Barriers to Adopting E-commerce in Chinese Rural Areas: A Case Study

Hong Guo, Shang Gao

Barriers to Adopting E-commerce in Chinese Rural Areas: A Case Study

Hong Guo[1] and Shang Gao[2]

[1] School of Business Administration,
Anhui University, Hefei, China
[2] School of Business, Örebro University, Örebro, Sweden.
homekuo@gmail.com, shang.gao@oru.se

Abstract. Although e-commerce has been adopted and developed rapidly in rural areas in China during the past two years, serious issues have been encountered as well. Practitioners and scientists proposed lists of barriers. However, such lists differ with each other for different regions and at different time. Fixed lists may not help much practically. Present research proposes a framework named N3F4 to structure and formalize such barriers. Based on the framework, researchers could make a list of barriers for a given region, perform surveys among interested people, prioritize the barriers, analyze reasons and propose solutions. In this paper, we introduce the N3F4 framework, and present a case study of applying the framework in one small county in China. The result shows that the N3F4 framework helps structure barriers before performing the survey, and it also helps analyze the result and come up with solutions afterwards, both effectively and efficiently.

Keywords: E-commerce, Chinese Rural Areas, Barriers.

1 Introduction

As e-commerce has been developed rapidly and gained huge achievement in Chinese cities, e-commerce giants such as Alibaba and JD.com accelerated their business expansion in Chinese rural areas. During this process, experiences in cities were copied to rural areas. However, due to huge differences between developed cities and rural villages in China, many challenges have been met. Chinese practitioners and experts reflected on their practices and proposed barrier lists as well as corresponding solutions. But limitations exist in such lists. Firstly, in such lists, it is often not clear from which perspective these lists have been proposed. For instance, when "lack of talented people" is proposed, it is not clear that such a barrier is meaning for business owners, consumers, or government. Therefore it is not clear which *subject* should pay attention to (and come up with solutions for) this barrier. Secondly, it is often confused that, what is the reason that has caused a barrier. For instance, when "logistics cost is high" is referred to, we are not sure if this is the reason why e-commerce has not been developed as well as expected, or this is the result of low development level of e-commerce. It is not clear that we should take steps to improve the infrastructure

like roads, or try to increase the e-commerce volume. In another word, it is difficult to analyze *reasons* and come up with *solutions*. Thirdly, it is often not clear that what is the result such a barrier will lead to. For regions where "logistics cost is high", the degree of "high" may differ a lot. As a result, different *priorities* should be granted to. To summary, such barrier lists may not help much in practice.

Despite various barrier lists proposed by experts, practitioners have been struggling for long time in many rural areas. This is primarily because of the huge differences between urban and rural areas in China. In addition, there is huge difference among different villages as well. A general barrier list does not make sense for different areas, different people, and at different stages. In this research, we propose a conceptual framework to generate barriers for a given region. We expect that barrier lists can be made in a more structured and efficient way. More importantly, solutions can be proposed more effectively.

The rest of this paper is organized as below. Section 2 introduces background knowledge about Chinese rural areas, e-commerce development in Chinese urban and suburban areas. In Section 3, we introduce some related work. Section 4 presents the N3F4 framework and how to apply the framework to structure a barrier list. Then we introduce a case study of applying N3F4 framework in Section 5. Later in Section 6, we discuss how N3F4 framework can be utilized in similar contexts. Limitations and future work are also discussed. And lastly, we conclude this paper in Section 7.

2 Background

2.1 Chinese Rural Areas: Subjects, Regions and Industries

In China, there are around 39789 towns (townships) [1], and more than 500 thousands villages. According to statistics in 2015, population in Chinese villages are 603.46 million, counting for 43.9% overall population of China. In such areas, primary industry is performed which refers to agriculture, forestry, animal husbandry, fishery, and services in support of these industries. In 2015, gross output value of primary industry was 10705 billion [1]. Most residents in villages are engaged in primary industry, especially agriculture.

