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Driving Effect of Delivery Service Quality to Pickup Behavior: an Empirical Test in E-commerce Logistics

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Abstract: To reveal the influencing mechanism of service quality of home delivery to the willingness of pickup service, this study constructed a theoretical model with seven variables and conducted empirical tests in accordance of relating assumptions on real samples. As indicated in this study, the relationship between the satisfaction as well as the trust of home delivery and pickup service did not show an expecting negative reaction which was that if the home delivery service was worse, the active pickup willingness was less. The results shown that the relationship between two discussed parcel delivery methods was not complete replacement but complementary. At last, the paper analyzed the causes of this controversial conclusion and explained its meaning and enlightenment towards customers' pickup service promoted by Chinese enterprises.

Key words: E-commerce logistics, pickup service, delivery network, empirical test

INTRODUCTION

Picking up system is an emerging solution for "the last mile problem" in electronic commerce logistics which completes parcel delivery procedure by pickup points deployed around customers. It not only can remit the choke point of parcel delivery but meets special parcel delivery requirements of part online shopping group (such as office workers). The service has been promoted in e-commerce logistics and constructed several organization model, such as collection and delivery point, sustainable networked delivery (Kim *et al.*, 2008), convenience store picking up service in Japan and Taiwan (Chupra and Meindl, 2007). In recent years, the parcel pickup points of logistic and electronic enterprises are also developed in Chinese mainland, attempting to promote pickup service in the dense population area of large or medium cities which indicates that the innovative parcel delivery method has been already in the practical schedule.

The promoting progresses in some areas are relatively slow and even show the symptom of lack of growth trend which indirectly reflects the depressing situation of picking up service, causing the hidden worry of logistic industry to the service positioning of pickup points. Previous theoretical researches mainly discussed about the pickup operation model (Kamarainen and Punakivi, 2002), the analysis of customers' characteristics and behaviors (Weltevreden, 2008) and the measurement of carbon emission (McLeod and Cherrett, 2009) etc which was lack of further discovery of the relation between home delivery service quality and the willingness to

pickup parcels. Some people hold an opinion that the relationship between above delivery ways is replacement and the quality of home delivery service must influence the willingness of customers to pickup parcels, so excellent home delivery service can make customers remain in traditional delivery method. In Chinese mainland areas, the service quality of express delivery is much-maligned and if the above assumption works, the picking up service is welcomed by most customers which disagrees with the current promoting status of parcel pickup point. Thus, whether the service quality of home delivery can influence the willingness of customers to pickup parcels needs to be discussed.

The rest of this paper firstly constructs a measuring model on home delivery service quality; then it analyzes all reactive relationship among all measurement dimensions with service satisfaction, service trust and customers' willingness to choose pickup service via empirical test; finally it concludes the findings whether the assumption is valid or not.

THEORETICAL HYPOTHESIS

The first task of this study is to establish the measurement model of home delivery service quality but current researches universally conclude the whole process of logistic business into the research model (Stank *et al.*, 2003; Mentzer *et al.*, 2004) which barely focuses on the parcel delivery step. Huang and Feng (2007) have investigated the service management issues under the model of convenient shop picking up service and proved the interaction relation among service quality,

service satisfaction and service trust. They built measurement models, covering information quality, timeliness, integrity etc., whose research situation is picking up service, having great discrepancy with home delivery. Zheng (2008) has paid her attention on order, customized service, response quality, goods delivery and discrepancy handling, though she has also defined the conception of “delivery quality”, her research model just covers the “integrity of goods” and “timely delivery”. With the integration of interview results and literature reviews, this paper eventually defines the home delivery service quality into four dimensions, including reliability (Relia), response performance (Resp), delivery flexibility (Flex) and handling of discrepancy (Discre) and proposes the following research assumptions (H1~H4):

- **H1:** Service reliability of home delivery has positive influence to customers’ service satisfaction
- **H2:** Response performance of home delivery has positive influence to customers’ service satisfaction.
- **H3:** Service flexibility of home delivery has positive influence to customers’ service satisfaction
- **H4:** Handling of discrepancy of home delivery has positive influence to customers’ service satisfaction

Meanwhile, this study examines the influence of customers’ home delivery satisfaction (Satis) influence to the willingness of adopting pickup service (Will). According to traditional recognition, if customers are unsatisfied with the delivery service, their willingness of pickup parcels is higher which forms the assumption that the satisfaction of home delivery service has negative influence to customers’ willingness to adopting pickup service (H5). In marketing research fields, “trust” is always regarded as the mediating variable of satisfaction and loyalty. The effect of service trust promoted by service satisfaction has been proved in many industries. This study integrated the service trust (Trust) into the research model which holds a hypothesis that the relationship between service satisfaction and service trust (H6) as well as service trust and willingness of adopting pickup service (H7) is shown as follows:

