



Review of Consumer-to-Consumer E-Commerce Research Collaboration


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ABSTRACT

This study uses a content analysis method to systematically review 83 research papers from 2002-2018 to explore consumer-to-consumer (C2C) e-commerce research trends. The findings of this study indicate that (1) C2C e-commerce is discussed and investigated in many disciplines, but mainly published in e-commerce journals; (2) studies on C2C e-commerce increasingly focus on diverse topics, but concentrate on regions such as China and the United States; (3) the focus of academic collaboration has shifted from domestic to international collaboration, and collaboration within the same institution. However, collaboration is scarce across different study teams; (4) the data-driven approach is the main approach used in studies on C2C e-commerce; (5) while the number of recent C2C e-commerce studies adopted theories is increasing, few have developed theoretical frameworks or models. Finally, study implications and future study suggestions are also discussed.

KEYWORDS

Collaboration, Consumer-to-Consumer, Content Analysis, E-Commerce, Social Network Analysis, Systematic Review

INTRODUCTION

In recent years, global online retail transactions have witnessed a trend of continuous expansion, with a strong growth momentum. The proportion of online retail sales in total global retail sales is projected to increase from 8.6% in 2016 to 17.5% in 2021 at a growth rate far exceeding that of physical retail sales (eMarketer, 2018). In particular, consumer-to-consumer electronic commerce (C2C e-commerce) has become popular and it has experienced rapid development (Jones & Leonard, 2008; Wei, Li, Zha, & Ma, 2019). In this study, C2C e-commerce is defined as consumers selling products to other consumers through an online network. While the current growth rate of C2C e-commerce is not as

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fast as that of B2B and B2C e-commerce, the impact of the scale of C2C transactions should not be ignored (Leonard & Jones, 2010). A recent survey showed that in 2017, 19% of respondents from Europe had used the Internet at least once to sell goods or services to other consumers (Statista, 2018). According to the same report, 30% of respondents from the US had sold used goods via Facebook pages at least once in 2017. Under fierce competition, the scale of China's C2C transactions accounted for 41.6% of the country's online retail market in 2017, with a growth rate of 30.7% (Department of Electronic Commerce and Informatization of China, 2018). The booming C2C e-commerce market will not only attract more investment inflows and create new business models, but also upgrade consumer experience and drive market competition.

Therefore, the C2C model has become a major focus of research, with increasing number of publications by the academia. Researchers have explored the C2C model from multiple perspectives, such as trust (Joo, 2015; Wei et al., 2019; Yoon & Occeña, 2015), reputation (Dai, Viken, Joo, & Bente, 2018; Fan, Ju, & Xiao, 2016; Houser & Wooders, 2006), purchase intention (Jia, Cegielski, & Zhang, 2014), risk (Meents & Verhagen, 2018), interaction (Abdul-Ghani, Hyde, & Marshall, 2011), customer loyalty (Huang, Chen, Ou, Davison, & Hua, 2017), and rewards for providing feedback (Cabral & Li, 2015). The research site has shifted from e-commerce platforms (Cui, Zhang, & Lowry, 2017; Li, Li, & Lin, 2008) to social media (Chen, Su, & Widjaja, 2016; Chong, Lacka, Boying, & Chan, 2018; Li & Wang, 2018). As C2C-related research seems to be of sustainable interest, it is consistent with the purpose and intent of this study.

Previous review studies have focused on articles published in the Information Systems (IS) Journals and explored mainstream areas of research related to C2C (Cui, Lai, & Liu, 2008; Leonard & Jones, 2010). Cui et al. (2008) analyzed the development of consumer behavior using meta-analysis based on 83 articles on online auctions published in the IS journals between 1998 and 2007. Research results show that consumer research on online auctions can be divided into three categories: promotive factors, consumer behavior, and auction output. Similarly, Leonard and Jones (2010) found 2,291 e-commerce articles in the IS discipline during the period 1997–2009, of which research on C2C e-commerce accounted for only 10.86%. They have pointed out that the three main areas of research on C2C e-commerce are C2C, online auctions, and online communities.

In view of the development of the C2C e-commerce industry, research on C2C e-commerce still has a lot of room for development as compared to other e-commerce models (Chong et al., 2018; Leonard & Jones, 2010). However, some researchers argue that B2B, B2C, and C2C models should not be treated differently (Shi & Wu, 2006). Previous studies on e-commerce that uses successful models have mostly focused on the B2C and B2B environment and ignored the C2C environment. C2C e-commerce has gone through a long process of development and achieved some brilliant outcomes in practice. There are still some gaps in the literature on C2C e-commerce that need to be explored. Therefore, it is necessary to review this literature from multiple perspectives to obtain a clear understanding of its development.

