

Summer 5-25-2013

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Recommended Citation

Peiji, SHAO; Liang, WU; Qian, Su; and Jing, YANG, "Influence Factors of E-commerce Adoption: An Empirical Research in Special Markets" (2013). *WHICEB 2013 Proceedings*. 61.

<http://aisel.aisnet.org/whiceb2013/61>

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Influence Factors of E-commerce Adoption: An Empirical Research in Special Markets

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Abstract: Recently, the development of special markets is playing an important role in accelerating Chinese economic evolution. However, Chinese special markets have the characteristics of rapid growth but lower level. This paper first studies the status of Chinese special markets according to the related statistical data, then, based upon E-Commerce adoption in corporations and the features of special markets, this paper mainly discusses three aspects of factors that influence the E-commerce adoption, environment, organization and technology. A questionnaire is designed, through the empirical research of special markets in Jinniu District of Chengdu, we study the influence factors of e-commerce adoption. At last, this paper presents the analysis result.

Keywords: special market, e-commerce, influence factor

1. INTRODUCTION

The special market formed in some region, running under the terms of market rules, is a place for commodity trading which chooses one or several kinds of commodities as its main bargaining object and whose managing mode is wholesale. At present, there are more than 90 thousand markets in China whose transaction totals up to 3400 billion Yuan, and 3377 markets whose transaction totals up to 100 million Yuan and the growth rate has reached 10.2%. The fact shows that goods transaction markets have become an important part of circulation system in China [5]. But along with gradually building market economic system and transforming the industry structure in China, the disadvantage of large number of special markets, small scale and lack of scientific administration becomes increasingly exposed.

Along with the economic development, modern business is a combination of product supply, sales and marketing in the global market, which presents higher demand for responsiveness to market information and new challenges to special markets. In order to succeed in the competition, special markets must adopt new techniques to reduce cost, increase the speed to respond and improve the quality of service. Some scholars have suggested that building E-marketplace based on materiality market is a suitable E-commerce mode in China [7]. In China, E-commerce has been applied to special markets. Some have already completed the first phase, which is the construction of providing information service, and have shown good results. However, the research about E-commerce adoption in special markets is only the introduction of several individual cases, and there is no deep and systematic study about the extent of the application and influence factors of E-commerce adoption.

This paper references the research results of influence factor of E-commerce adoption in enterprises and the characters of special markets, analyzes and discusses the influence factors of E-commerce adoption in special markets. There are many resemblances between E-commerce adoption in special markets and enterprises, but special markets have their particularity as the following:

1.1 Several objects involved in E-commerce of special markets

From economic activities of special markets, the main object of a special market consists of two parts. One is the administrant, and the other is the transaction participant of the inner the market. So, when we consider E-commerce adoption in special market, not only the condition and intention of organizer is important, the transaction participant's will also plays an important role.

1.2 Degree of E-commerce implementation and intention of E-commerce adoption.

E-marketplace is the top-level of applying E-commerce in special markets. At present, due to the fact that the application of E-commerce in special markets mostly stays in the phase of providing information service and big gaps exist in building well functioning E-marketplace, this paper will measure the application level of E-commerce from the following two aspects: degree of E-commerce implementation and intention of E-commerce adoption. The latter reflects the top manager's strategic vision regarding E-commerce.

2. THE INFLUENCE FACTORS OF E-COMMERCE ADOPTION

At present, there are two ways to study the influence factors of E-commerce adoption in corporations, namely the theory research and the application research. From theoretical perspectives, researchers study the influence factors of E-commerce adoption by using innovation adoption theory, institutional theory, strategic orientation theory, and upper-echelon theory. For example, institutional theory suggests that a firm may imitate organizational structures and strategies adopted by other firms. Therefore, innovation adoption can be a symbolic or institutional-pressure-driven action ^[1-2]. Strategic choice theory and upper-echelon theory suggest that a firm's strategic orientation and the personal characteristic of its top managers influence its approach to innovation adoption ^{[4][6]}. The theory of diffusion of innovation (DOI) suggests how potential user perception of IT innovation influences its adoption ^[11]. These streams of research provide a theoretical foundation for understanding organizational decision about innovation adoption.

