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Empirical Study of E-logistics System Based on Tibet Logistics Industry

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Abstract With the rapid growth of E-logistics in the global logistics industry, it is important to get insight into E-logistics system in Chinese logistics industry. Regarding the current situation of E-logistics of Chinese logistics industry, there are still many problems to be concerned and resolved. This paper will review the concepts and theoretical background of E-logistics System from previous researches. After acknowledging the essential issues on E-logistics System, a research model is designed and tested based on the Theory Acceptance Model. This research aims to provide theoretical and practical contributions for Chinese logistics companies to enhance understanding on E-logistics System. It also provides some useful theoretical implication and practical guidelines for the development of E-logistics System in Chinese logistics industry.

Key words Chinese logistics industry, E-logistics process, Logistics information system, Added value

1 Introduction

1.1 Background and research purpose The advent of this new digital economy has triggered a new type of logistics——e-logistics. E-logistics is fast becoming a "must have" in the global logistics industry. Chinese logistics industry (CLI) is also facing the large challenge. Frankly speaking, subject to the restraints from many kinds of conditions, the stage of development of e-logistics in CLI is still relatively low now. Chinese government and the enterprises have paid much more attention than ever before to the logistics industry after it being introduced into China. Facing with the increasing intensity of competition after China's WTO accession, logistics companies try to consider how to create more effective services to their customers and try to build their own e-logistics system so that they can survive in the global logistics market.

Therefore, there are many issues of e-logistics system which come into being in Chinese logistics companies.

Therefore, the main purpose of this study is stated : Firstly, the study stated the definition and factors influenced e-logistics system according to related research. Secondly, the study empirically examines the major factors affecting e-logistics system in Chinese Logistics Company (CLC). Thirdly, after identifying the factors, this study would endeavor to propose some points in CLC, which adopt e-logistics system, operate more successfully and effectively. Fourthly, in this dissertation, an effort would be made to suggest CLC how to adopt e-logistics system, which has some potential to invest, by using the factors which are concluded in this study.

1.2 Research methods The research methodology employed here is based on empirical data collected through questionnaire surveys distributed to the ELS in Chinese logistics industry. This research involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence. The survey questionnaire consisted of scaled, as well as open-ended, questions on the extent to which the respondent companies had adopted the e-logistics system in their operations, and the factors to influence ELS.

2 Literature review

2.1 Definition of e-logistics system (ELS) E-logistics can be defined simply as the application of Internet-based technologies to traditional logistics processes.

2.2 The main components of e-logistics system Cheng and Yue pointed out the e-logistics system can be described by the process, the information system and the value. They also found that most of factors influence as follows: Reliability factors, maintainability factors, software factors and facility, transportation and handing factors act key role for ELS.

3 Research model and hypotheses

3.1 Research model The further process of carrying on this research is to build and test a model. In order to achieve a global synchronized electronic supply chain, all of Chinese logistics companies have to deploy a global strategy that enables all players to benefit from the e-logistics system.

In the model, there are three related factors: Reliability, Maintainability, Supportability (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. Therefore, three aspects of e-logistics system are the final variables.

Based on referred theories, the research model and hypothesis are indicated in Fig. 1.

3.2 Hypotheses This research hypothesizes that these five factors have significant effects on e-logistics system. By providing refined five factors, it is more likely to enhance degree of e-logistics

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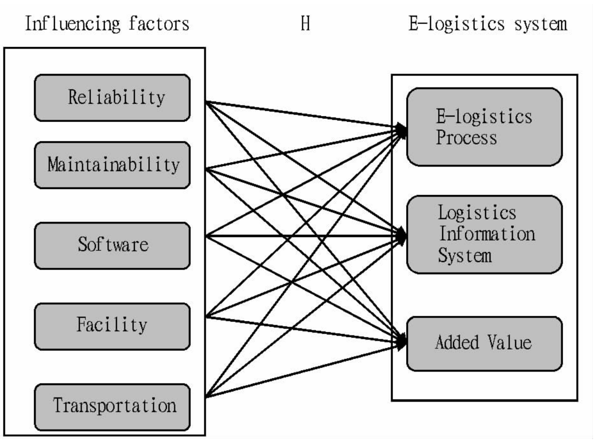

Fig. 1 Research model

process, logistics information system and added value. Based on this observation, the following three hypothesizes are proved.