Compared to other e-commerce models, C2C is an emerging area of research. Collaborative research teams are necessary and desirable not only for developing an emerging area of research, but also for increasing productivity (Levitt & Thelwall, 2016; Yuan, Wu, & Tsai, 2019). As a growing business model, C2C e-commerce is making considerable progress. Research on this model through extensive academic collaboration is likely to yield valuable results in the future (Fischbach, Putzke, & Schoder, 2011). Therefore, the following research questions have arisen: (1) What are the topics being covered in C2C research? (2) What is the status of collaboration? (3) What is the methodology being used?

To answer the above questions, this paper conducted a systematic review followed by a social network analysis (SNA) to explore the status of C2C e-commerce research based on peer-reviewed journals indexed in Web of Science (WOS). We believe this study is the first study that examines the trends of research on C2C e-commerce in terms of focus areas, researcher communities, and theories. The contributions of this study are as follows: (1) providing an overall picture of the change in trend

for the C2C e-commerce sector based on peer-reviewed journals indexed in WOS; (2) generating an understanding of the topics that researchers use to explore C2C e-commerce; (3) examining the current status of C2C-related academic communities from academic partnerships; (4) emphasizing the need for greater collaboration between the industry and the academic community.

This paper is organized as follows. Section 2 discusses the methodology used for this study. Section 3 provides the results of the study. Section 4 presents the conclusion, explains the limitations of this study, and gives recommendations for future research directions.

METHODOLOGY

The growth of the C2C e-commerce industry continues has attracted the attention of the academic community and various publications. This study provides a systematic review of published papers related to C2C e-commerce and uses extensive content analysis and SNA to explore trends in the C2C-related research community. The systematic review protocol involves selection, validation and quality assessment of major studies, data extraction, and data synthesis (Busalim & Hussin, 2016; Kitchenham & Charters, 2007), with the main goal of reducing research biases. The validation of this study is performed with respect to the background, definitions, and research questions presented above. The search for available articles from the databases comprises of two stages: identification and analysis.

Article Identification

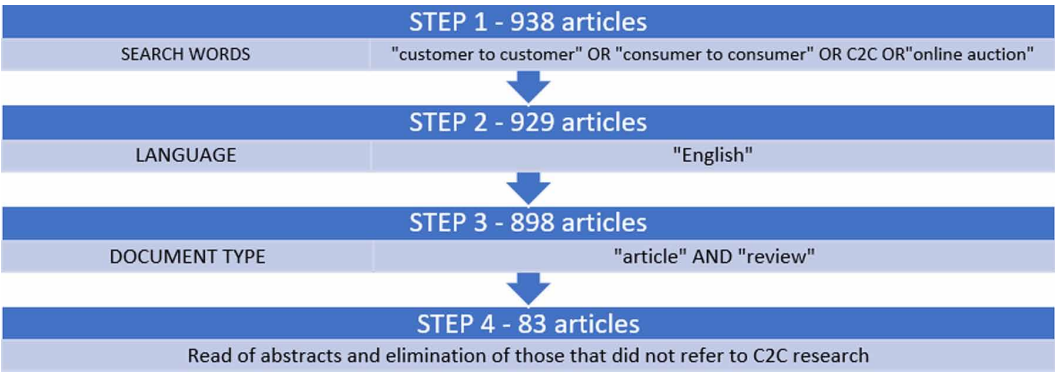
Long-term data need to be collected to accurately capture the research trends. In early February, 2019, we searched for journal papers published before 2018 through the WOS citation index, which is a library of selected quality academic journals maintained by Thomson Reuters. We defined four keywords, “customer-to-customer,” “consumer-to-consumer,” “C2C,” and “online auction” (Cui et al., 2008; Leonard & Jones, 2010; ter Huurne, Ronteltap, Corten, & Buskens, 2017) to identify all publications related to C2C. The initial search yielded 938 documents, including published articles, conference articles, editorial materials, notes, comments, book reviews, magazines, trade publications, and retractions.

Furthermore, the following exclusion and inclusion strategies were employed to focus only on articles related to C2C e-commerce and those comparing C2C with other models (Figure 1). First, only articles published in English were considered. Second, peer-reviewed articles were considered the most effective and all other types of articles and retractions were excluded. Third, these papers were distributed equally to the first, fourth, and fifth authors of this study, who then read the titles, abstracts, and keywords to assess their value for further review. Finally, when an article could not be classified based solely on the abstract, the complete article was reviewed for appropriate classification. When there was a disagreement on the classification of an article, all the authors conducted a full-text analysis to determine whether the article was consistent with our research objective. Using these strategies, we found 83 articles that were published between 2002 and 2018.

