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Liwei Li

Beijing Union University, [liweili@163.com](mailto:liweili@163.com)

Xiaojuan Sheng

Beijing Union University, [shengxiaojuan@buu.edu.cn](mailto:shengxiaojuan@buu.edu.cn)

Liyi Ma

Beijing Union University, [gltyiyi@buu.edu.cn](mailto:gltyiyi@buu.edu.cn)

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# **E-business Research in China over the Last Two Decades: a Bibliometric Analysis of Projects Granted by National Social Science Fund of China**

*Research-in-Progress*

**Liwei Li**

Management College, Beijing Union  
University

No. 97 Beisihuan East Road, Chao Yang  
District, Beijing, P. R. China  
liliwei@buu.edu.cn

**Xiaojuan Sheng**

Management College, Beijing Union  
University

No. 97 Beisihuan East Road, Chao Yang  
District, Beijing, P. R. China  
shengxiaojuan@buu.edu.cn

**Liyi Ma**

Management College, Beijing Union University  
No. 97 Beisihuan East Road, Chao Yang District, Beijing, P. R. China  
maryliyi@126.com

## **Abstract**

*The fast growth of electronic business activities in China during the last two decades has attracted significant attention from practice as well as academics in different countries. The purpose of this paper is to draw the basic outline of e-business research over the last two decades in China based on e-business research projects granted by National Social Science Fund of China from 1999 to 2017. Changes of the research on e-business over time, subject distribution, geographical distribution, active research institutions and high frequency words have been analyzed. The findings showed that the research subjects on e-business in China over last two decades could be classified into 6 categories: online consumer behavior, trust of e-business, internet business model innovation, rural electronic business, internet financial and macro issues related to e-business. The research on e-business has obtained the attention of researchers from different disciplines including management, economics, law, library, sociology, statistics, sports and journalism. The results have given a clear image of the academic investigation on e-business over the last two decades in China.*

**Keywords:** E-business Research, NSSFC Projects, Bibliometric Analysis

## **Introduction**

The rapid development of e-business promotes the innovation of theoretical research of e-businesses-business has nowadays become an important topic of academic research. E-business is an interdisciplinary science that involves many areas such as management, economics, computer, law, marketing, logistics, etc. It covers a very wide range of research. Many studies have used bibliometric method to examine the research trend of electronic business worldwide on papers published in journals. Ngai & Wat(2002) divided e-commerce research into four subjects including application, technology, support and implementation. Chen & Wang(2010) conducted a literature review and classification for electronic business research based on 4,948 SCIE papers and 2,875 SCI papers from 1999 to 2008. Hozhabri(2012) made a literature review of the studies done on online shopping based on the papers published in ISI Web of Science and Scopus from 2001 to 2011 and found that online shopping research could be classified into 12 categories of subject, most notably the business and management, computer science, engineering, and social sciences areas of online shopping have obtained more attention of the researchers. Fatima et al.(2017) analyzed the e-commerce research trends by using university digital resources from 2010 to 2015 and found that the research theme on

e-commerce in China could be classified into 13 different topics including strategy issue, adoption issue, theory and methodology, technical issue, security and legal issue, marketing and CRM, logistics, operations, assessment, social issue, transformation and organization.

Over two decades have passed since China accessed internet in 1994. The fast growth of electronic business activities in China during the last two decades has attracted significant attention from practice as well as academics in different countries. The purpose of this paper is to draw the basic outline of e-business research over the last two decades in China. This study focuses the e-business research of China for the reason that China has been the largest and fast-growing market of electronic business with high number of internet users worldwide. By the end of 2017, the number of internet users in China has reached 772 million which accounted for 55.8% of the total population (CNNIC, 2018). With the spread of the internet, the e-business market in China keeps growing in size. According to the data of National Bureau of Statistics of China, the transaction volume of e-business in China reached 26.1 trillion yuan in 2016. E-commerce market in China is expected to expand transactions to more than 40 trillion yuan by 2020, according to China's 2016-2020 e-commerce development plan. Meanwhile, e-business in China is taking more and more share in the global market. China has become the world's largest retail e-commerce market, with sales expected to top \$899.09 billion in 2016, representing almost half (47.0%) of digital retail sales worldwide and 18.4% of total retail sales in China, according to eMarketer's latest worldwide retail forecast.