From application perspectives, the research mainly aims at a certain industry. For example Sophia Wang and Waiman Cheung studied E-commerce adoption by travel agencies in Taiwan considering management, organization and environment factors ^[13]. Qiu Changbo mainly discussed the situation of E-commerce application in electronics industry by using the factors of enterprise nature, the English level of CEO and CIO, and the providers' status ^[10]. Some researchers such as Afzaal H Seyal ^[3], studied E-commerce adoption in small & medium enterprises.

Now, there is little research about E-Commerce application in the special markets. E-Commerce adoption is a complex issue for a special market because it involves business process changes. This paper references the research results of influence factors of E-commerce adoption in enterprises and the experts' advice, proposes a research framework to explain the key factors that affect E-commerce adoption by special markets. (Figure 1)

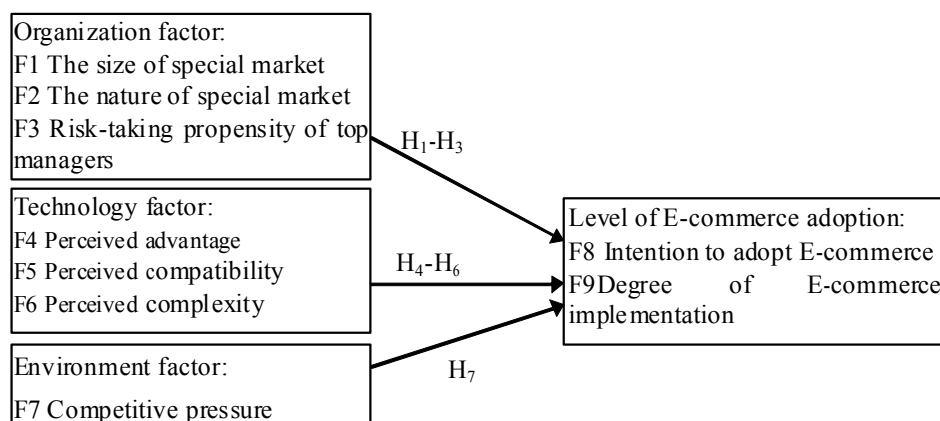


Figure 1 Framework of E-commerce adoption in special markets

2.1 Organization factor

2.1.1 Special market attributes

In IT adoption, organizational factors play an important role in the adoption decision. Several researchers' studies have supported the size, structure and profitability to be associated with the use of technology [3][13]. The size of a special market is an important index to describe its convergence degree and profitability, and generally the markets of larger size are more profitable and pay more attention to new technology. So we initially think the size of special markets is one of the important factors to decide its innovation motive. Qiu Changbo's study shows that the ownership structure is one of the important factors as well to decide its innovation motive in China [10]. And at present the ownership structures of private enterprise, collective enterprise and state-owned enterprise exist in special markets. Therefore this paper will study the influence factors from the two aspects of the size and ownership structure of special markets. The following hypothesis is made:

H₁: Size of special market is positively related to the intention of E-commerce adoption, and is positively related to the degree of E-commerce implementation in special markets.

H₂: The ownership structure is related to the intention of E-commerce adoption, and is positively related to the degree of E-commerce implementation in special markets.

2.1.2 The risk-taking propensity of top managers

A firm's strategic actions often reflect the personal characteristics of its top managers and the risk-taking propensity of top managers is an important factor to influence strategy choice [6]. Sitkin and Pablo defined risk-taking propensity as a decision-maker's tendency to take or avoid risks [12]. A number of researchers have studied the CEO characteristics and CEO attitude towards adoption of IT and found a direct link with the success of adoption [3], [8], [13]. When a special market turns traditional operation mode to E-commerce, it faces many uncertainties including the risk of technologies, stall owners accept or not and so on. So the risk-taking propensity of its top managers plays an important role in the decision process. So, we propose the following hypothesis:

H₃: Risk-taking propensity of top managers is related to the intention of E-commerce adoption and is related to the degree of E-commerce adoption in special markets.