There is a huge difference between urban and rural areas in China, both from the natural perspective and the social perspective. Therefore, issues regarding agriculture, countryside and farmers have been traditionally important for economy increase and social development in China. Such issues are characterized as "Three Nong" issues meaning "NongYe" (agriculture), "NongCun" (countryside) and "NongMin" (farmers)[2].

2.2 E-commerce in China Developed Cities and Rural Areas

As the world's largest online market, Chinese e-commerce sales at $750 billion in 2016 sales [3]. Nearly 25% of all sales are apparel, footwear, and accessories. Another 20% is electronics and appliances. All these sales are about living industrial goods.

Meanwhile, internet [4] and e-commerce were perceived as a new engine for rural empowerment and a number of experimental projects were initiated in recent years. From 2015, e-commerce giants started their businesses in Chinese rural areas. Businesses mainly include selling industrial products in countryside, selling agricultural products to cities, agricultural materials e-commerce, and etc. Despite huge achievement in some rural areas[5], problems have also been encountered in many other areas.

3 Related Work

There are many scientific papers where barriers, difficulties, challenges and issues that hinders the adoption and diffusion of e-commerce in developed countries are enumerated [6-11]. However, as indicated in [12], the development route of Chinese e-commerce may not follow that in US and other developed countries. Many such barrier lists may not fit well in China.

Chinese researchers have proposed various barrier lists for rural e-commerce adoption, at different time and in different perspectives. In [13], the author thought that the difference between residents in rural areas and cities is one of the most prominent issues for e-commerce adoption in China. For instance, residents in rural areas are more conservative and do not trust new things like electronic payment. Residents in rural areas are less educated and may not be qualified for running e-commerce. In addition, low level of logistics services, low level of standardization of agricultural products, and food safety issues bring difficulties for e-commerce development also. Similarly, in [14], high-cost logistics, small scale and unprofessional online shops, and low standardization level of agricultural products are thought to be important barriers for developing e-commerce in Chinese rural areas. While in [15], the authors emphasized on issues for e-commerce of fresh agricultural products in China. Such issues include lack of cold-chain logistics, weak supply chain management, high loss, and slow business expansion at grass roots level. As introduced in Section 1, most of such barriers were proposed without detailed description about their subjects, reasons and corresponding results. This is because such barriers were usually proposed at a high theoretical level and did not intend to provide concrete solutions to a given area at a specified time.

In [16], thirty barriers to e-commerce were gathered from literature and put into six groups as social and culture barriers, technical barriers, economical barriers, political barriers, organizational barriers, and legal and regulatory barriers. Some business runners of small and medium enterprises in Egypt were asked to indicate the factors which inhibited e-commerce adoption. A similar case study was introduced in [17]. However, as indicated in [18], issues inhibiting SMEs in their uptake of e-commerce have largely remained the same for many years. Researches should focus more on how to overcome barriers instead of reinventing barrier lists. In our research, we try to formalize barriers in a structured way, so that it is possible to identify and prioritize top barriers for a given situation in order to overcome them.

4 N3F4 Framework Formalism

4.1 "Three Nong" Issues

"Three Nong" issues are issues concerning "NongYe" (agriculture), "NongCun" (countryside) and "NongMin" (farmers). "Three Nong" consists of subjects, region and major industry. There are complicated relationship among these issues. And such issues consist of not only natural issues, but also social issues. As a large agricultural country, "Three Nong" issues have being traditionally very important for China as they concerns national quality, economic development, social stability, national prosperity, and etc.

"Three Nong" issues are very important for e-commerce adoption and development in Chinese rural areas as well. This is because when e-commerce were firstly advocated in rural areas, practitioners copied their experiences of operating e-commerce of industrial products in urban areas. The difference between "Three Nong" and their correspondences in urban areas represented reasons why new barriers are met in rural areas.

1. "Nong" Region (NR): NR is referred to as rural areas, villages or countryside. When NR is compared with urban areas, geographical features, infrastructure levels, supporting services, and etc. may differ a lot. For instance, it is usually less developed in NR than in cities.
2. "Nong" People (NP): In Chinese, NP is primarily refers to people who perform agriculture (farmers). Most of the residents of NR is NP. In this research, we refer to residents in NR as NP.
3. "Nong" Industry (NI): Traditionally, agriculture is the major industry which is performed in NR. In this research, we include forestry, animal husbandry, fishery and etc. that most NP are engaged in.