- **H5:** The satisfaction of home delivery service has negative influence on customers’ willingness on picking up service
- **H6:** The satisfaction of home delivery service has positive influence on customers’ service trust
- **H7:** The service trust of home delivery has negative influence on customers’ willingness on pickup parcels

EMPIRICAL ANALYSIS

Questionnaire survey: The measuring items of all variables have two resources, one is the reference of relevant research literatures, the other is the supplement design in accordance of the definition of variables and research goals. At last 23 measuring items are finally proposed based on the independent assessments of 15 college students.

This research successively entrust 46 virtual shops in Taobao to publish online survey. The quantity of collected samples is 391 and 53 pieces of samples are removed according to screening rules, so the final amount of effective samples is 338. The ratio of sample amount with total number of items exceeds 10:1 which meets the requirement of sample capacity of path analysis (Nunnally and Bernstein, 1994).

Analysis of reliability and validity: As Table 1 shows, all Cronbach α coefficients are larger than 0.71, so the reliability of scale is qualified, whose measurement has consistency and stability. The validity analysis mainly focuses on the content and constructs validity. the measuring items are originated from relevant papers and theoretic analysis, so the validity of content is guaranteed. All factors loading of variables mostly exceed 0.6 (few are between 0.5 and 0.6). In addition, the items have relatively good cumulative variance contribution, so the construct validity of the scale is relatively good.

This study also computes relevant coefficient of total score in each item of variables (Table 1). All Pearson correlation coefficient exceed 0.5 and reach the significance level of 0.01 which proves that relevant scale has relatively excellent content validity. To demonstrate the feasibility of those service measuring items, we extracted four factors via principal component method, KMO reaches 0.898 and the chi-square test value of Bartlett sphericity test is 1023.652 with 16 freedom degrees and 0.001 less significance probability. The communality of all items exceeds 0.5 and the cumulative variance contribution of common factors reaches 72.146%. In the rotated matrix of factors, expect that Fx1 isn’t classified into the theoretical dimension, all rest items are belonging to the common factors according to what has anticipated. By analyzing the connotation of Fx1 and considering about the distribution of rotation sums of squared loading, we still retain it in accordance of theoretical assumption.

Path analysis: To prove the validity of the assumption, we utilize AMOS20.0 to construct path analysis model

Table 1: Reliability and validity analysis result of the scale

Variable	Measuring items	Relevant coefficient	Factor loading	Cronbach' α
<i>Relia</i>	Ra1: Couriers take care parcels well	0.834	0.724	0.754
	Ra2: Couriers won't steal parcels.	0.814	0.655	
	Ra3: Couriers carry parcels carefully.	0.756	0.661	
	Ra4: Couriers deliver parcels timely	0.732	0.616	
<i>Resp</i>	Rp1: Couriers have polite manner	0.899	0.774	0.834
	Rp 2: Couriers are patient	0.832	0.662	
	Rp 3: Couriers are willing to answer calls.	0.801	0.788	
<i>Flex</i>	Fx1: Specifying collecting agents is allowed	0.655	0.571	0.715
	Fx2: Delivery time is allowed to change	0.811	0.747	
	Fx3: Delivery place is allowed to change	0.742	0.662	
<i>Discre</i>	De1: Couriers apologize timely.	0.820	0.712	0.846
	De2: Couriers never refuse rejection behavior	0.802	0.692	
	De3: Couriers will assist to examine goods	0.776	0.589	
	De4: Couriers will provide returning guidance.	0.813	0.765	
<i>Satis</i>	Sa1: The home delivery satisfies me.	--	0.678	0.780
	Sa2: I didn't complain for home delivery.		0.822	
	Sa3: The delivery meets what I anticipated		0.763	
<i>Trust</i>	Tr1: I trust home delivery.	--	0.675	0.755
	Tr2: I never worry about mistakes in delivery.		0.723	
	Tr3: I'm willing to recommend home delivery.		0.607	
<i>Will</i>	Wi1: I'm willing to try pickup service.	--	0.671	0.824
	Wi2: I wish the point be settled in nearby.		0.736	
	Wi3: I'm interested on pickup service.		0.667	