The main purpose of this study is to make a systematic review on e-business research and highlight the academic research trends over two decades in China by using the e-business projects supported by National Social Science Fund of China (NSSFC). NSSFC projects on e-business from 1999 to 2017 are chosen, because the NSSFC represents the highest level of research projects of social science in China reflecting the level of development of disciplines. A statistical analysis on the NSSFC projects in the field of e-business will help learn the basic outline and current situation of e-business research in China.

The paper is organized as follows. Section 2 introduces the data and research method. Section 3 gives a bibliometric analysis of e-business research in China from the number of research projects, subject distribution, project categories, active research institutions and geographical distribution. Section 4 summarizes the main research subjects in the field of e-business based on word frequency analysis, social network and semantic network analysis. Conclusions and future research of this study are provided finally.

## **Data and Methodology**

The data in this study come from the project database query system of the National Planning Office for Philosophy and Social Sciences in China (<http://fz.people.com.cn/skygb/sk/index.php/Index/index>). In this database, project information like title, year, discipline, category, institution and applicant could be obtained. In order to ensure the integrity of the information and no omission of important projects, the definition of e-business in a broad sense is adopted in this study, keywords such as "e-business", "e-commerce", "online shopping", "O2O", "B2B", "B2C", "C2C", "online trading", "mobile commerce", "internet marketing", "Internet", "network", and "online" in Chinese are searched, artificial screening method is used to exclude duplicate and obviously irrelevant projects, and 170 items are obtained finally starting from 1999 to 2017.

In this paper, the basic data is first sorted by Excel 2007, and then the statistical software SPSS 20.0 is used to carry out descriptive statistical analysis on the items such as year, project category, subject classification, institutions and regions. Finally, ROST News Analysis Tool 4.5 software developed by professor Shen Yang of Tsinghua University in China to build social networks, and then carry out word frequency analysis and semantic network analysis of the research subjects.

## **Bibliometric Analysis of E-business Research in China**

### ***Annual Number of Projects***

Since Professor Zhang Naigen from Fudan University received the first NSSFC project in e-business in 1999, 170 projects in total have been granted by NSSFC in this field by 2017. As can be seen from figure 1, the number of e-business projects was less than 5 before 2009, began to increase in 2010, and reached to 8 in 2013. It has showed a growth spurt since 2014 with the number of projects of 24 in 2014, 31 in 2015, 39 in 2016 and 36 in 2017. Based on the projects numbers, we divide the e-business research of China into three stages: 1999-2009 as a starting stage, 2010-2013 as a development stage and 2014-present as a mature stage.

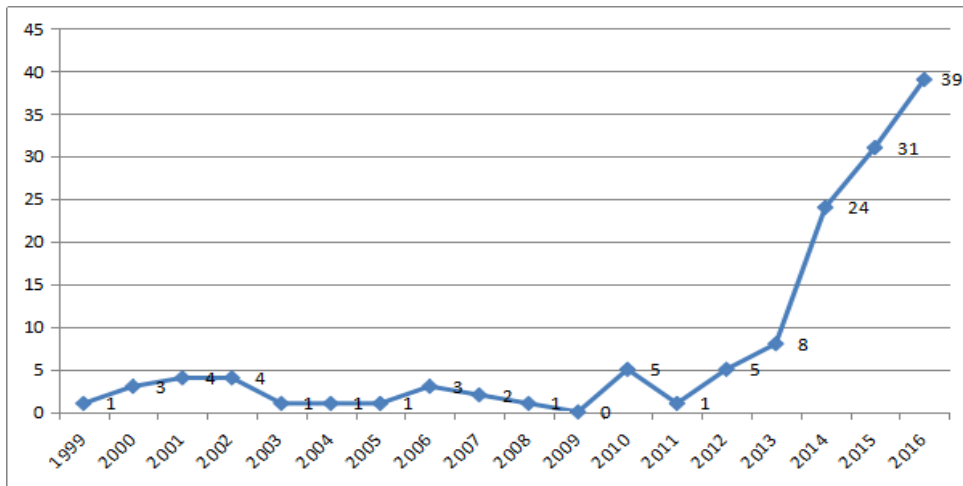


Figure 1. Annual Number of Projects

**Project Category Distribution**

E-business projects of NSSFC are mainly general projects, the number of which is 103, accounting for 60.6% of total, followed by youth projects, the number of which is 42, accounting for 24.7%, as shown in Figure 2. With the application of e-business both in depth and breadth, the importance of e-business academic research has become increasingly prominent. Since 2014, key projects and major projects have been granted in the field of e-business. There are 4 major projects and 10 key projects. Among the 4 major projects, three are 3 on internet finance and one is on cross-border e-business, indicating that internet finance and cross-border e-business has been the focus of government’s attention.