4.2 Four Flows of E-commerce

E-commerce includes exchange of goods, cash, information among businesses and consumers [19]. In addition, e-commerce usually makes it easier to exchange information, cash and goods than traditional commercial behavior. In Chinese literature, it is referred to as "Four Flows of E-commerce".

If e-commerce is developed well in some areas, we can see that the "Four flows" should run smoothly and efficiently. On the country, if e-commerce is not developed well in some areas, one or more of the "Four flows" must not run well. Therefore, whether the "Four flows" runs smoothly can be used to judge the level of e-commerce development in one area to some extent.

1. IF (Information Flow): Information flows among businesses and consumers during the whole process of a transaction. Such information includes commodity information, marketing information, asking price information, payment status information, consumer services information, and etc. When E-commerce is utilized, information flows much more easily than before (when mail, telephone, and face-to-face communication were used);
2. CF (Cash Flow): A transaction is formally executed when a buyer pays (cash

flows from the buyer to the seller) and gets the product. For E-commerce, it is easy for cash to flow (payment or transaction) owing to the usage of electronic payment means and Electronic Funds Transfer (EFT);

3. GF (Goods Flow): When a buyer pays, he gets the product (goods flows from the seller to the buyer). In another word, GF refers to logistics. Some kinds of commodities such as electronic books, software and tickets can be transferred virtually via network. Most commodities still need to be transferred physically. However, utilizing information technologies makes GF more effectively and efficiently than before;
4. TF (Trade Flow): In addition to information flow, cash flow and goods flow, TF includes a series of activities during the whole transaction process. Such activities are like: (sellers) market positioning, (sellers) market promoting, (consumers) acquiring commodity information, (sellers and buyers) negotiating, and (sellers and buyers) contract signing. TF is the base of CF and GF. TF also includes some activities that CF, IF and GF do not cover. For E-commerce, most of such activities can be eased by utilizing electronic means and information technologies.

4.3 N3F4 Framework Formalism

To develop the N3F4 framework, we reviewed more than thirty scientific papers regarding barriers (sometimes called as challenges, problems, difficulties or issues) that have been met when e-commerce were promoted in Chinese rural area. As indicated in [12], the development route of Chinese e-commerce may not follow that in US and other developed countries. Thus these scientific papers are mostly written in Chinese and published in notable Chinese journals. Corresponding solutions are often proposed in such papers as well. Considering the limited space, the detailed review method and process will be presented in another paper. We collected barriers and solutions, analyzed commonalities and differences among them. It was found that such barriers are often proposed from different perspectives and at different levels as introduced in Section 1. We identified two important factors for each barrier: reasons and results. While "SanNong" can be used to characterize reason categories (what kind of urban-rural differences caused the barrier), "Four Flow" can be thought as which part of e-commerce is hindered by such a barrier as a result. We constructed the N3F4 framework therefore as Table 1 shows. This table can be used as a container of barriers as we introduce in the next section.

Table 1. A Two-Dimension Issue Space Structured by N3F4 framework

	TF	**IF**	**CF**	**GF**
NR				
NP				
NI				

4.4 Applying N3F4 Framework to Structure Barriers

By following this idea, we collected, reconstructed the barriers in one list as Table 2 shows.

