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The Empirical Study on the Factors Affecting E-logistics System in Chinese Logistics Industry

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Abstract: This research designs the research model and tests it based on the Theory Acceptance Model. The five key factors (Reliability, Maintainability, Software, Facility and Transportation) are related with E-logistics system as independent variables. The results of this study confirm that the E-logistics systems are affected by Reliability,Maintainability, Facility and Transportation. This research provides some useful theoretical implication and practical guidelines for the development of E-logistics System in Chinese logistics industry.

Key words: The Empirical Study, E-logistics System, TAM ,Chinese Logistics Industry

1. Introduction

1. 1 Background and Research Purpose

Minimizing the logistics costs in order to retain competitiveness can be seen as an ongoing process in the 21st century. Nowadays the e-logistics in both global and local logistics corporations have to enhance their market competitiveness by applying the efficient and effective e- logistics system for reducing their logistics cost and improved customer services. E-logistics is becoming an indispensable way of doing business in both domestic and international trade. The successful implementation of e-logistics system is expected to bring a number of benefits to the logistic industry. A better understanding of these benefits may help to further motivate logistics service provides to adopt e-logistics system. Considering the increasing environmental complexity and competitive pressure along with increased market opportunity, research on E-logistics system(ELS) of Chinese logistics industry (CLI) in an international context can provide many useful insights.

1.2 Research Methodology

As the exact number of Logistics service providers (LSP) in China is not known, a random sample of 1,000 LSPs involved in freight forwarding, shipping, and transportation and warehousing services was drawn from the Logistics Directory in China. The completed questionnaires were to be returned within a month. Of the 1,000 questionnaires mailed, 140 were returned and used for analysis. The overall response rate was 14 percent, which is considered an acceptable rate for a mail survey in China. The research tested for the mean differences between the two groups of responses in a random selection of measurement items in the questionnaire. The results found no significant differences ($p > 0.10$) in the means of the variables between the theoretical respondents and non-respondents. As such, the data collected in this study should not exhibit a non-response bias.

2. Research Model and Hypotheses

E-logistics can be defined simply as the application of Internet based technologies to traditional logistics processes. Dawe(1995) showed the logistics system is a collection of data, hardware, software, and rules that work together to support an activity. They pointed out the e-logistics system can be described by the process, the information system and the value. According to related research ,this paper focus on the most important factors for e-logistics system. They are reliability

factors, maintainability factors, facility factors, software factors, transportation and handling factors.Therefore ,the study builds the research model. In the model, there are five related factors: Reliability, Maintainability, Software, Facility, Transportation and handing. These factors will be tested according to the model if they can influence the whole of e-logistics system, including the e-logistics process, logistics information system and added value. Based on this ,the following five hypothesizes will be proved.

Hypothesis 1: Reliability is positive effects on ELS.
Hypothesis 2: Maintainability is positive effects on ELS.
Hypothesis 3: Software is positive effects on ELS.
Hypothesis 4: Facility is positive effects on ELS.
Hypothesis 5: Transportation is positive effects on ELS.

3. Empirical Analysis

3.1 Data Collection

The surveys respondents for this study were recruited from July 7th to 30th in 2015 and the participants were solicited through distribute questionnaire in a variety of sent emails. Each questionnaire was defined with composing of a five point scale and scale method a‘1 = strongly disagree’ to ‘3 = neutral’ and ‘5 = strongly agree’ Likest-scales.

3.2 Descriptive Analysis of Data

112 of the 140 questionnaires were recollected back as the results from the respondents. Because of unseriousness or some other reasons, 28 invalidated questionnaires were ruled out. For all that remained data, the 112 questionnaires, were used to empirical data analysis and evaluate the variables and research model of our paper. The descriptive statistics details of the respondents’ characteristics can be seen in Table - 1 and Table -2:

<Table-1> General Information of Survey Companies

Items	Options	Frequency	Percent (%)
Service type	Mechanical and electrical products	17	15.2
	Household appliances	16	14.3
	Automobile and accessories	12	10.7
	Energy products	23	20.5
	Construction materials	12	10.7
	Farm Products	9	8.0
	Textile	7	6.3
	Others	16	14.3
Number of employees	1-99	31	27.7
	100-999	52	46.4
	1000-1999	29	25.9
	2000-4999	0	0
	5000 above	0	0
Turnover (thousand)	1-100	0	0
	100-1000	16	14.3
	1000-2000	30	26.8
	2000-5000	35	31.3
	5000 above	31	27.7