(i) E-logistics process.

Hypothesis 1 – 1: Reliability is positive effects on the e-logistics process.

Hypothesis 1 – 2: Maintainability is positive effects on the e-logistics process.

Hypothesis 1 – 3: Software is positive effects on e-logistics process.

Hypothesis 1 – 4: Facility is positive effects on the e-logistics process.

Hypothesis 1 – 5: Transportation is positive effects on e-logistics process.

(ii) Logistics information system (LIS).

Hypothesis 2 – 1: Reliability is positive effects on logistics information system.

Hypothesis 2 – 2: Maintainability is positive effects on logistics information system.

Hypothesis 2 – 3: Software is positive effects on logistics information system.

Hypothesis 2 – 4: Facility is positive effects on logistics information system.

Hypothesis 2 – 5: Transportation is positive effects on logistics information system.

(iii) Added value of e-logistics system (ELS).

Hypothesis 3 – 1: Reliability is positive effects on the added value of ELS.

Hypothesis 3 – 2: Maintainability is positive effects on the added value of ELS.

Hypothesis 3 – 3: Software is positive effects on the added value of ELS.

Hypothesis 3 – 4: Facility is positive effects on the added value of ELS.

Hypothesis 3 – 5: Transportation is positive effects on the added value of ELS.

4 Empirical analysis

4.1 Data collection The surveys respondents for this study were recruited from July 7th to 30th in 2011 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' Likert-scales. The survey instrument was pre-tested with a small sample of business persons in China. The pilot study was used to pre-test potential tasks and check the experimental protocol, which included survey items and interview questions. After the pre-test, the wording of some questions was modified in order to non-response bias was tested and no statistically significant differences were found for the study variables between early and late respondents. The survey was used to evaluate the model of this thesis and validate the interrelationships related to E-logistics system and the influential factors. Therefore, participants were asked to assess the degree of their experience on two sets variables. One set is consist of reliability, maintainability, facility, transportation and handing, software as the independent variables. The other is included of process, logistics information system and added value of e-logistics as dependent variables.

Table 1 Summery of data collection

Period	July 7th to 30th in 2011
Respondents	Logistics company staffs in China
Number of Samples	112

4.2 Reliability and validity 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.

4.2.1 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 2, the alpha value of each item show a good reliability, and the average of them is 0.778, especially e-logistics process even achieved 0.950. These alpha value shows that measures have good reliability.

Table 2 Chronbach's Alpha

Variables	Number	Alpha
Reliability	3	0.721
Maintainability	3	0.788
Software	3	0.741
Facility	2	0.755
Transportation and handing	3	0.811
E-logistics process	2	0.950
Logistics information system	3	0.664
Added value	3	0.799
Average	0.778	

4.2.2 Validity test. Factor analysis is often used in data reduction to identify a small number of factors that explain most of the variance observed in a much larger number of manifest variables. Also, it is used to evaluate underlying variables or factors that explain the pattern of correlations within a set of observed variables (Miyazaki and Fernandez, 2000). Factor analysis can also be used to generate hypotheses regarding causal mechanisms or to screen variables for subsequent analysis (Chellappa and Pavlou, 2002). In this report, the constructing validity has been assessed by identifying the concepts of ELS. In addition, factor scores are derived on the identified components via the formal survey questionnaires.

There are 22 survey items in the questionnaires were referred to this study. In order to determine the underlying structure, first step was to examine the correlation matrix for determining its appropriateness for factor analysis. 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.

Table 3 KMO and Bartlett's test

Kaiser – Meyer – Olkin measure of sampling adequacy		0.672
Bartlett's test of sphericity	Approx. Chi-square	2576.295
	df	231
	Sig.	0.000

The second step, for demonstrating that reliability, maintainability, facility, transportation and handing, software; ELP, LIS and added value are independent measures; SPSS 12.0 was used to perform the factors analysis. Table 4 and 5 indicate eight separate factors. All eight scale concerns were included in an exploratory factor analysis.