Table 2. Barriers of Adopting and Developing E-commerce in Chinese Rural Areas

Barriers in one list:	
B1. Lack of related services;	B2. Lack of platform and cooperation atmosphere;
B3. Lower income and living conditions in rural area;	B4. Bad coverage of network, or bad signal;
B5. Lack of local information broadcasting;	B6. Lack of information consulting channel;
B7. Fewer bank offices;	B8. Lack of local channel to get finance support;
B9. Mobile payment, payment through online banks, electronic banks, and telephone banks are not widely available;	B10. Lack of space for production and storage;
B11. Road network is not developed and convenient enough;	B12. Expensive and inconvenient logistics;
B13. Lack of cold-chain logistics;	B14. Lack of computer and mobile phone skills;
B15. Lack of electronic commerce knowledge;	B16. Lack of operation management capability;
B17. Fierce competition due to many similar products;	B18. Low margin due to high production and operation cost;
B19. Lack of market information;	B20. Difficulty of finding buyers;
B21. Difficulty of selling with a desirable price;	B22. Difficulty to ensure similar quality level;
B23. Difficulty to ensure supply quantity;	B24. Difficulty of recruitment;
B25. Inconvenient of communication due to few internet users;	B26. Difficulty of getting information and operation without computers;
B27. Lack of funds;	B28. Lack of financing channels;
B29. High logistics cost due to remote and decentralized production& living area;	B30. Low consumer trust in food safety;
B31. Quality fluctuation due to different season and types of farm products;	B32. Price fluctuation due to different season and types of farm products;
B33. Difficulty of scale up due to features of specified farm products;	B34. Taobao and Wechat [20] platforms are not suitable for selling farm products;
B35. Selling agricultural products demands more funds;	B36. Difficulty of storage and transportation because farm products are perishable;

B37. Requirement of cold-chain logistics because farm products are perishable;	B38. High logistics cost because farm products are produced in small scale and scattered;
B39. Difficulty to ensure supply quantity due to small scale and scattered production;	

By putting all the barriers in N3F4 according to which aspects such barriers are caused by, and which flow such barriers may hinder, the barrier list is structured as Table 3 shows. Such a structured barrier list can be used for surveys in order to collect user attitudes. We will introduce this in Section 5.

Table 3. Barriers in N3F4 Framework

	TF	**IF**	**CF**	**GF**
NR	**B1**, B2, *B3*	*B4*, **B5**, B6	*B7*, B8, *B9*	B10, *B11*, B12, B13
NP	B14, **B15**, B16, **B17**, **B18**, **B19**, **B20**, B21, *B22*, B23, B24	*B25*, *B26*	B27, B28	**B29**
NI	B30, B31, B32, B33	*B34*	*B35*	B36, B37, **B38**, **B39**

5 Case Study

In this section, we present how we apply N3F4 framework to prepare a survey, analyze data, and propose solutions in one case study.

5.1 Method and Process

In April 2017, more than one hundred farmers took part in an e-commerce training course in a mountainous country in Anhui province of China. Few of them have utilized e-commerce tools to sell their agricultural or farm products online. While most of them only have intention or interests to adopt e-commerce for their businesses (if there are) in future. We prepared a survey and asked these farmers to give a score (from 1 to 5) for each barrier listed in Table 2. 75 valid questionnaires have been received afterwards.

5.2 Data Analysis and Discussion

By counting the average score each barrier was, we came up with top ten barriers and bottom ten barriers for the participants. We observe where each barrier locates (due to which "Nong" and bring impact to which "Flow"), analyze possible reasons, and propose corresponding solutions.

Top Ten Barriers and Bottom Ten Barriers for All Participants

Firstly, we come up with top and bottom ten barriers for all participants as Table 4 shows. By highlighting such barriers (top ten in red and bolded, while bottom ten in green and italic) in N3F4 framework as shown in Table 3, some interesting facts were found:

1. Five of the top ten barriers (B15, B17, B18, B19 and B20) are located in the cell of NP-TF. Which means, such barriers are due to the population quality of NP (farmers primarily), and the result of such may be somehow devastating (for TF): buyers cannot be found or products cannot be sold with a desirable price. As a consequence, business contract may not even be signed. This is in accordance with the fact that most of the participants said they were aware of their shortcomings, so they took part in the training. Such talents issues are also highlighted in many Chinese scientific papers that we have reviewed.
2. Both B25 and B26 are within the bottom ten barriers. Although B25 and B26 are also caused by NP, they only bring impacts to information flow, and are thought as not important as other barriers. This might be because they are about lower-level computer skills. While broadband is popularized in Chinese rural areas, more and more people in such area get in touch with computers, mobile phones and become more skillful to utilize such IT tools to get information and communicate with others. According to CNNIC [21], there have been 201 million internet users in Chinese rural areas, accounting for 33.1 of total population in such areas. At the training site, almost every participants used mobile phone and Wechat, and when a Wechat group was established, many participants chat actively. This fact supports the hypothesis to some extent.