2.2 Technology factor

In the IT application process, the characteristics of technology itself are also an extremely important influence factor, and the appraisal of potential users will affect its application. Rogers has identified five characteristics of innovation that affect the rate of diffusion. These are: relative advantage, complexity, compatibility, trainability and observability [11]. Some researchers have studied the relation of above variables with the adoption of innovation. The study of Moore and Benbasat indicates that the relative advantage, compatibility, complexity are more influential than the other two characteristics [9]. This article merely carries on one preliminary research to the E-commerce application in special markets, therefore we chooses three more influential factors, namely relative advantage, compatibility, complexity as three explanatory variables of IT characteristics.

Usually, there are some difficulties in technology, IT resources and funding when applying E-commerce in special markets. Therefore we initially think the superiority of E-commerce is conforming to special markets' demand, and the bigger advantage and complexity top managers perceive the higher degree application of E-commerce, but the bigger difficulty they face, the lower degree application of it. Hence, the following hypothesis is made:

H₄: The perceived advantage of E-commerce is positively related to the intention of E-commerce adoption, and is positively related to the degree of E-commerce implementation in special markets.

H₅: The perceived complexity of E-commerce is negative related to the intention of E-commerce adoption, and is negative related to the degree of E-commerce implementation in special markets.

H₆: The perceived compatibility of E-commerce is positive related to the intention of E-commerce adoption, and is positively related to the degree of E-commerce implementation in special markets.

2.3 Environment factor

In this paper, the environment factor mainly is the competition pressure of special markets. Many studies show that firms tend to adopt innovations under increasing competitive pressure in order to reduce the risk [13]. The special market not only faces the competition of numerous congener markets, but also need extend the channel of inviting investment constantly, and meet the request of inside stall owner about improving service quality in order to increase the appeal to them. At present, the special market faces two major substitutes' threats.

One is vertically integrated trends of enterprises. Some studies show, with the constant expansion of enterprise in size and the improvement of the degree of integration, a lot of special markets will disappear.

The other is influence brought in by revolution of retail business. Along with large enterprises gradually setting up their own commercial network, and chain store, storage, etc. some new retail type emerges. So we think the bigger competition pressure some special markets feel, more tends to enhance its own competitive ability using the E-commerce. Hence:

H₇: Competitive pressure is positively related to the intention of E-commerce adoption, and is positively related to the degree of E-commerce implementation in special markets.

3. SAMPLE COLLECTION AND DATA ANALYSIS

Above analysis involves nine factors, among which seven factors are independent variables. They are the size and ownership structure of special markets, risk-taking propensity of top managers, perceived advantage, complexity and compatibility and competitive pressure. The other two factors, namely intention to adopt E-commerce and degree of E-commerce implementation are dependent variables.

Among the independent variables, ownership structure is a selective variable and the investigation objects only can choose one from private enterprise, collective enterprise and state-owned enterprise. We use the transaction value to measure the size of special markets, and this is a common measure method. Among the dependent variables, the degree of E-commerce implementation was measured with construct level of network infrastructure. Due to fact that the application of E-commerce in special markets mostly stays in the phase of providing information service and there is little on-line trading, it is difficult to fully evaluate the degree of E-commerce implementation in special markets. The construct of network infrastructure supports E-commerce application, and its level partly reflects the degree of E-commerce implementation. Except above three variables, others are measurement variables and need several observable indexes to measure indirectly. There is a lot of research about these variables in E-commerce adoption in enterprises [3],[13], so this paper bases on these study and considers the traits of special market to design the measurement of these factors.