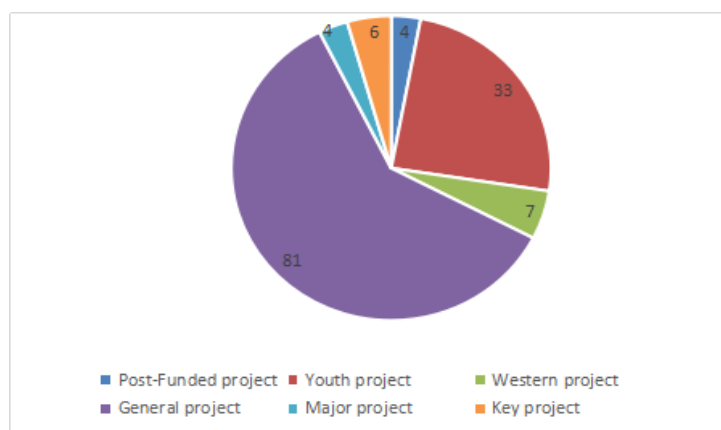


Figure 2. Distribution of Project Category

**Subject Distribution**

E-business is a typical interdisciplinary field that attracts the attention of researchers in different disciplines. The e-business projects granted by NSSFC involve 10 disciplines including management science, applied economics, law, theoretical economics, library and information science, sociology,

statistics, sports science and journalism, as shown in Table 1. Among them, management science has the highest number of projects, reaching 62, followed by applied economics, reaching 52, the third is law, reaching 21, the fourth is theoretical economics, reaching 10, and the fifth is library and information science, with the project number of 8. The above results show that management science and applied economics are the main force in the field of e-business research. E-business related legal issues, information dissemination and service and other issues are also hotspots of research direction.

**Table 1. Disciplinary Distribution**

Discipline	No.	Discipline	No.
Management Science	62	Statistics	6
Applied Economics	52	Sociology	5
Law	21	Sports Science	2
Theoretical Economics	10	International Studies	1
Library and Information science	8	Journalism	1
philosophy	1	Political Science	1

#### **Active Research Institutions**

The active research institutions in e-business are much decentralized, involving 121 research organizations. This shows that e-business research has become a commonly studied research field and has attracted the attention of different institutions. As shown in Table 2, Xi'an Jiaotong University has 6 research projects, indicating that Xi'an Jiaotong University has strong scientific research strength in the field of e-business. Zhejiang Gongshang University has 6 research projects. Jiangxi University of Finance and Economics has 4 projects, ranking the third. Central University of Finance and Economics, Zhejiang University, Nanjing University of Finance and Economics, Nanjing Audit University, Hebei University of Technology and Jiangsu University have 3 approved projects. 25 colleges and universities such as Sun Yat-sen University, Renmin University of China and Fudan University each have two projects, the other 86 colleges and universities each have 1 approved project.

**Table 2. Active Research Institutions on E-business**

Name of Institutions	No.
Xi'an Jiaotong University	6
Zhejiang Gongshang University	6
Jiangxi University of Finance and Economics	4
Zhejiang University	3
Central University of Finance and Economics	3
Jiangsu University	3
Nanjing University of Finance and Economics	3
Nanjing Audit University	3
Hebei University of Technology	3

#### **Geographical Distribution**

E-business related research projects granted by NSSFC are distributed in 24 provinces in China. Beijing ranks first with 23 projects, followed by Jiangsu with 18 projects, Zhejiang has 13 projects, Shanghai and Hubei Province each have 11 projects, Shaanxi 10, Henan and Guangdong each 8, Sichuan Province and Chongqing each 7, Hebei Province, Hunan Province, Jiangxi Province and Shandong Province each 6, Anhui, Liaoning Province and Tianjin each 5, Fujian and Guangxi each 4, and the other seven provinces each 1.

### **High Frequency Words in Project Title**

ROST new Analysis Tools 4.5 developed by Tsinghua University is used to analyze topics of NSSFC projects in e-business related fields, and the research themes and hotspots are found through word frequency analysis and building social network maps.

The project name will be collated and summarized in the txt text file, and the ROST NAT software will be used to perform word frequency statistics. After filtering meaningless words, the research sample is obtained and the high frequency keywords that appear in the research topic are obtained. The high frequency words are classified in an artificial way, and shown in Table 3. Basic keywords such as e-business, Internet, mobile e-business appear most frequently.