Article Analysis

Article analysis is a key stage in a systematic review and it involves a coding scheme and a coding manual (Abbasi & Nilsson, 2012). A coding scheme is a form in which a related project is encoded into data and then entered. A coding manual is a set of instructions for the coders that clearly defines the categories used to classify the text. The coding scheme and coding manual are presented in Table 1. Each paper was analyzed based on the descriptive statistics, collaboration relationships, and research methods. First, the descriptive statistics were used to determine the number of authors, journals, distribution of data collection areas, and topics (Gao, Xu, Ruan, & Lu, 2017; Mansouri, Lee, & Aluko, 2015). Second, the collaborative relationships for each paper, including authors and

Figure 1. WOS database research process



their affiliations and countries, were analyzed (Wu, Goh, Yuan, & Huang, 2017). Third, the research methods and theories used in the literature were summarized (Mansouri et al., 2015).

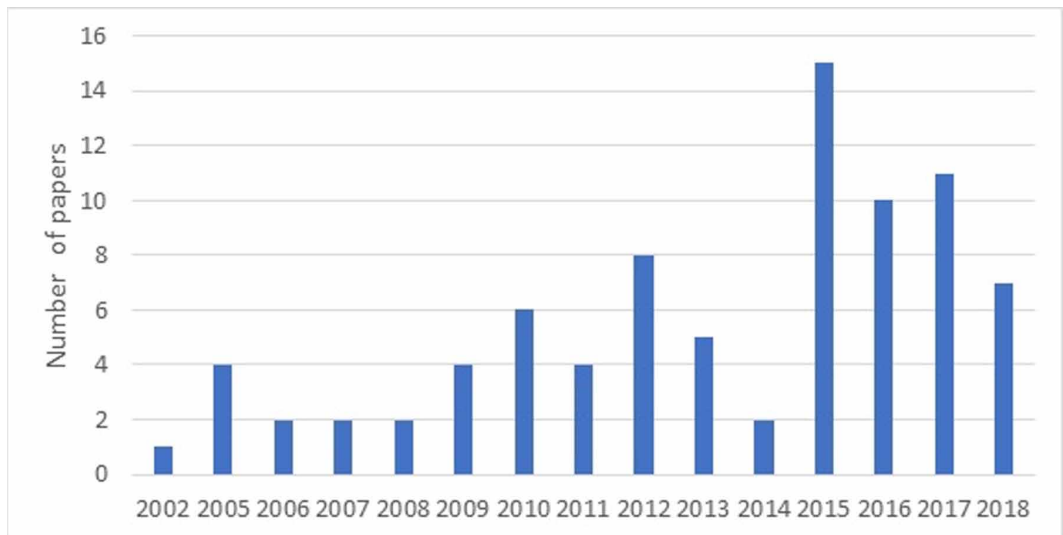
We collected 83 articles for this study, which amount to more than 10 articles per year since 2015. To understand the development trend of C2C-related research, the study considered the year of publication and distribution of articles and compared two groups of studies for the periods 2002–2014 and 2015–2014. The main reason for this division is that after 2015, the number of relevant C2C-related papers increased by more than three times on average per year compared to the period 2002–2014 period (Gao et al., 2017; Yuan et al., 2019). According to Figure 2, the year 2014 seems ideal for separating the articles because the number of published articles increased rapidly to 15 in 2015. Hence, this can minimize the difference in the number of articles between two groups and help readers learn more about the changes and trends in recent years.

After a systematic review of these published articles, we performed an in-depth content analysis to scrutinize each article and obtain relevant data. The fourth and fifth authors undertook the coding work for this study. Before starting the coding work, they received training to avoid personal misunderstandings or preferences. In the coding process, they held a code inspection meeting to avoid human errors every time they finished analyzing 10 papers. The coders were required to exchange their results with each other as a reliability check among the coders. The coding process actually began when each coder clearly understood the requirements after the second round of coding and discussion. The Kappa value between the coders was 0.852, thus showing good consistency.

Table 1. Coding schedule and coding manual

Classification	Category	References
Descriptive statistics	Publication years, journal names, number of authors, country of data collection, research topics	Busalim and Hussin (2016); ter Huurne et al. (2017); Akter, Bhattacharyya, Wamba, and Aditya (2016); Wamba, Akter, Kang, Bhattacharya, and Upal (2016)
Collaboration	Author, affiliation, and country	Palvia, Pinjani, and Sibley (2007); Wu et al. (2017); Yuan et al. (2019)
Research method	Research methodology and theory	Busalim and Hussin (2016); Palvia et al. (2007); Tang (2019); ter Huurne et al. (2017)

Figure 2. Distribution of reviewed papers by year



RESULTS

Descriptive Analysis

Figure 2 shows the distribution of published articles on the C2C model. The first paper on the C2C model was published in 2002, with an average of no more than five published papers per year (Average = 4.88, standard deviation = 4.18). The number of published papers did not exhibit a steady growth trend, although it reached 15 in 2015. An average of three papers was published annually during the period 2002–2014. This increased by three times after 2015. Thus, it is evident that research on C2C e-commerce did not receive the attention of researchers until recent years.