Table 4. Identified Top Ten Barriers and Bottom Ten Barriers from the Case Study

Top Ten Barriers			**Bottom Ten Barriers**		
4	**B1**	**3.92**	*9*	*B3*	*3.14*
8	**B5**	**3.86**	*4*	*B4*	*2.64*
10	**B15**	**3.73**	*2*	*B7*	*2.58*
9	**B17**	**3.82**	*1*	*B9*	*2.50*
3	**B18**	**3.93**	*8*	*B11*	*3.09*
5	**B19**	**3.9**	*6*	*B22*	*2.96*
7	**B20**	**3.87**	*7*	*B25*	*3.04*
1	**B29**	**3.96**	*5*	*B26*	*2.65*
6	**B38**	**3.89**	*3*	*B34*	*2.61*
1	**B39**	**3.96**	*10*	*B35*	*3.19*

3. In all CF related cells, there is no top ten barriers. Instead, two barriers (B7 and B8) within these cells are thought as not quite important (in bottom ten barriers). This may indicate that, in rural areas where mobile phone have been popularized, traditional bank offices and payment methods may not be quite important for people to adopt e-commerce. Thanks to the e-payment technologies and platforms such as Wechat payment and Alipay, it is possible for rural areas to develop e-

commerce without some traditional infrastructure construction. And it makes it possible for a "corner overtaking" for such an area.

4. Compared with CF and IF related cells, there are more top ten barriers (B29, B38, and B39) in GF related cells. This is in accordance with reports from scientific papers and practitioners that high cost and bad quality of logistic services seriously hindered e-commerce development in many rural areas. We can further identify reasons that might have caused such issues by looking at other barriers in GF related cells. Despite fine road network (B11 is in bottom ten barriers), high logistics cost might be primarily caused by remote and decentralized population and production (B38).

Top Ten Barriers for Business Owners

Compared with general people who have interests or intention to run a business, it may be important to pay more attention to the needs of existing business owners.

We also look at the situation of participants who have already utilized e-commerce tools for their businesses. 5 such valid questionnaires are included. The corresponding top ten barriers differ a lot with that of all participants. These barriers are: B5, B6, B15, B16, B17, B18, B25, B27, B28, B29, B32, B38 and B39 (several barriers have the same score). By comparing this list with the top ten barriers of all participants, we found that:

1. In addition to B5, B6 is also in top ten barriers. That is to say, information turns out to be more important for business holders than general people. Business owners might not be satisfied with access to general information. They have further requirements such as consulting on specified and personalized topics. This is reasonable because as long as people have begun businesses, various concrete issues might be met.
2. Many top ten barriers (B15, B16, B17 and B18) are still found in NP-TF. Compared with the general situation, B19 and B20 are no longer thought as quite important because business runners could find market information and sell their products out better. However, these business runners find operation skills are very important (B16 is one of the top ten barriers).
3. B27 and B28 are new barriers that appear in top ten barriers. Both of them are about CF indicating that people may not feel the pressure of money until they have really run an e-commerce.

Top Ten Barriers for Returnees

Urbanization has partly led to serious population loss in many Chinese villages. When most young adults move to big cities to work, large proportion of residents are children, women of childbearing age, and elders. As a result, "lack of talents, technician or labor" becomes a general issue in many areas. When e-commerce is promoted in such areas, governments often introduce policies to lure returnees and great expectations are placed on them.