**Table 3. Word Frequency in Project Title of NSSFC**

Category	Typical words and frequency	Total
Basic keywords	E-business (42), Internet (41), Mobile (11),, Online (16)	110
business model	Model (23), Business model (8), Model innovation (7), Cross-border (7), O2O (6), Sharing economy (5), Sharing economy (3), P2P (3), E-commerce platform (2), B2B (1), C2B (1), Social Networking (4), Community (3), Medical Services (2), Fresh Food (2), Retail (2), E-shop (1)	80
Online Consumer Behavior	Consumer (10), User (6), Customer (4), Consumption (6), Behavior (8), Word of Mouth (5), Adoption (3), Comments (2)	44
Internet finance	Finance (26), Lending (6)	32
Trust in E-business	Trust (7), Credit (1), Credit Risk (3), Integrity (3), Credit (1), Fraud (1), Counterfeits (1)	16
Rural E-business	Rural Areas (7), Agricultural Products (5), Farmers (3), Agriculture (1), Industries involving agriculture (1)	16
E-business Laws, Regulatory and other Macro Issues	Supervision (10), Governance (9), Regulation (8), Law (5), Legislation (3), System (4), Policy (4), Guidance (3), Government (3), Taxation (2)	51

In recent ten years, the business model of e-business in China has been actively engaged in innovation and the related research has been very active. Among them, the model innovation, O2O, sharing economy and cross-border e-business appear more frequently.

In terms of consumer behavior research under the Internet environment, user behavior, Internet word of mouth, online reviews and adoption behavior also appear more frequently in the field.

In terms of trust and credit issues under the Internet environment, the relevant terms of trust, credit risk and creditworthiness appear 16 times.

The words related to rural e-business such as rural areas, agricultural products and rural households appear 16 times, indicating that rural e-business is also a field where scholars study more.

In areas related to Internet finance such as finance and borrowing, the cumulative frequency of occurrences hit 32, indicating that Internet finance is a hotspot of research.

The rapid development of e-business has also brought about many social problems. The macroeconomic issues related to e-business regulation, taxation, laws and policies are also hot research areas.

It can be roughly speculated that the hot topics in the field of e-business research include e-business business model, consumer behavior under the Internet environment, Internet finance, trust and credit issues, rural e-business, e-business related macro issues from the word frequency. A further analysis is conducted through the social network and semantic network.

"Social network and semantic network analysis" function of Rost NAT software is used, after importing the Fund title and clicking the "quick analysis" button, the social network diagram of the e-business research topic in the NSSFC Project is obtained."e-business", "rural areas", "social contact", "consumer", "consumption", "behavior", "mode", "regulation", "influence" and "Internet" are key nodes in the social network. Research topics include consumer behavior, business model, rural e-business, and Internet finance, etc.

### **High Frequency Words in Latest 3 Years**

To better learn the latest research trend, the high frequency words analysis from year 2015 to 2017 was conducted, as shown in table 4.

Internet, mechanism, model, effect, sharing, consumer and finance are some of the high frequency words in 2017, which indicate that internet finance, sharing economy, internet business model innovation are the current research hotspots.

Internet, model, regulation, innovation and finance are some of the high frequency words in 2016, which indicate that internet finance, internet regulation, internet business model innovation are the research hotspots in 2016.

Internet, finance(9),e-business, model, mechanism and enterprises are the top high frequent words in 2015,which indicate that internet finance, internet business model innovation and e-business of enterprises are the research hotspots in 2015.

We could conclude that business model, internet finance, internet regulation are some hot research themes in latest 3 years.

**Table 4. Word Frequency in Latest 3 Years**

Year	Typical words and frequency
2017	Internet/online(11),mechanism(12),Model(8),effect(5),Sharing(6),Consumer(6),Finance(5),Strategy(5),Innovation(4),Platform(4),e-commerce(4)
2016	Internet(17),Regulation(9),Model(8),effect(6),Theory(5),Innovation(5),Finance(4),Enterprise(4),mechanism(4),relationship(4)
2015	Internet(10),Finance(9),electronic business(8),model(6),mechanism(5),Enterprise(5),Innovation(4),Regulation(4)

## **E-business Research Subjects in China over the Last Two Decades**

Based on the above analysis, combined with the analysis of the approved projects, it is found that the hotspots and research themes in the field of e-business could be classified into the following six aspects.