This study covers 83 papers related to C2C e-commerce distributed across 51 journals from various fields such as e-commerce, business research, and engineering. Journals that covered more than three such papers, mainly journals from the field of e-commerce, are listed in Table 2. *Electronic Commerce Research and Applications*, *International Journal of Electronic Commerce*, and *Information & Management* published the highest number of papers, accounting for more than 20% of the total.

Table 3 provides an analysis of the number of authors for each paper. During the study period, the average number of authors working together was around three. Most articles involved two to three authors, accounting for nearly two-thirds (62.7%) of total number of articles. Based on the comparison between the periods 2002–2014 and 2015–2018, the proportions of articles with one and three authors declined, whereas the proportions of articles with two and four or more authors increased significantly. This shows that the number of authors working on each article has increased in recent years, from an average of 2.8 to 3. In a highly competitive academic environment, it is important to combine the expertise of each researcher to enhance the efficiency and effectiveness of research (Yuan et al., 2019).

Table 4 lists the countries and regions where the main research objects of previous studies are located. Multiple classifications of the 83 articles yielded 75 different categories. Out of the 83 articles, 16 did not specify the objects, five focused on two or more countries, one had a global scope, and one focused on Europe. The extant literature for the study period is mainly focused on countries like China (49.3%) and the US (20.0%). The study area during the period 2002–2014 was dominated by China (40.0%), followed by the US (20.0%). In 2015–2018, research has focused on China (57.5%), the US (20.0%), and the Republic of Korea (10.0%). The number of papers related to China increased

Table 2. C2C articles by Journal

Name	Counts
Electronic Commerce Research and Applications	7
International Journal of Electronic Commerce	6
Information & Management	5
Decision Support Systems	4
Electronic Commerce Research	3
Electronic Markets	3
Journal of Business Research	3
Journal of Electronic Commerce Research	3

Notes: Show only if > 2

Table 3. Number of authors and percentage

Number	2002-2014		2015-2018		Total	
1	5	12.5%	3	7.0%	8	9.6%
2	8	20.0%	11	25.6%	19	22.9%
3	19	47.5%	14	32.6%	33	39.8%
4	6	15.0%	10	23.3%	16	19.3%
5	2	5.0%	5	11.6%	7	8.4%
Total	40	100.0%	43	100.0%	83	100.0%

significantly, thus reflecting China’s potential for the development of C2C e-commerce. This study further analyzed the literature on China. However, we have found that the lead authors of more than one-third of the articles were from outside China.

Table 5 summarizes the topics related to the C2C model that were explored by researchers in their studies. Out of the 83 articles, 24 explored more than two topics. This shows that the total number of topics is higher than the total number of articles during the study period. The most studied topics during the period 2002–2014 include auction (19.1%), reputation (19.1%), and trust (17.0%). This finding is consistent with Leonard and Jones (Leonard & Jones, 2010), who indicate that trust in the e-commerce sector has been extensively studied. During the period 2015–2018, trust (14.0%), auction (10.5%), and reputation (10.5%) remained the leading research topics, followed by purchase behavior (8.8%), social capital (8.8%), and social media (8.8%). Trust is imperative in the e-commerce environment because online consumers are often more susceptible to transactional risks, especially when the quality of products or services offered by online sellers is uncertain (Li & Wang, 2018; Sullivan & Kim, 2018). The comparison between the periods 2002–2014 and 2015–2018 shows that there was a significant increase in the frequency of topics like social capital, social media, feedback, and risk.

Analysis of Collaboration Networks

Table 6 presents the details on collaboration among researchers. The period 2002–2018 mainly witnessed international collaboration (nearly 40%), followed by collaboration among different institutions within a country (24.1%) and within the same institution (21.7%). The comparison between the periods 2002–2014 and 2015–2018 show that the proportion of single authorship decreased

Table 4. Country of data collection and percentage

Country	2002-2014		2015-2018		Total	
China	14	40.0%	23	57.5%	37	49.3%
United States	7	20.0%	8	20.0%	15	20.0%
Taiwan, China	5	14.3%	2	5.0%	7	9.3%
Republic of Korea	2	5.7%	4	10.0%	6	8.0%
German	1	2.9%	1	2.5%	2	2.7%
Netherlands	1	2.9%	1	2.5%	2	2.7%
Global	1	2.9%	0	0.0%	1	1.3%
Greece	1	2.9%	0	0.0%	1	1.3%
New Zealand	1	2.9%	0	0.0%	1	1.3%
Poland	1	2.9%	0	0.0%	1	1.3%
Canada	1	2.9%	0	0.0%	1	1.3%
Europe	0	0.0%	1	2.5%	1	1.3%
Total	35	100.0%	40	100.0%	75	100.0%

by 5.5%, while collaboration within the same institution increased by 8.1%. At the national level, collaboration among academic institutions of the same country declined sharply, while industry-academic collaboration increased slightly. At the international level, collaboration among researchers