Among all our 75 valid questionnaires, 25 are from returnees. When we focus on these people, we have the top ten barriers as: B2, B5, B6, B12, B17, B18, B19, B20, B21, B29. By comparing this list with the general one, we found that:

1. B2 appears in top ten barriers now. In cities, talented people often worked and studied together. While in rural areas, such platform is quite rare. Returnees realize this difference because they have seen or experienced that;
2. In addition to B5, B6 is also in top ten barriers. Similar to business owners, returnees might have a wider view and think about e-commerce in an independent way. As a result, they require channels to consult on personalized topics more than other people;

Top Ten Barriers for College Graduates

In addition to returnees, college graduates are better educated and more innovative. Thus, they are often thought as another important force for rural areas to develop E-commerce.

Five college graduates participated in our survey, and their correspondent top ten barriers are: B2, B12, B13, B18, B19, B20, B24, B29, B36, and B37. Findings are:

1. B2 also appears in top ten barriers as it is in the list for returnees. This might be caused by similar reasons: college graduates have sights or experience which make them feel it is important to work and study together with others;
2. B13 and B37 appear in top ten barriers as never before. Both items are about cold-chain logistic services. Both items do not appear in top ten lists for general people, business owners, or returnees. We consider the reason is that college graduates think highly of advanced and new things. However, it is difficult to judge for a given area whether applying cold-chain logistic is a practical choice as cold-chain logistic services charge much more than general logistic services.

6 Discussion

A list of top ten barriers implies information of what blocks the adoption or hinders the diffusion of e-commerce. Surveys can be conducted to help scientists and practitioners identify particular barriers for a given region, from perspective of a given demographic and at a given stage. By doing so, requirements can be analyzed and prioritized, and solutions can be proposed correspondingly.

However, such lists vary under different conditions. **Firstly**, different demographics possess different top ten barriers. This helps us analyze and infer what caused the issues, and what the issues will bring impacts on from corresponding perspectives as we discussed in the case study. **Secondly**, it is obvious that top ten barriers also differ from each other for different areas. For instance, in more remote mountainous regions where Internet is not populated and few people use mobile phones, people may probably pay more attention to infrastructure related barriers such as B11 (road), B4 (internet signal), and etc. **Thirdly**, such lists differ for different industries. For instance, when online shopping (living industrial goods) is considered, the top ten barriers might differ from that when online shopping (agricultural supplies) is considered. **Lastly**, such lists differ with time. As time goes on, roads and Internet would be populated, people would grow to be more knowledgeable and skillful, industries would be developed, and barrier list would change as well.

As a result, barriers should be observed for different regions and different industries, from perspectives of different demographics, and at different time. By doing so, the prioritized barriers can be thought as reflective, constructive and instructive. From the case study presented in Section 4, we can see that N3F4 framework helps us generate and structure barrier lists, as well as analyze barrier reasons and results, both effectively and efficiently.

Limitations and Future Work

There are limitations of current research. Barriers enumerated in Table2 are not formalized well. Some of them have similar meanings and have confused survey participants. Correspondingly, we identify some possible future work. Firstly, we plan to refine the current barrier list by reviewing and analyzing recent literature. Secondly, we will collect and analyze barriers which have been met and reported in related subdomains such as agricultural materials e-commerce, living industrial goods e-commerce, and etc. Thirdly, we plan to carry out more formal and large-scale surveys to evaluate the N3F4 framework.

7 Conclusions

In this paper, we introduce the N3F4 framework to structure barriers encountered when e-commerce is adopted in Chinese rural areas. The framework is based on two traditional theories in China. The first is the N3 theory which refers to three key feature categories of Chinese rural areas: agriculture, farmers, and countryside. And another is the F4 theory which characterizes that when a transaction happens, information, cash, goods and transaction activities "flow" among stakeholders. Such flows can be eased by utilizing IT tools in e-commerce transactions. We introduce both the N3F4 framework and how to apply it to generate and structure prioritized barrier lists for a particular purpose. A case study of applying N3F4 is presented. And the result shows that, the N3F4 framework helps us not only when barriers are enumerated and structured, but also when result is analyzed, and solutions are proposed.