3.1 Sample selection

In this paper, the samples are special markets of the Jinniu District in Chengdu. Until the end of 2004, the Jinniu District covers 145 markets (not including 48 markets of farm products), and the number and transaction value are already close to half of the special markets in Chengdu. Therefore, the sample is representative. From transaction value we can see that the size of markets in the Jinniu District is uneven. A few super-huge markets and numerous medium and small-scale markets coexist. There are 36 markets whose transaction value reaches 100 million - 1 billion Yuan and the total of their transaction value is up to 8,200 million Yuan, taking up 41% of total transaction value. There are 5 markets whose transaction value reaches 1 billion Yuan and the total of their

transaction value is up to 10,500 million Yuan, taking up 52% of total transaction value. Before the questionnaires were sent out, pilot interviews were conducted with a small group of masters of special markets. For the purpose of study, 60 special markets were randomly selected from different types and transaction value. With the help of Jinniu District government, 49 completed questionnaires were returned. As there was no significant difference between the respondents and the non-respondents in terms of special market type and transaction value, there is no non-response bias in the final sample.

3.2 Measurement reliability and validity

SPSS for windows 10.0 was used to analyze the survey data. Cronbach's alphas were computed to assess the internal consistency reliability of dependent and independent scales. The reliability coefficients of every dependent variable factor range from 0.72 to 0.83, and independent variable factor ranges from 0.85 to 0.89, which is higher than the acceptable level of 0.70. The result shows the measurement scales are reliability. In order to ascertain validity, pilot interviews were conducted with a small group of top masters of special markets. After analyzing the pilot interviews, the paper uses nineteen items to measure six dependent variable factors except the factor of ownership structure and eight items to measure two independent variable factors.

In this course principal component and varimax rotation was conducted in dependent and independent scales. In dependent scales it shows in appendix 1 and appendix 2, six factors were extracted using the criteria of eigenvalue greater than 1, and the extracted factors accounted for 61.969% of the total variance. The factor loadings for all the items are more than 0.5 suppressed. In independent scales it shows in appendix 3 and appendix 4, two factors were extracted using the criteria of eigenvalue greater than 1, and the extracted factors accounted for 61.969% of the total variance. The factor loadings for all the items are more than 0.5 suppressed.

3.3 Findings and analysis

At present the ownership structures of private enterprise, collective enterprise and state-owned enterprise exist in special markets, and comparing the E-commerce application level of different ownership structures is helpful to find the influence factors. Table 1 lists the comparison result of the intention of E-commerce adoption and degree of E-commerce implementation in special markets. In table 1, the preceding item of each column is the mean, and the latter item is the significance of mean disparity. This research uses T-test. It shows the intention to adopt E-commerce in collective enterprises is higher than state-owned and private enterprise, but the disparity is not significant. In the aspect of degree of E-commerce implementation, private enterprises are the highest, next are the state-owned and collective enterprises, but the disparity is not significant too. Our survey shows most special markets focus their operations around marketing, and the ownership structure has no influence on E-commerce adoption, so H_2 is not supported.

Table 1. The Level of E-commerce adoption in different ownership structure markets

Ownership structure	Level of E-commerce adoption	Intention to adopt E-commerce	Degree of E-commerce implementation
State-owned enterprise (N=15)		3.47	0.247
Collective enterprise (N=12)		3.52	0.241
Private enterprise (N=22)		3.39	0.253
		0.119	0.123

In order to analyze whether or not other factors are associated with the application level of E-commerce, further analysis around the correlation is needed to study the relationship between dependent variable factors and independent variable factors. Table 2 shows the result. We can see the size of special market and perceived compatibility is positively associated with the intention to adopt E-commerce and the degree of E-commerce implementation, so H_1 and H_6 is supported. Risk-taking propensity of top managers and perceived advantage is

positively associated with the intention to adopt E-commerce, but not with the degree of E-commerce implementation. It seems that the two factors have little to do with a special market's "real" innovation in E-commerce. Perceived complexity and competitive pressure is positively associated with the degree of E-commerce implementation, but only with a marginally significant relationship with the intention to adopt E-commerce. Table 3 is the summary of hypothesis testing.