Table 5. Topic frequency and percentage

Topic	2002-2014		2015-2018		Total (%)	
Trust	8	17.0%	8	14.0%	16	15.4%
Auctions	9	19.1%	6	10.5%	15	14.4%
Reputation	9	19.1%	6	10.5%	15	14.4%
Purchase behavior	3	6.4%	5	8.8%	8	7.7%
Social capital	1	2.1%	5	8.8%	6	5.8%
Social media	1	2.1%	5	8.8%	6	5.8%
Price	2	4.3%	3	5.3%	5	4.8%
Loyalty	2	4.3%	2	3.5%	4	3.8%
Resale	2	4.3%	1	1.8%	3	2.9%
Satisfaction	1	2.1%	2	3.5%	3	2.9%
Feedback	0	0.0%	3	5.3%	3	2.9%
Risk	0	0.0%	3	5.3%	3	2.9%
Services	2	4.3%	0	0.0%	2	1.9%
Decisions/choices	0	0.0%	2	3.5%	2	1.9%
Others	7	14.9%	6	10.5%	13	12.5%
Total	47	100.0%	57	100.0%	104	100.0%

Note: 24 articles explored more than two topics.

Table 6. Collaboration analysis and percentage

Collaboration Form	2002-2013		2014-2018		Total	
Single authored	5	12.5%	3	7.0%	8	9.6%
Institutional level	7	17.5%	11	25.6%	18	21.7%
<i>National level</i>						
Among academics	15	37.5%	5	11.6%	20	24.1%
Cross-sector collaboration	1	2.5%	3	7.0%	4	4.8%
<i>International level</i>						
Among academics	11	27.5%	20	46.5%	31	37.3%
Cross-sector collaboration	1	2.5%	1	2.3%	2	2.4%
Total	40	100.0%	43	100.0%	83	100.0%

from different countries increased sharply, which indicates that in recent years, researchers have shifted from domestic to international collaborations and collaboration within the same institution. Cross-sector collaboration refers to at least one author of the paper is from a different sector (e.g., academia and industry). Between 2014 and 2018, the proportion of cross-sector collaboration between scholars and practitioners has increased significantly (9.3%), but such collaboration has not received much attention. Our findings indicate that the data for many C2C e-commerce studies were collected from auction sites. Therefore, practitioners can help improve academic research through their participation in studies on relevant topics and problems for a profound insight into the research findings (Schneberger, Pollard, & Watson, 2009).

This study explored the collaboration among authors, institutions, and countries, and the closeness of collaboration by analyzing data on the authors. After excluding eight single-authored papers, this study used SNA to visualize the relationship in collaboration networks. Figures 3–5 show the collaboration networks, which comprise of nodes and links. In the figures, a node can represent an author, an institution, or a country. A link represents collaborations in the C2C-related research, and its thickness indicates the frequency of collaboration among the authors, institutions, and countries. This shows that the formation of a network contains at least two elements, nodes and links. This study used NodeXL and Netdraw to visualize networks and calculate network weights.

Figure 2 depicts the collaboration networks for the 75 papers authored by two or more researchers. It shows 222 authors who formed 287 collaborations. Our results indicate that this research community is relatively fragmented. Only four groups of researchers had strong or wide collaborations, among which the collaboration networks headed by X.Y. Chen, W. Wu, C. Zhang, and Z.X. Lin had highest number of researchers. Some members published at least two papers and introduced other members to expand the collaboration networks. In general, the collaboration networks in the C2C sector had a low density and scattered structure, indicating that most researchers published only one paper. C2C e-commerce is no longer considered a mere marginal activity driven by a group of leading users (Saarijärvi, Joensuu, Rintamäki, & Yrjölä, 2018). Hence, it needs to be studied by more dedicated researchers. Attracting more people to invest in this sector will form closer collaborations.

Figure 4 shows inter-institutional collaboration networks formed by the authors' affiliations. Out of the 83 articles, 57 involved the collaboration of different institutions, specifically 110 institutions forming 172 collaborations. Some universities such as The Hong Kong Polytechnic University, Tsinghua University, and Bar Ilan University were centrally located in the research communities' collaboration network, which can bridge different groups. These institutions have two or more partners at the same time and as such, they derive greater benefits as compared to their partners (Wu et al., 2017; Yuan et al., 2019).