Table 4 Rotated Component Matrix I

Items	Component				
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
REL1	0.839				
REL3	0.760				
REL2	0.744				
MAI3		0.833			
MAI1		0.822			
MAI2		0.771			
SOF2			0.908		
SOF1			0.884		
SOF3			0.578		
FAC1				0.873	
FAC2				0.862	
TRA2					0.728
TRA3					0.692
TRA3					0.556

Table 5 Rotated Component Matrix II

Items	Component		
	Factor 1	Factor 2	Factor 3
IMP1	0.914		
IMP2	0.901		
ADO1		0.788	
ADO3		0.755	
ADO2		0.658	
ADD1			0.754
ADD2			0.744
ADD3			0.714

Note: (i) Extraction method: Principal component analysis; (ii) Rotation method: Varimax with Kaiser normalization.

5 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, 7 and 8.

Table 6 Regression analysis for the antecedents of e-logistics process

Dependent variable	Independent variable	R^2	F	Sig	Beta	t	Sig	Hypothesis
PROC	RELI	0.327	10.316	0.000 *	−0.017	−0.216	0.830	N. S.
	MAIN				0.061	0.765	0.446	N. S.
	SOFT				−0.023	−0.280	0.780	N. S.
	FACI				−0.060	−0.728	0.468	N. S.
	TRAN				−0.578	7.093	0.000	Significant

* $P<0.05$, ** $P<0.1$

Note: (i) Dependent variable: Implementation of e-logistics process; (ii) Independent variable: Reliability, maintainability, software, facility, transportation and handing.

As can be seen from Table 6, the effect of transportation on ELP in ELS is significant (βTRAN = 0.00, $P<0.05$). Hence, the fifth hypothesis (H5 – 1) receives strong support by the study's results. In contrast, the effects of other factors are non-significant, showing that it does not act as an antecedence of ELP in ELS. Hence H1 – 1, H2 – 1, H3 – 1, H4 – 1 are not supported. The model coefficient is extremely significant ($F=10.316$, $P<0.05$); and the data explains a substantial degree of the variation ($R^2 = 0.327$).

In Table 7, regression analysis indicates that the effect of maintainability (βMAIN = 0.00, $P<0.05$) are significantly related with LIS and Software (βSOFT = 0.05, $P<0.1$) are marginally significantly related with LIS, rendering limited support for H3 – 2. Thus hypothesis H2 – 2 and H3 – 2 are accepted. On the other hand, reliability, facility and transportation do not show significant relationship with LIS. Hence H1 – 2, H4 – 2, and H5 – 2 can not be supported. The model coefficient is significant ($F = 4.365$, $P<0.05$); and the data explains a substantial degree of the variation ($R^2 = 0.172$).

As can be seen from Table 8, regression analysis indicates that the effect of reliability (βRELI = 0.00, $P<0.05$), maintainability (βRELI = 0.01, $P<0.05$), facility (βFACI = 0.02, $P<0.05$) and transportation (βTRAN = 0.00, $P<0.05$) are significantly related with added value of ELS. Thus hypothesis H1

-3, H2 -3, H4 -3 and H5 - are accepted. On the other hand, Software doe not show significant relationship with added value of ELS.

Hence H3 -3 can not be supported. The model coefficient is significant ($F = 13.984$, $P < 0.05$ and the data explains a substantial degree of the variation ($R^2 = 0.397$).

Table 7 Regression analysis for the antecedents of logistics information system

Dependent variable	Independent variable	R^2	F	Sig	Beta	t	Sig	Hypothesis
LOGI	RELI	0.172	4.365	0.000 *	-0.053	-0.598	0.551	N. S.
	MAIN				0.332	3.714	0.000	Significant
	SOFT				0.177	1.929	0.056	Significant
	FACI				-0.020	-0.217	0.829	N. S.
	TRAN				0.114	1.249	0.214	N. S.

* $P < 0.05$ ** $P < 0.1$

Note: (i) Dependent variable: Logistics information system; (ii) Independent variable: Reliability, maintainability, software, facility, transportation and handing.

Table 8 Regression analysis for the antecedents of added value

Dependent variable	Independent variable	R^2	F	Sig	Beta	t	Sig	Hypothesis
ADDE	RELI	0.397	13.984	0.000 *	0.286	3.714	0.000	Significant
	MAIN				0.200	2.637	0.010	Significant
	SOFT				0.120	1.542	0.126	N. S.
	FACI				0.173	2.227	0.028.	Significant
	TRAN				0.382	4.959	0.000	Significant

* $P < 0.05$ ** $P < 0.1$

Note: (i) Dependent variable: Added value; (ii) Independent variable: Reliability, maintainability, software, facility, transportation and handing.