<Table-2> General Information of E-logistics

Items	Options	Frequency	Percent (%)
Who is the principal of the logistics Business?	Director	0	0
	Department manager	6	6.0
	Vice president	44	39.3
	President	62	55.4
	No	0	0
What is the most main Convey pattern in the logistics business?	Telephone	0	0
	Fax	0	0
	Internet	112	100.0
	EDI	0	0
	Others	0	0
What is the main E-logistics system and management Technology?	TRS	0	0
	GPS	2	1.8
	GIS	1	0.9
	AVLS	0	0
	EOS	18	16.1
	Service provider	89	79.5
	Others	0	0
How long does the company invest on E-logistics?	1 year	4	3.6
	1-2 years	33	29.5
	2-3 years	63	56.3
	3-5 years	12	10.7
	5years above	0	0
What is the rate of Logistics costs which cover sales figures	Under 5%	0	0
	5-10%	6	5.4
	11-20%	51	45.5
	21-30%	39	34.8
	31% above	16	14.3

3.3 Reliability and Validity

3.3.1 Reliability Test

In the next step, the reliability of the data of our research will be validated. It has been known that Cronbach's alpha takes charge of the examination of the reliability. It is a common method to test reliability. From Table - 3, the alpha value of each item show a good reliability, and the average of them is 0.763. These alpha value shows that measures have good reliability.

<Table-3> Chronbach's Alpha

Variables	Number	Alpha
Reliability	3	.721
Maintainability	3	.788
Software	3	.741
Facility	2	.755
Transportation and handing	3	.811
Average		.763

3.3.2 Validity Test

The KMO value of the test statistic for sphericity was based on a Chi-square transformation of the determinant of the correlation matrix is (0.672) and the associated significant level was extremely low (0.000). Based on the results, all the eight factors are accepted as the interpretable ones. They are showed as Table - 4 and Table - 5.

<Table-4> KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.672
Bartlett's Test of Sphericity	Approx. Chi-Square	2576.295
	df	231
	Sig.	.000

<Table-5> Rotated Component Matrix

Items	**Component**				
	Factor1	Factor2	Factor3	Factor4	Factor5
REL1	**.839**				
REL3	**.760**				
REL2	**.744**				
MAI3		**.833**			
MAI1		**.822**			
MAI2		**.771**			
SOF2			**.908**		
SOF1			**.884**		
SOF3			**.578**		
FAC1				**.873**	
FAC2				**.862**	
TRA2					**.728**
TRA3					**.692**
TRA3					**.556**

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

3.4 Empirical Data Analysis

The effects of reliability, maintainability, software, facility, transportation and handing on the implementation of ELS are assessed by regression analysis. The results of empirical study are listed in Table 6. As can be seen from Table 13, regression analysis indicates that the effect of reliability (β_{RELI}= 0.00, p<0.05), maintainability (β_{RELI}= 0.01, p<0.05), facility (β_{FACI}= 0.02, p<0.05) and transportation (β_{TRAN}= 0.00, p<0.05) are significantly related with ELS. Thus, hypothesis H_1, H_2, H_4 and H_5 are accepted. On the other hand, Software doe not show significant relationship with ELS, H_3 can not be supported.

< Table 6> Regression Analysis for the Antecedents of E-logistics system

Dependent Variable	Independent Variable	R^2	F	Sig	Beta	t	Sig	Hypothesis
E	RELI	.397	13.984	.000*	.286	3.714	.000	Significant
	MAIN				.200	2.637	.010	Significant
	SOFT				.120	1.542	.126	N.S.
	FACI				.173	2.227	.028.	Significant
	TRAN				.382	4.959	.000	Significant
* p<0.05 ** p<0. 1								

a. Dependent Variable: E-logistics system
b. Independent Variable: Reliability, Maintainability, Software, Facility, Transportation and Handing

4. Conclusions and Implications

One of the contributions of the study is the development of the extensive set of interrelationships in each component of ELS and exogenous influence factors. the investigation results perfectly inflect that the main problems of the most logistic enterprises in China and also provide valuable insights into the current status of ELS in Chinese logistics industry. Practically, the paper also provides some helpful suggestions for the development of ELS in Chinese logistics industry.

For the advance software technology, most of Chinese logistics industry have weak competitive capability and financing ability. They could not invest redundant funds to purchase the advance software technology. Therefore, the survey results show software factor is no positive effect on E-logistics systems in Chinese logistics industry. Then the Chinese government should provide some preferential treatments and policies to Chinese logistics industry for the development of ELS.

In this case, Logistic companies could learn the experience of E-logistics management from developed countries and eliminate funding problems with the support of government so as to find out the short cut to speed up the pace of development of EIS as far as possible.Meanwhile, Chinese logistics companies take advantage of ELS to accelerate Chinese logistics industry development so as drive the whole e-logistics industry to move forward.

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