Figure 3. Co-authorship networks

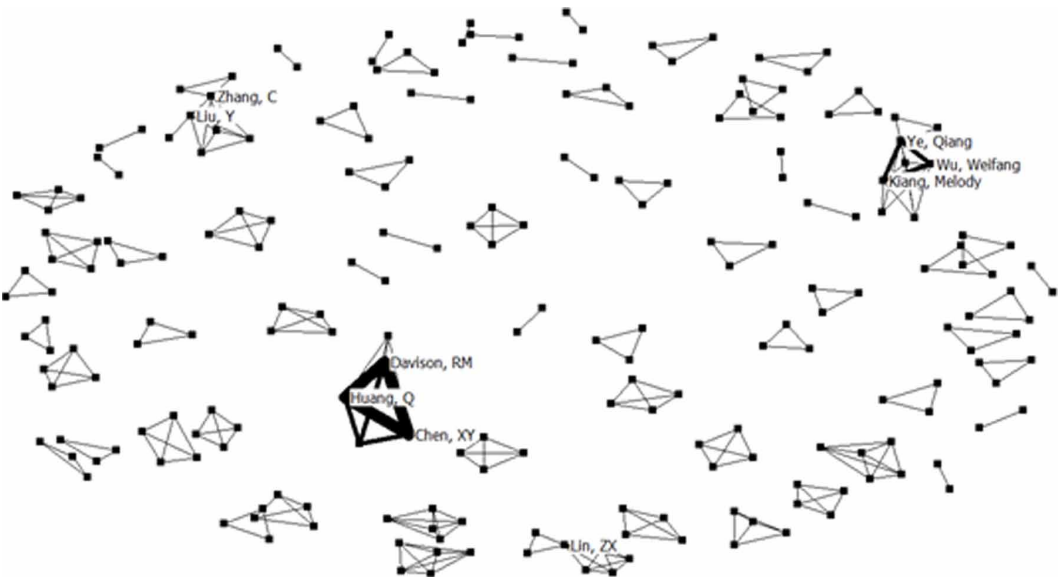


Figure 5 shows the international collaboration networks. The authors of the 83 articles belonged to 16 countries. Among them, 33 articles involved 95 collaborations by researchers from different countries or regions. Researchers from Japan, New Zealand, and Greece have not yet established any collaborative relationships with researchers from other countries in C2C-related research. We divided the research community into two groups for the duration of the study, which included the US-led core group and the marginal group comprising of Macau and Australia. The core group

Figure 4. Institutional collaboration networks



Figure 5. International collaboration networks



was led by the US because it is one of the leaders in C2C e-commerce. As researchers have mostly focused on C2C e-commerce in China, China was placed at the core of the sub-group along with the United Kingdom and Denmark. However, China is not placed in a structural hole, mainly due to two reasons. First, some of the C2C-related research on China has only been co-authored by researchers from China. Second, Chinese researchers had to rely on American researchers during international collaboration. According to our sample, up to 10 articles involve Chinese researchers collaborating with researchers from the US.

Research Methods and Theory

As presented in Table 7, the research methods most commonly used by researchers include survey (30.5%) and secondary data (23.4%), with growing trends in frequency of application. Few studies were conducted using qualitative methods like interviews (3.9%), and qualitative research (3.1%) and frameworks (0.8%). This shows that the C2C-related literature is dominated by empirical research. It is obvious that data-driven research is of paramount importance in research on any topic, especially when in its initial stages (Cui et al., 2008). According to the comparison between the periods 2002–2014 and 2015–2018, the frequency of application of field study and field experiment increased the most, while that of laboratory experiment decreased the most.

Another important aspect of research is the application of theoretical models. The cases where theories were used in the literature are presented in Table 8. We found that 44.58% of the studies used a theory to explore research questions, and involved 35 theories. The signal theory (12.3%) was most commonly used, followed by the theory of social capital (8.8%) and prospect theory (8.8%). The signal theory suggests that IT-supported cues can affect consumer perceptions, attitudes, and behaviors. The theory of social capital, which emphasizes the relationship between people, grew dramatically in terms of frequency of application and it was used to explore seller credit, buyer loyalty, and satisfaction. During the period 2002–2014, 57.5% of the literature did not use a theory. This percentage decreased by four percentage points during the period 2015–2018. It is evident that in recent years, researchers have gradually focused on the use of theories to explore research questions.

Table 7. Methodology rank and frequency

Methodology	2002-2014		2015-2018		Total	
Survey	19	29.7%	20	31.3%	39	30.5%
Secondary data	13	20.3%	17	26.6%	30	23.4%
Mathematical model	5	7.8%	8	12.5%	13	10.2%
Laboratory experiment	7	10.9%	3	4.7%	10	7.8%
Field experiment	3	4.7%	6	9.4%	9	7.0%
Field study	2	3.1%	5	7.8%	7	5.5%
Interview	4	6.3%	1	1.6%	5	3.9%
Qualitative research	3	4.7%	1	1.6%	4	3.1%
Content analysis	4	6.3%	0	0.0%	4	3.1%
Library research	2	3.1%	1	1.6%	3	2.3%
Speculation/commentary	1	1.6%	1	1.6%	2	1.6%
Frameworks and conceptual model	1	1.6%	0	0.0%	1	0.8%
Case study	0	0.0%	1	1.6%	1	0.8%
Total	64	100.0%	64	100.0%	128	100.0%