References

1. *National Bureau of Statistics of the People's Republic of China*. 2017; Available from: http://www.stats.gov.cn/.
2. Lin, W. and C. Wong, *Are Beijing's Equalization Policies Reaching the Poor? An Analysis of Direct Subsidies Under the "Three Rurals"(Sannong).* The China Journal, 2012(67): p. 23-46.
3. *Chinese Ecommerce Market Pegged at $1.7 Trillion by 2020*. 2017; Available from: http://multichannelmerchant.com/news/chinese-ecommerce-market-pegged-1-7-trillion-2020/.
4. Zhao, J., *ICT4D: Internet adoption and usage among rural users in China.* Knowledge, Technology & Policy, 2008. **21**(1): p. 9-18.

5. Leong, C.M.L., et al., *The Emergence of Self-Organizing E-Commerce Ecosystems in Remote Villages of China: A Tale of Digital Empowerment for Rural Development.* Mis Quarterly, 2016. **40**(2): p. 475-484.
6. Kshetri, N., *Barriers to e-commerce and competitive business models in developing countries: A case study.* Electronic commerce research and applications, 2008. **6**(4): p. 443-452.
7. Kapurubandara, M. and R. Lawson, *Barriers to Adopting ICT and e-commerce with SMEs in developing countries: an Exploratory study in Sri Lanka.* University of Western Sydney, Australia, 2006: p. 2005-2016.
8. Lawrence, J.E. and U.A. Tar, *Barriers to e-commerce in developing countries.* Information, society and justice journal, 2010. **3**(1): p. 23-35.
9. MacGregor, R.C. and L. Vrazalic, *E-commerce adoption barriers in small businesses and the differential effects of gender.* Journal of Electronic Commerce in Organizations, 2009. **4**(2).
10. MacGregor, R.C. and L. Vrazalic, *A basic model of electronic commerce adoption barriers: A study of regional small businesses in Sweden and Australia.* Journal of small business and enterprise development, 2005. **12**(4): p. 510-527.
11. MacGregor, R.C. and M. Kartiwi, *Perception of barriers to e-commerce adoption in SMEs in a developed and developing country: a comparison between Australia and Indonesia.* Journal of Electronic Commerce in Organizations, 2010. **8**(1): p. 61-82.
12. Haley, G.T., *E-commerce in China: Changing business as we know it.* Industrial Marketing Management, 2002. **31**(2): p. 119-124.
13. Lai, X.Y., *Problems and Countermeasures in the Development of Algricultural Electronic Commerce*, Chinese Journal of Agricultural Resources and Regional Planning, 2016. **37**(3): p. 180-183.
14. Li, J.B. and Chen, W.,*Problems and Innovative Countermeasures in the Development of Algricultural Electronic Commerce*, Commercial Times, 2014(34): p. 89-90.
15. Liu, J.X., Wang, K.S and Zhang, C.L, *Main Problems and Countermeasures in the development of Freash Algraicultural Products Electronic Commerce*. China Business and Market, 2016. **30**(12): p. 57-64.
16. Zaied, A.N.H., *Barriers to E-Commerce Adoption in Egyptian SMEs.* International Journal of Information Engineering & Electronic Business, 2012. **4**(3): p. 9-18.
17. Sandberg, K.W., *Barriers to adapt eCommerce by rural Microenterprises in Sweden: A case study.* International Journal of Knowledge and Research in Management and E-Commerce, 2014. **4**(1): p. 1-7.
18. Chitura, T., et al., *Barriers to electronic commerce adoption in small and medium enterprises: A critical literature review.* Journal of Internet Banking & Commerce, 2010(2): p. 1-13.
19. Ying, W. and S. Dayong, *Multi-agent framework for third party logistics in E-commerce.* Expert Systems with Applications, 2005. **29**(2): p. 431-436.
20. Gao, S. and J. Krogstie. *Understanding Business Models of Mobile Ecosystems in China: A Case Study*. in *the proceedings of the 7th International Conference on Management of computational and collective IntElligence in Digital EcoSystems (MEDES'15)*. 2015. Caraguatatuba/Sao Paulo, Brazil: ACM.
21. CNNIC, *China Statistical Report on Internet Development*. 2017.