Table 2. The result of correlation analysis

Correlation test	Intention to adopt E-commerce	Degree of E-commerce implementation
The size special market	0.35***	0.38***
Risk-taking propensity of top managers	0.29**	0.22*
Perceived advantage of E-commerce	0.44***	0.20*
Perceived complexity of E-commerce	0.24*	0.37**
Perceived compatibility of E-commerce	0.39***	0.43***
Competitive pressure	0.19*	0.35***

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Table 3 Summary of hypothesis testing

Hypothesis	Intention to adopt E-commerce	Degree of E-commerce implementation
H1: The size special market	Support	Support
H2: Ownership Structure of special market	Not support	Not support
H3: Risk-taking propensity of top managers	Support	Not support
H4: Perceived advantage of E-commerce	Support	Not support
H5: Perceived complexity of E-commerce	Not support	Support
H6: Perceived compatibility of E-commerce	Support	Support
H7: Competitive pressure	Not support	Support

4. CONCLUSIONS

E-commerce has dramatically changed the manner of inter-and intra-organization transaction and by contrary the internal and external factors affect E-commerce adoption in special markets. Seven factors except the ownership structure have significant relativity with the intention to adopt e-business or the implementation degree of E-commerce. The study shows that decisions in favor of E-commerce adoption in special markets are not based entirely on technological readiness. They are also affected by the top managers' perceptions of the environmental and organizational conditions and their risk-taking propensity. Especially, in special markets the stall owners' wills and conditions are very important.

The paper analyzes the influence factors of E-commerce adoption in special markets, and the result can provide references when special markets draw E-commerce plan and can help avoid blindness of application. It chooses 49 special markets as research samples, and if we can get more samples in other area, the result will be more persuasive. The variables included in the research frame are not comprehensive. Seven factors potentially affecting special markets' adoption of E-commerce are selected based on former studies. The other potentially important factors have been excluded.

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Appendix 1 Eigenvalue and variance explained of dependent variable factors

Factors	Eigenvalue	% of Variance	Cumulative %
Size of special market (F1)	6.456	20.992	20.992
Risk-taking propensity of top managers (F3)	2.145	10.975	31.967
Perceived advantage of E-commerce (F4)	1.946	10.127	42.094
Perceived complexity of E-commerce (F5)	1.874	9.650	51.744
Perceived compatibility of E-commerce (F6)	1.235	5.960	57.704
Competitive pressure (F7)	1.112	4.265	61.969

Appendix 2 Factor load of dependent variable factors

Index	F1	F3	F4	F5	F6	F7	Communality
Transaction value	0.842						0.669
Believe that higher financial risks are worth taking for higher rewards		0.724					0.624
Enjoy taking risks		0.712					0.615
Strong proclivity for high-risk business projects with changes of very high return		0.707					0.528
Reduced operating costs			0.658				0.574
Strong relationship with stall owners			0.711				0.544
New income source			0.698				0.511
More effective information processing			0.615				0.507
Lack of funding				0.806			0.644
Lack of technology base				0.772			0.562
Lack of technology personnel				0.690			0.706
Lack of experience				0.567			0.687
Consistent with business need					0.689		0.662
The support from stall owners					0.754		0.598
Support from other E-commerce focused organization					0.801		0.706
Competitive pressure from competitors						0.642	0.624
Competitive pressure from supermarkets						0.669	0.673
Competitive pressure from vertical integrated trends of enterprises						0.716	0.701
Competitive pressure from stall owners						0.686	0.694

Appendix 3 Eigenvalue and variance explained of independent variable factors

Factor	Eigenvalue	% of Variance	Cumulative %
Intention to adopt E-commerce (F8)	6.456	42.992	42.992
Degree of E-commerce implementation (F9)	2.972	19.462	62.454

Appendix 4 Factor load of independent variable factors

Index	F8	F9	Communality
Intention to expand on-line business in near future	0.67		0.603
To increase involvement in e-commerce	0.69		0.619
E-commerce as focus of business development	0.75		0.675
Web site number		0.78	0.683
The number of computer connecting internet		0.83	0.702
The capacity of database		0.79	0.691
Bandwidth of net		0.81	0.699
Integrated of information system		0.74	0.667