### **Online Consumer Behavior**

Consumption, consumer and consumer behavior are the three high-frequency words appear in the topic of approved projects, indicating that internet consumer behavior is a hot topic in the field of e-business. Online consumer behavior mainly studies various consumer psychology and consumer behavior of different consumers in the Internet environment such as online shopping, mobile internet,

big data and social commerce, and analyzes various factors and the mechanism affecting consumer psychology and consumer decision.

### ***Trust in E-business***

The virtuality of internet and regulatory difficulties make the trust issues very important in e-business environment. Trust and credit issues in the internet environment have also become academic research hotspots in e-business. The booming e-business results in online fake products, internet fraud, and telecommunications fraud and privacy information disclosure. According to the monitoring results of the 360 Security Center in 2016, 70.5% of internet users had suffered from network security incidents. Among them, online fraud is the primary network security problem encountered by Internet users. Trust is an important issue which has been frequently studied in the e-commerce literature. For the trust mechanism in e-commerce, risk, security, reputation, trust propensity are the common antecedents and satisfaction, use intention and loyalty are the common consequences (Kim et al., 2017).

### ***Rural E-business***

The popularity of smart phones makes the proportion and size of rural netizens increasing, which further drive the development of rural e-business market. As early as 2013, e-business enterprises such as JD.com, Alibaba and Suning launched "going rural" strategies. The development of rural e-business is becoming a new impetus for governments and e-business enterprises to seek new development. In November 2015, the General Office of the State Council issued the Guiding Opinions on Accelerating the Development of e-business in Rural Areas, and comprehensively deployed and guided the healthy and rapid development of rural e-business. Against such background, the development model of rural e-business has also become a hot topic of academic study. 10 projects have been supported in the NSSF for rural e-business since 2014.

### ***Internet Business Model Innovation***

Model and business model are high-frequency words of approved projects. The popularization and infiltration of mobile internet not only bring about changes in consumer behavior patterns, but also promote the innovation of business models. The faultiness of China's traditional business system and dividend brought by mobile Internet users has promoted the innovation of China's internet business model.

### ***Internet Finance and Regulation***

The rapid development of internet finance has become an important phenomenon attracting much attention in e-business in recent years. Internet finance has also become a hot spot in academic research both in e-business and finance field. In the past three years, the projects approved by the NSSF on internet finance hit 24. The research topics mainly focus on the risk prevention, governance and regulation of Internet finance.

### ***Macro Issues on E-business***

China has become the largest e-business market in the world, but the problems such as the stagnation of legislation and ineffective supervision make the development of e-business more difficult. It is urgent for governments to face and solve the different kinds of issues brought by innovative internet models like mobile payment, sharing economy and internet finance. Meanwhile, with the spurt of e-commerce transaction volume, macro issues like tax on e-business and legislation on e-business have also become hot research areas.

## **Conclusions**

This paper analyzes projects on e-business supported by NSSF from 1999 to 2017 and draws the basic outline of the research and development of e-business in China over the last two decades. As a typical interdisciplinary field, e-business has attracted the attention of different types of colleges in different disciplines. Management science and applied economics are the main subjects of e-business research. Xi'an Jiaotong University and Zhejiang Gongshang University have strong scientific research strength in the field of e-business. "e-business", "Internet", "finance", "model", "mechanism", "impact", "innovation", "enterprise", and "mobile" are the high-frequency words in e-business



research. "e-business", "rural", "social contact", "consumer", "consumption", "behavior", "patterns", "regulation", "impact" and "Internet" are the key nodes in e-business social networks. Research hot spots in China mainly focus on six aspects: e-business business models, online consumer behavior, internet finance, trust of e-business, rural e-business and macro issues related to e-business.

The results have given a clear image of the academic status on e-business over the last two decades in China. This paper comprehensively demonstrated the current situation of e-business research in China which was reflected by NSSFC project. This research provides guidelines to the e-business academics domestic and overseas to select research problems and topics.

## **Limitations & Future Research**

Limitations and future research directions of our study are as followings.

Firstly, one of the limitations of this study is that only NSSFC projects are included for bibliometric analysis. More projects on e-business like the National Natural Science Fund projects in China and Humanities and Social Sciences projects of the Ministry of Education in China should be included in the future research which could reflect the similarities and dissimilarities of different projects and offer more detailed information on e-business research status in China.

Secondly, a comparative analysis between NSSFC projects and papers on e-business published in journals would offer more accurate information on the research status of e-business in China in the future study. A comprehensive analysis including data on journal papers and different kinds of research projects should be made in the future study.

Thirdly, a comparative analysis on e-business research between China and other countries like US should be made in the future study to find the difference of research subjects in different countries since there are many differences in countries.

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