Countries Collaboration and Research Themes in EC Research

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Abstract. This study identified 19,831 publications on electronic commerce (EC) research during 1996-2012, based on the all subject categories of SCIE and SSCI. Using a bibliometric analysis, this study analyzed countries/territories productivity and collaboration, author keywords and keywords plus. A few meaningful views of global trends of EC research were revealed. First, China, USA and UK were the top 3 most productive countries. The USA took the central position of collaboration network and USA-China, USA-Canada and USA-South Korea are the main international collaboration relationship. Second, internet, security and trust were the top 3 author keywords over the years. Third, the keywords plus of model have become more prevalent since 2006, indicating more attention is paid to the research methods of EC-related topics. Overall, the findings of this study reveal global trends and directions for EC researchers and practitioners.

Introduction

The rapid growth of Electronic commerce (EC or E-commerce) brought a corresponding increase in the number of academic papers on the subject [1]. The research areas, topics, methods, stakeholder, diversity, etc. of EC were discussed from various perspectives by many scholars [1-6]. However, most of them only analyze the journal articles of several top journals on EC research, such as International Journal of Electronic Commerce, Electronic Commerce Research, Journal of Electronic Research, MIS Quarterly, Information System Research, etc., ignoring others publications. Scholars are required to understand the overall development of the EC research. Therefore, others publications are also provided with the important value in tracing the global trends of EC research issues. To fill the vacancy of EC bibliometric research, this study has undertaken to analyze 19,831 EC publications in ISI Web of Science from 1996 to 2012 in order to achieve the following specific objectives: (1) to examine the productivity of most productive countries/territories and its international collaboration network; (2) to provide a better understanding of the change trends on research topics in different periods.

Research Background

Since EC burst on the scene, a series of bibliometric papers and literature reviews have been published to better understand the classification of EC. The early attempts to clarify the EC research domain was made by Clarke (2000), who analyzed the articles in EC and IS journals from 1993 to 2000. Ngai and Wat (2002) presented a literature review and classification scheme for EC research, by analyzing the 275 articles in various journals between 1993 and 1999. The results showed the Inter-organizational systems, corporate strategy and security were popular research topics [2]. Based on previous studies, some scholars have extended the EC research in topics and methods. Wareham et al. (2005) conducted a bibliometric analysis of 582 articles in both academic and professional journals from 1997 to 2003. The result indicated the conceptual method were the most prevalent in EC research, which included two sources: mathematical and theoretical treatises [3]. Lee and Kim (2007) classified the research methods of EC into two categories of conceptual research and instrument development by examining 1,103 articles in EC-related research, which including four methods: field studies, experiments, mathematical modeling, technology [4]. Lee et al. (2011) also found laboratory
experiments had been applied to some consumer-oriented studies, by analyzing 1,792 articles during 1996-2009 [5].

**Countries/Territories Productivity and Collaboration**

The outputs of different countries/territories are identified by the author address information. There were 96 countries/territories contributed 19,733 publications about EC-related research after removing 98 publications without any author information, during 1996-2012. The cumulative publications of top 20 countries/territories were 18,372, comprising 92.7% of total publications, and the publication share ranged from 0.9% (Switzerland) to 24.9% (China).

China (4,935; 24.9%) and USA (4,638; 23.4%) were ranked the top 2 by total publications, followed by UK (1,251; 6.3%), Taiwan (988; 5.0%), and Australia (858; 4.3%). The average number of publication outputs of top 20 countries/territories was 919, with a share of 4.6%. It was noteworthy that the proportion of China’s journals articles and proceedings papers were seriously imbalance, with the lowest share of journals articles (9.6%) and the highest share of proceedings papers (88.2%). However, USA (2,025; 43.7%) obtained the absolute advantage by journals articles, followed by UK (561; 44.8%), Taiwan (517; 52.3%). The average outputs of top 20 countries/territories in journals articles and proceedings papers were 297 and 529, respectively.

During the study periods, a total of 3,812 publications out of 18,732 publications published from top 20 countries/territories involved international collaboration, which was 20.7% of the total. USA (1,082) was ranked the first in the list by the total number of international collaboration publications, and Singapore (51.0%) was the top gainer in the list by share of international collaboration publications. On the contrary, Romania (4.6%) and China (8.4%) obtained the rank of countdown first and penultimate, respectively, by share of international collaboration publications. Figure 1 shows the international collaboration network of top 20 most productive countries/territories, visualizing by social network analysis software NetDraw 2.1. Points represent countries/territories and thicknesses of connection lines represent the strength of collaboration. As shown in the Figure 1, the USA occupies the center of collaboration network and most frequently collaborated with productive countries/territories. There are three major international collaborations in EC-related research: USA-China, USA-Canada, USA-South Korea.

