, 2011, PROC ASIST ANN MEET	78	9.75
PARASURAMAN A, 2015, J SERV RES	73	18.25
BARDACH NS, 2013, BMJ QUAL SAF	72	12
LAM W, 2012, PROC VLDB ENDOW	71	10.1429
MILLER AR, 2013, INF SYST RES	70	11.6667
SHEN J, 2012, J ELECTR COMMER RES	70	10
YANG CC, 2012, INT CONF INF KNOWLEDGE MANAGE	69	9.8571
GARCIA D, 2014, J R SOC INTERFACE	66	13.2
HAJLI M, 2013, INF MANAGE COMPUT SECUR	66	11
ZHANG Y, 2013, WWW - PROC INT CONF WORLD WIDE WEB	65	10.8333
CLAUSSEN J, 2013, INF SYST RES	65	10.8333
IKEDA K, 2013, KNOWL BASED SYST	62	10.3333
XIANG Z, 2017, TOUR MANAGE	60	30
HE W, 2015, INF MANAGE	60	15
ZHANG KZK, 2014, INT J INF MANAGE	60	12
LUO X, 2013, J MANAGE INF SYST	59	9.8333
BRAJOS-GOMEZ J, 2015, INT J INF MANAGE	58	14.5
NGO-YE TL, 2014, DECIS SUPPORT SYST	58	11.6
KLAUS P, 2013, J SERV RES	58	9.6667
TANG Q, 2012, J MANAGE INF SYST	58	8.2857
JANSEN BJ, 2011, J INF SCI	58	7.25
KUPAVSKII A, 2012, ACM INT CONF PROC SER	57	8.1429
LAU RYK, 2014, DECIS SUPPORT SYST	56	11.2
PARK H, 2014, J RETAIL CONSUM SERV	56	11.2
CHEUNG CMK, 2014, DECIS SUPPORT SYST	55	11
MIKALEF P, 2013, J THEOR APPL ELECTRON COMMER RES	55	9.1667
LI YM, 2013, DECIS SUPPORT SYST	55	9.1667
GONÇALVES CURTY R, 2013, ELECT COMMER RES APPL	53	8.8333
OESTREICHER-SINGER G, 2012, MANAGE SCI	53	7.5714
CHANG CW, 2014, COMPUT HUM BEHAV	51	10.2
GOPINATH S, 2013, MANAGE SCI	51	8.5
XU SX, 2013, MIS QUART MANAGE INF SYST	51	8.5
ALALWAN AA, 2017, TELEMATICS INF	50	25
TAVANA M, 2013, EXPERT SYS APPL	50	8.3333
DOU Y, 2013, INF SYST RES	48	8
LI Q, 2014, INF SCI	46	9.2
TENG S, 2014, ONLINE INFO REV	46	9.2
ZHAO WX, 2016, IEEE TRANS KNOWL DATA ENG	45	15
RANCO G, 2015, PLOS ONE	45	11.25
HAJLI N, 2015, TECHNOL FORECAST SOC CHANGE	43	10.75
NADEEM W, 2015, INT J INF MANAGE	42	10.5
LI YM, 2014, INF SCI	42	8.4
GHOSE A, 2014, MANAGE SCI	42	8.4
DUWAI RI RM, 2014, INT CONF INF COMMUN SYST , ICICS	42	8.4
YOON VY, 2013, DECIS SUPPORT SYST	42	7
CHHABRA S, 2011, ACM INT CONF PROC SER	42	5.25
YAN Z, 2015, INF MANAGE	41	10.25
DINH TN, 2014, IEEE ACM TRANS NETWORKING	41	8.2
CAMBRIA E, 2013, BIG DATA COMPUTING	41	6.8333
WEI Y, 2011, J ELECTR COMMER RES	41	5.125
EASLEY D, 2013, PROC ACM CONF ELECTRON COMMER	39	6.5
LUNA-NEVAREZ C, 2012, J DESTIN MARK MANAGE	39	5.5714
BADAWY AM, 2009, J ENG TECHNOL MANAGE JET M	39	3.9
TUAROB S, 2013, PROC ASME DES ENG TECH CONF	38	6.3333
BALAJI MS, 2016, INF MANAGE	37	12.3333
HUANG Z, 2015, TECHNOL FORECAST SOC CHANGE	37	9.25
BRENGMAN M, 2012, MANAGE RES REV	37	5.2857
LEVINA N, 2014, INF SYST RES	36	7.2
NERI F, 2012, PROC IEEE/ACM INT CONF ADV SOC NETWORKS ANAL MIN , ASONAM	36	5.1429
CHEN H, 2010, IEEE INTELL SYST	36	4
SIGALA M, 2017, CURR ISSUES TOUR	35	17.5
XIE K, 2015, J MANAGE INF SYST	35	8.75
CANTADOR I, 2015, RECOMMENDER SYSTEMS HANDB , SECOND EDITION	35	8.75
BILGIHAN A, 2014, INF TECHNOL TOUR	33	6.6
MAO Y, 2012, PROC ACM INT WORKSHOP HOT TOP INTERDISCIP SOC NETWORKS RES ,	33	4.7143
CHEN A, 2014, J MANAGE INF SYST	32	6.4
WIRTZ BW, 2013, J ELECTR COMMER RES	32	5.3333
ABIDIN C, 2016, SOCIAL MEDIA SOC	31	10.3333
WRIGHT AJ, 2015, OCEAN COAST MANAGE	31	7.75
GUO L, 2015, PROC ACM SIGMOD INT CONF MANAGE DATA	31	7.75