CONCLUSION

To explore the status of research on C2C e-commerce and show a full picture of this sector, we conducted a comprehensive and systematic review of the literature. The literature sample for this study included peer-reviewed English articles from 2002 to 2018. Articles on C2C e-commerce have been published since 2002, with 15 such articles being published in 2015. Based on our analysis of 83 scientific articles, we can draw the following conclusions. First, research on C2C e-commerce covers many disciplines with many articles published in journals from various fields, such as e-commerce, business studies, and engineering technology. However, most of them have been published in journals related to e-commerce. Second, in a highly competitive academic environment, the number of authors

Table 8. Theory frequency and percentage

Theory	2002-2014		2015-2018		Total	
Signaling theory	2	7.4%	5	16.7%	7	12.3%
Social capital	0	0.0%	5	16.7%	5	8.8%
Prospect theory	3	11.1%	2	6.7%	5	8.8%
Game theory	4	14.8%	0	0.0%	4	7.0%
Utility theory	1	3.7%	3	10.0%	4	7.0%
Information processing theory	1	3.7%	2	6.7%	3	5.3%
Attribution theory	1	3.7%	1	3.3%	2	3.5%
Social presence theory	1	3.7%	1	3.3%	2	3.5%
Others	14	51.9%	11	36.7%	25	43.9%
Total	27	100.0%	30	100.0%	57	100.0%

per article has been increasing. Third, research on C2C e-commerce has witnessed greater variety of topics, but the research sites tend to be more focused on countries like China and the US. Fourth, collaborative relationships for co-authoring papers on C2C e-commerce have shifted from domestic to international collaboration and collaboration within the same institution. Moreover, such relationships are rarely found among different research teams. Fifth, data-driven research is still the main type of research conducted on C2C e-commerce. Finally, although more than half of the articles did not use any theory, the proportion of theories used in articles has increased slightly in recent years.

Research Implications

In terms of descriptive statistics, majority of contributions were involved collaboration among two to three researchers, while single-authored articles showed a downward trend. This indicates that team collaboration has become popular in the academic community for dealing with academic issues and conducting research. According to (Levitt & Thelwall, 2016), authors working in groups of two or three are usually the most productive. This shows that the collaboration rate exceeds 0.9, thus emphasizing importance of collaboration. E-commerce researchers believe that team collaboration is a beneficial and useful tactic that can help generate more citations (Fischbach et al., 2011). Furthermore, the research sites of the literature was mainly focused on China and the US. It is worth mentioning that the number of articles on China has increased significantly in the past four years, showing the increasing focus of researchers on China's C2C e-commerce market. China's online market is unique, especially with respect to its cultural context and unique individual sellers (Lin, Hsu, & Chiang, 2016). The determination of the research sites is also affected by the economic strength and growth rate of a country (Yuan et al., 2019).

Research on the C2C model is still limited to a few fields. The results of this study are consistent with that of Leonard and Jones (2010). For examples, many studies exist regarding online communities (e.g., Cabral & Li, 2015; Chong et al., 2018; Dai et al., 2018; Li, Guo, Wang, & Zhang, 2016) and online auctions (e.g., Abdul-Ghani et al., 2011; Houser & Wooders, 2006; Li, Chung, & Fiore, 2017). However, research topics have become more diversified, indicating that the number of studies in the field of C2C e-commerce is increasing. Our result shows that trust, auction, and reputation were the most popular topics for research. Trust has long been a dominating topic in e-commerce research (Lin et al., 2016). The willingness to buy or sell goods or services on the Internet is primarily influenced by the trust in the security of online shopping and the reliability of both buyers and sellers. Dishonest sellers may not deliver goods or may deliver inferior goods, while dishonest buyers may not pay (Houser & Wooders, 2006). Therefore, establishing trust between buyers and sellers who may not have met in person is a key factor in transactions.

International collaboration was the primary form of academic cooperation observed. Collaboration among researchers from the same country or region witnessed a sharp decline, indicating that researchers are more inclined towards international collaboration for conducting research on C2C e-commerce. Scientifically developed countries benefit more from scientific leadership as compared to developing countries, which increase their influence by providing papers that without undertaking a leading role (de Moya-Anegon, Guerrero-Bote, Lopez-Illescas, & Moed, 2018). This study also shows that China receives the greatest attention among researchers, but the researchers from the US form the core of the academic community, indicating that the core group will dominate and influence the direction of research on C2C e-commerce. In addition, practical collaborations have been neglected to some extent. The outcomes of many important studies are obtained by investigators mainly via practical activities or face-to-face interactions (Wu et al., 2017). Collaborative relationships among researchers are not widespread across the network and remain fragmented. Most researchers have not conducted any extensive investigations and published only one paper related to the C2C model, which is not conducive to the development of the C2C e-commerce industry and research related to it.