![Figure 1. Top 20 most productive countries/territories international collaboration network.](image)

**Author Keywords and Keywords Plus**

Author keywords analysis offered information about research trends that concern researchers. There was a great diversity within the EC-related research, which included a total of 65,784 author keywords were identified from 1996 to 2012. In order to better reveal the change trends of research topics, this study processed the author keywords by two steps. Firstly, as EC appeared in large
numbers in publications was the core retrieval term in the study, lacking the true significance for analyzing EC itself. So, this study deleted the keyword of EC-related, including e-commerce, electronic commerce, e-business, electronic business, etc. Secondly, different parts of speech, deformation and abbreviation of one word were combined. Finally, an author keyword data set was obtained with a total of 60,427, in which 18,443 (30.5%) appeared only once and a further 5,256 (8.7%) appeared twice.

Among the top 20 author keywords in EC-related topics during 1996-2012, “internet” (913, 4.6%) was ranked the highest among all keywords, followed by four keywords appeared more than 500: “security” (899, 4.5%), “trust” (627, 3.2%), “SCM” (544, 2.7%), “B2B” (513, 2.6%), while “B2C” was ranked countdown first by 173 publications and 0.9% share. This study also compare the rank of author keywords in three periods: 1996-2001, 2002-2007, and 2008-2012. “internet”, “security”, “SCM” and “B2B” have been the most frequently used keywords with stable rankings during three periods. Some keywords have increased significantly in three research periods. For example, the ranking of “recommendation systems” moved from 250th in 1996-2001 to 6th in 2008-2012, “loyalty” moved from 149th to 8th, and “TAM” moved from 99th to 12th. These imply more attention of EC research has been paid to them in the last 17 years. However, four keywords, “agent”, “XML”, “multi-agent” and “commerce” have decreased significantly during three research periods. There has been no dramatic change in the ranks of other keywords, such as “CRM”, “data mining”, “privacy”, “IT”, etc.

Figure 2 depicts the yearly trends of the top 5 author keywords. As can be seen, “trust” demonstrates a striking growth throughout the years. The other four keywords, “internet”, “security”, “SCM” and “B2B”, as discussed previously, have also been popular, only with occasional fluctuations.

A total of 40,924 keywords plus were identified in EC-related research during 1996-2012, in which 5,341 (13.1%) appeared only once or twice. The distributions of top 20 keywords plus have shown the results similar to the author keywords. Some keywords such as “internet”, “IT”, “trust”, “technology”, “information”, “commerce”, “behavior”, “TAM”, “satisfaction” were also emphasized in author keywords. One of the noticeable changes was the ranking of model in the keywords plus, which ranked the top first by a total number of 1,263. As discussed in author keywords, the ranks of “trust” and “TAM” also have increased significantly in keywords plus during three periods. Additionally, some keywords also showed an increase, which did not appear in the top 20 author keywords, including “online”, “impact”, etc.

Figure 3 depicts the yearly trends of the top 5 keywords plus. As can be seen, five keywords all demonstrate a noticeable growth throughout the years. However, the gap between “model” and other four keywords has widened considerably since 2006. It can be concluded the research methods would be the emphasis of EC-related research. This result is consistent with that of Lee et al. (2011) in which discussed the change trends of EC research methods during 1996-2009[5].
Conclusion

This study reveals several interesting trends in EC research. There were 96 countries/territories producing EC-related publication from 1996 to 2012. China, USA and UK were the top 3 most productive countries, accounting for 54.6% share of total publications. However, USA was ranked the first and China was the penultimate in the rankings of journals articles. The USA took the central position of collaboration network and the most frequently collaborated with productive countries/territories in the list, with a total of 1,082 international collaboration publications. USA-China, USA-Canada and USA-South Korea are the main international collaboration relationship in EC research areas.

Several meaningful themes of EC-related research were identified by Author keywords and keywords plus analysis during period. Firstly, Compute Science and Management Science dominated the EC research, maintaining the popular position over the year. Secondly, some technology-oriented issues (agent, XML, multi-agent) appeared the downward trends during the research periods. On the contrary, the rankings of management-oriented issues (customer satisfaction, loyalty, B2C, etc.) increased significantly in 1996-2012. Thirdly, internet, security and trust were the most frequently issues of EC research over the years. These results provided more evidence that the safety of online transaction have aroused widespread attention. Finally, the keywords plus of model have become more prevalent since 2006, which indicate more attention is paid to the research methods of EC.

References