Table 2: Results of path analysis

Path	Anticipated symbol	Estimated	Standard error	Critical ratio	P
H1 (<i>Relia</i> ~ <i>Satis</i>)	+	0.232	0.062	3.742	***
H2 (<i>Resp</i> ~ <i>Satis</i>)	+	0.194	0.081	2.395	0.024*
H3 (<i>Flex</i> ~ <i>Satis</i>)	+	0.296	0.076	3.895	0.003**
H4 (<i>Discre</i> ~ <i>Satis</i>)	+	0.107	0.06	1.783	0.182
H5 (<i>Satis</i> ~ <i>Will</i>)	-	0.374	0.166	2.253	0.019*
H6 (<i>Satis</i> ~ <i>Trust</i>)	+	0.377	0.036	10.472	***
H7 (<i>Trust</i> ~ <i>Will</i>)	-	0.533	0.313	1.703	0.077

***p<0.001, **p<0.01, *p<0.05

and choosing maximum likelihood method to evaluate the path coefficient, variance and covariance parameters, the model can be converged and identified after implementation of evaluation. The error variation reaches significance level but not in negative stage and no large standard error emerges in model which indicates that the model has excellent fitting performance. The overall fitting chi-square test value is 13.665 ($p = 0.072 > 0.05$) and the ratio of chi-square value to freedom degree is 1.854, GFI = 0.977, AGFI = 0.935, RMSEA = 0.071, NFI = 0.986 which can be regarded as the evidence of the fitness of sample data to this theoretical model.

By analyzing unstandardized regression coefficient (Table 2), the regression coefficients of reliability, response performance and delivery flexibility are positive and all pass the significance test of 0.05, enabling H1, H2, H3 to gain the sample support. The regression coefficient of handle of discrepancy to service satisfaction is positive but it does not reach the significance level of 0.05 which

implicates that the effect of couriers' handling of discrepancy influences the customers' experience in some extent and just has not been supported in statistical meaning.

The regression coefficient of delivery satisfaction to customers' willingness of adopting pickup service is positive and it passes the significance test of 0.05 which goes against H5. The regression coefficient of home delivery trust to willingness to pickup service is also positive. Though it doesn't show statistical significance, regression coefficient symbol doesn't fit H7. The regression coefficient results of the two research path shows that the service quality of home delivery doesn't have negative effect on willingness to pickup service which is anticipated previously. It overthrows our traditional concept which is that if customers are not satisfied with the parcel delivery method, they will be easier to accept other delivery way. Table 2 also indicates that home delivery service really has positive effects on

service trust and analyzed by significance test, H6 is validated. If research further regression coefficient results it is not difficult to discover that the medium effect of service trust in theoretical model is not evident (0.065 significance level).

DISCUSSION

Based on the above results, we find that in the present express industry environment in China, the quality of home delivery service are playing a “promoting” but not “restraining” role in the willingness of customers to picking up service; that is to say, when the customers are pleased with the delivery service, the wishes they try to pickup service would increase. However, the “complaining” customers, who aren’t satisfied with the traditional delivery mode, have fewer wishes with proactive try to picking up instead.

Why will appear this “unexpected” influencing mechanism? We speculate an important fact that social cognition of pickup service is rather limited; to great majority of express customers, the perimeter zones don’t have any convenient official pickup service points. For example, in this research, 70% respondents report they haven’t tried standard pickup service in practice. So the pickup service’s advantages described in the questionnaire are unable to attract prospective customer fully. Beyond that, this paper also tries to give some explanations: firstly, the customers who are pleased with home delivery service are always those who frequently receive parcels, they have much deeper understanding about pickup service than common customers which is good for eliminating the psychological resistance caused by information inaccessible or lack of knowledge. Secondly it is more probable that the frequent customers can’t sign for parcel personally. So they have much consciously eager to normalized pickup service. Thus, the “complaining” customers are always “stubborn” as well. Our conclusions have two implications. Firstly, related firms should make service orientation clear enough, positioning the two kinds of parcel delivery as relation of “complement” instead of “replacement”. It is not reasonable to demonstrate the development value in the point of service advantages. For example, an express customer may choose pickup mode on a specific period for specific trade but he or she may prefer home delivery on other occasion. The pickup service mode becomes to an “alternative” delivery scheme in fact. Secondly, the electronic commercial enterprises’ pickup service promotion should pay more attention on those customers who frequently shop online. Those people perceive to pickup points earlier, having higher trustworthy, bigger acceptance wishes and producing pickup service requirement easier.

The research conclusion of this paper is obviously controversial, thereby follow-up studies are required. On the one hand, the amount of respondents needs to be enlarged, reviewing theoretical assumptions on the basis of large samples; on the other hand it is necessary to bring the online-shopping experience and other characteristics into the research model, to observe its regulating effect for part assumptions.

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