LIU L, 2016, INT J INF MANAGE	30	10
HEW JJ, 2016, COMPUT HUM BEHAV	30	10
LI Q, 2014, DECIS SUPPORT SYST	30	6
MACKEY TK, 2013, J MED INTERNET RES	30	5
MANDIBERG M, 2012, THE SOC MEDIA READ	30	4.2857
ZHAO Z, 2015, BUS HORIZ	29	7.25
LAI LSL, 2015, J ELECTR COMMER RES	29	7.25
BILGIHAN A, 2016, INT J QUAL SERV SCI	28	9.3333
BERNABÉ-MORENO J, 2015, KNOWL BASED SYST	28	7
ROYLE J, 2014, INT J INF MANAGE	28	5.6
SUL HK, 2014, PROC ANNU HAWAII INT CONF SYST SCI	28	5.6
DAVIS R, 2014, J RETAIL CONSUM SERV	28	5.6
BUSALIM AH, 2016, INT J INF MANAGE	27	9
BENSON V, 2015, INF TECHNOL PEOPLE	27	6.75
FENG H, 2014, NEUROCOMPUTING	27	5.4
DEDE E, 2013, IEEE INT CONF CLOUD COMPUT , CLOUD	27	4.5
CAO CC, 2013, PROC ACM SIGKDD INT CONF KNOWL DISCOV DATA MIN	27	4.5
YAN Q, 2016, ELECT COMMER RES APPL	26	8.6667
DORAN D, 2013, PROC IEEE/ACM INT CONF ADV SOC NETWORKS ANAL MIN , ASONAM	26	4.3333
BOTHOS E, 2010, IEEE INTELL SYST	26	2.8889
HASSAN ZADEH A, 2014, DECIS SUPPORT SYST	25	5
TANBEER SK, 2014, J ORG COMPUT ELECTR COMMER	25	5
YAN SR, 2015, INF SCI	24	6
HE W, 2015, IND MANAGE DATA SYS	24	6
WU YCJ, 2015, COMPUT HUM BEHAV	23	5.75
RIBEIRO MT, 2014, ACM TRANS INTELL SYST TECHNOLOG	23	4.6
REINHOLD O, 2011, BLED ECONF - EFUTURE: CREAT SOLUTIONS INDIVID , ORGAN SOC	23	2.875
TURBAN E, 2010, ACM INT CONF PROC SER	23	2.5556
ASWANI R, 2018, INT J INF MANAGE	22	22
WANG Y, 2017, INT J INF MANAGE	22	11
NEIROTTI P, 2016, INT J INF MANAGE	22	7.3333
ZHANG W, 2016, PHYS A STAT MECH APPL	22	7.3333
NGO-YE TL, 2012, ACM TRANS MANAGE INF SYST	22	3.1429
LIN X, 2017, INT J INF MANAGE	21	10.5
CHEN H, 2015, INF SYST RES	21	5.25
LEE SYT, 2015, ELECT COMMER RES APPL	21	5.25
LU Y, 2014, IEEE COMPUT GRAPHICS APPL	21	4.2
SLAVAKIS K, 2014, IEEE SIGNAL PROCESS MAG	21	4.2
NOH M, 2013, J ELECTR COMMER RES	21	3.5
RUI H, 2011, ACM TRANS MANAGE INF SYST	21	2.625
KUMAR S, 2011, PROC NATL CONF ARTIF INTELL	21	2.625
LAI LSL, 2010, WORLD ACAD SCI ENG TECHNOL	21	2.3333
BAETHGE C, 2016, ELECTRON MARK	20	6.6667
JIN X, 2016, PHYS A STAT MECH APPL	20	6.6667
BANERJEE S, 2014, PROC SCI INF CONF , SAI	20	4
PORSHNEV A, 2013, PROC - IEEE INT CONF DATA MIN WORKSHOPS, ICDMW	20	3.3333
KWAHK KY, 2012, PROC ANNU HAWAII INT CONF SYST SCI	20	2.8571
SCHUCKERT M, 2016, ASIA PAC J TOUR RES	19	6.3333
MAKREHCHI M, 2013, PROC - IEEE/WIC/ACM INT CONF WEB INTELL , WI	19	3.1667
TRENZ M, 2013, ECIS - PROC EUR CONF INF SYST	19	3.1667
QIN L, 2011, J ELECTR COMMER RES	19	2.375
DHAR V, 2010, INF SYST RES	19	2.1111
WU C, 2016, PLOS ONE	18	6

## 11. Country scientific production

One of the other important areas of research is the study of the scientific production of countries. Studies show that researchers from the United States (654 articles), China (368 articles), India (291 articles), and the UK (234) have played a major role in scientific production of social networks and e-commerce.

## Country Scientific Production



**Fig. 10.** The frequency of the keywords used in different E-commerce studies

## 12. Conclusion

This study has been in the field of analyzing and illustrating the scientific products of the world for 14 years in the fields of e-commerce and social networks, and has tried to provide a comprehensive review of the research published in the literature. The increasing growth of studies began in 2009 and has continued at an almost constant rate. Thematic analysis shows that the subject under study has a significant but not developed research field and is in a group of transversal and general, basic themes. Studies have shown that researchers in the United States, Germany and China have received the greatest attention in this research. International cooperation in the European Union is well-suited; however, the United States and China have had the highest levels of international cooperation in the field of social networking and e-commerce. Future studies can use existing algorithms to predict the link in the international research network and contribute to research policy developments in the world with the advent of network developments. Also, the study of the relationship between international scientific collaboration and the effectiveness of e-commerce research will determine whether research undertaken through partnerships with other countries has had more citation-effectiveness than its scientific output.

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