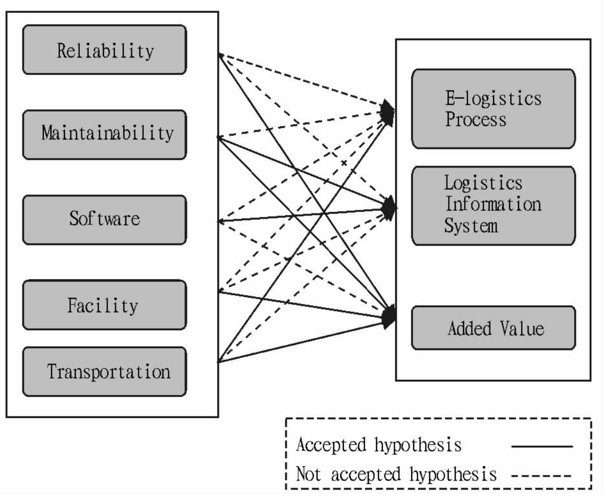

Fig. 2 Empirical analysis result of research model

This section presents the statistical results of the measurement -validation and hypothesis testing. As shown in Fig. 5, significant results have been found to support the study hypotheses. It's clear that transportation affects ELP. It's also evident that maintainability and software are significant factors influencing the level of LIS. Additionally, it found the added value of ELS is influenced by reliability, maintainability, facility and transportation.

This study finds no evidence of statistically significant relationship between these factors (reliability, maintainability, software, facility) and ELP, thus the hypotheses are not certified. The same situation also appears reliability, facility, transportation factors and the LIS; software factor and added value.

6 Conclusions and implications

ELS have been examined by a large number of scholars. However, most of these studies focused on the issues related to e-logistics system as a whole and its internal characteristic. This research explores internal components of ELS and their exogenous influence factors and tests their relationship each other in Chinese Logistics Companies (CLC).

Based on the findings of data analysis, transportation factor is found to have a positive relationship with e-logistics process and added value in CLC. One of the key challenges for the Chinese logistics industry is the situation of the country's transport infrastructure. Consistent with the literature (TSENG, YUE & Michael, 2005), this paper maintained that without well developed transportation, logistics could not bring its advantages into full play. Besides, good transport system in logistics activities could provide better logisticsefficiency, reduce operation cost, and promote service quality. However, Outside of the maineconomic centers in China, the logistics sector tends to be of low quality, highly inefficient and with little technological competence. Logistics companies in the region often complain of insufficient integration of transport networks, warehousing anddistribution facilities. Thus, LSP recognize that transportation factor have played an important role for improvement of e-logistics. The investigation results of this paper also show this point.

This investigation also found that reliability factor contributes only to the added value. This present findings support that improving cost-effectiveness approach based reliability is powerful variable. Seemingly, CLC would find reliability advantage to be a prerequisite of competitive cost that in turn contributes to reliability growth.

The study revealed that maintainability contributes to LIS and added value in CLC. Logically, LSP which continue to strive for maintainability through R&D based the ease, accuracy, safety, and economy in the performance of maintenance functions would be in a better position to achieve its strategic goals of gaining access to new technology, shortening its lead time, creating improved customer value and enhancing customer satisfaction.

Moreover, this study found that software contributes only to LIS in CLS. Software has become the major element of support in China. This is particularly true where automation, computer application, digital data bases are used in the accomplishment of supportability and maintainability of LIS. Such as Enterprise Resourcing Planning (ERP), Customer Relationship Management (CRM) and other advance software have applied on LIS. Thus, the survey results show software factors have a positive support function in LIS of CLI.

The study found that facility has the significant effect on value growth performance in ClC. Logically, logistics companies would also find facility advantage to be a prerequisite of competitive cost that in turn contributes to facility effectiveness.

Therefore, Consistent with the current situation of Chinese logistics industry, 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 CLI.

There are a number of limitations to be approach adopted. For example, although the research demonstrates significant findings, it does not cover all factors related to ELS. Additional research needs to extend the study to other factors and business contexts to reinforce our confidence in the generalizability of the findings of this study. In short, although the study provides theoretical and practical insight into ELS in CLC, future research is needed to extend the proposed model to reinforce our confidence in the findings of this study.

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