In terms of research methods, survey and secondary data are the mainstream methods being used. The result of the survey method is consistent with those of Palvia et al. (2007), but the proportion of

secondary data is much higher than indicated by their findings. In C2C e-commerce, a buyer and a seller evaluate each other based on the outcomes of their transactions, which provides a good basis for research. Compared with the B2B and B2C models, it is easier for researchers to obtain C2C transaction data through web crawlers or experimental design. In addition, among the theories used during the period 2002–2018, the signal theory was used most frequently, followed by the theory of social capital and prospect theory. The frequency of application of theories in the literature has gradually increased, thus boosting research based on theory.

Research Limitations

This study has certain limitations. First, we used precise keywords to search for literature in the WOS. Although some studies were related to C2C e-commerce, they were ignored based on the different keyword expressions used to search for them. In addition, we focused only on English academic literature published in international journals and articles published in non-SCI/SSCI index publications (book reviews, conference papers, magazines, and letters) were excluded in this study. Nevertheless, this study argues that 83 papers spanning nearly two decades are sufficient to represent the body of research on C2C e-commerce. Many of the trends that emerged in our data analysis were selected from the C2C e-commerce literature based on strict criteria. Therefore, we believe that this study may be helpful for future research.

Future Research Directions

With major changes in C2C e-commerce, researchers need to continually revise their priorities and benchmarks to accurately reflect the development of the e-commerce market. The results of this study show that the research on the development of C2C e-commerce still has room for growth. Based on the literature review, we propose the following future research directions and hope that the analytical perspectives and viewpoints provided by this study provide a reference for research on C2C e-commerce.

1. This study found that researchers mostly conducted research in a group of two or three, suggesting some degree of research collaboration. However, very few papers have been published through collaboration between the academic community and practitioners. The variety of assumptions and beliefs make in academic research makes it very different from management practices. In the future, collaboration between the academic community and practitioners will be required for developing new topics and closing the gap between academic research and industries practices.
2. We have observed that in recent years, research related to C2C e-commerce has shifted its focus from e-commerce platforms (eg, Taobao or eBay) to online communities (eg, Facebook.com or Wechat). More and more e-commerce platforms are beginning to use social media to increase their economic efficiency (Ahn & Sura, 2020; Chong et al., 2018; Huang & Benyoucef, 2013; Lv, Jin, & Huang, 2018). Some social media also provide transaction functions, for example, Instagram and Facebook have developed webcast sales, trading communities, and marketplaces (Chen et al., 2016; Saarijärvi et al., 2018). Additionally, personality traits and personalities as an extension from topics such as marketplace group, shop, and live auctions must be examined in C2C social commerce. These dynamic areas contain huge possibilities for research.
3. The research sites have been focused on two or more countries, accounting for less than 10% in this study. In the highly competitive global market, many C2C e-commerce platforms are gradually becoming global as international companies. Therefore, future researchers can conduct research on C2C e-commerce at the international level to analyze cross-cultural or general issues.
4. Trust and auction are still the most studied topics. The emergence and increasing popularity of social networks and mobile payment systems are expected to promote the growth of global C2C e-commerce. However, Internet fraud, identity threats, and lack of payment assurance are barriers to the application of these services. A social networking site cannot control the quality of goods

sold because it can only serve as an intermediary. Further research is encouraged to investigate whether risk is no longer the main concern for buyers and which specific risk is most important to sellers. This study also suggests that researchers can investigate topics related to C2C e-commerce from different perspectives. For example, in recent years, free competition strategies (such as free slotting, free shipping, and free handling), mobile e-commerce consumption patterns, and international e-commerce development have become good topics for research related to C2C e-commerce.

5. The results of this study indicate a tendency for increase in international academic collaborations. However, the research community focused on C2C e-commerce is still sparsely distributed, with only a few researchers working with others. Given the diversity of C2C e-commerce involving buying, selling, and platforms, as well as the development of international e-commerce, collaboration for research needs to be strengthened.
6. To date, research agenda on C2C e-commerce has focused only on the US, China and Northeast Asia. Other emerging areas are also worth exploring, including Southeast Asia and South America. We also found that China itself has a lot of research on it, but not by it. Many studies on C2C e-commerce in China involved scholars from the US. The booming C2C e-commerce market is yet to be explored by more scholars with respect to areas such as WeChat merchants, C2C e-commerce payments, and C2C cross-border e-commerce.
7. Researchers mainly used quantitative methods for research on C2C e-commerce. Qualitative methods, such as case study and field study, enable researchers to preserve the overall meaningful characteristics of real-life events (Palvia et al., 2007). This study suggests that research results and development practices can be enhanced through hybrid qualitative approaches.
8. This study found that few papers provided a clear framework or model for the development and research of the C2C e-commerce industry (Chu, 2013). It is recommended that researchers can conduct research in this aspect to provide new ideas and creative suggestions for C2C development. With a constant increase in the frequency of application of theory in C2C-related research, researchers can explore C2C e-commerce from a theoretical perspective in the future.

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