

The Impact of Online Customer Service on Consumers' Purchase Conversion-Moderation effect of information cues

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Abstract. This paper explores the influence of online customer service on consumer purchase conversion and the moderating effect of information cues on this influence, and provide mentoring program for online customer service optimization services. The results further verify that online customer service can significantly promote consumers' purchase conversion. The service effect of online customer service is positively moderated by product sales and product prices. Exploring the impact of online customer service on consumers' subsequent purchase conversions.

Keywords: Online Customer Service, Information Cues, Purchase Conversion.

1. Introduction

E-commerce websites provide users with various information cues, including product descriptions and pictures. Existing research has confirmed that various information cues in online shopping situations will affect consumers' perceived product quality and purchase intention [1]. It's needed to lucubrate the comprehensive understanding of the mechanism of customer service effect on purchasing decisions, improve their marketing strategies.

2. Literature review

2.1 The impact of online customer service on purchase conversions

Online customer service mainly solves the problem of insufficient consumer trust through two main mechanisms. First, communication provides an opportunity for e-commerce companies to build interpersonal relationships with customers [2]. It delivers goodwill to buyers. Second, online customer service alleviates information asymmetry by providing information, effectively reducing the perceived risk of purchases [3]. At the same time, trust, in turn, leads to consumers being more willing to share information with friends and to make repeated purchases.

2.2 Information cues

Previous researches mainly apply information cues to the evaluation and prediction of product usability to improve user experience. Pirolli mentions an important concept in his information foraging theory, that is, information cue. The descriptive text and pictures that accompany the link are also informative cues to the content of the link [4].

3 Model building

3.1 Model assumptions

This paper focuses on the two most obvious cues of information on e-commerce platforms: (1) the product's on-page sales (sales within the last month) (2) the product's on-page price. Information cascade theory shows that consumers are likely to make decisions based on the choices of others, making online purchases a preferential process of dependence on products, so products with higher sales are more attractive to users [5]. Therefore, the following assumptions are made:

Hypothesis 1 The impact of online customer service on the subsequent purchase conversion of consumers is positively moderated by the sales displayed on the product page.

Similarly, price, as an effective signal of quality, is an important factor that consumers generally consider in their purchasing decisions. When consumers search for products, they often hope that the products are more cost-effective [6]. When users inquire about products with lower prices, they are also more likely to buy products. Therefore, the following assumptions are made:

Hypothesis 2 The influence of online customer service on the subsequent purchase conversion of consumers is negatively moderated by the price displayed on the product page. **Table 1** presents a list of study variables.

Table 1. The variable names and their meanings

	Variable names	Meaning
Explained variable and key explanatory variable	Purchase _{ij}	Dummy variable for whether user i buys product j on that day
	Chat _{ij}	Dummy variable for whether user i consults online customer service for product j
	Sale _j	Product j displays the sales volume on the page of the day month
	Price _j	Product j shows the price on the page of the day
Instrumental variable	IVintensity _i	The number of non-travel insurance products viewed by user i on the previous day
	IVRob_chati	Whether user i has used robot customer service before the day
	Buy_before _{ij}	Whether user i has purchased product j before the current day
	Buy_numi	The number of times user i purchased travel insurance products before the day
	Buy_amti	The average amount of travel insurance products purchased by user i before the day
	Gender _i	The gender of user i, 0 means female; 1 means male

3.2 Model building

This study uses the treatment effect mode, which consists of two stages. The first stage is the processing equation, which examines the determinants of whether users use the online customer service system; the second stage is the purchase equation, which explores the impact of online customer service usage and other factors on user purchase conversion. Assuming that the user's purchase behavior $Purchase_{ij}$ is a linear function of online customer service selection $Chat_{ij}$ and other explanatory variables, the regression equation can be set as follows:

$$Purchase_{ij} = \theta_1 + \varepsilon_1 = \beta_0 + \beta_1 Chat_{ij} + \beta_2 Sales_{ij} + \beta_3 Price_{ij} + \beta_4 Chat_{ij} * Sales_{ij} + \beta_5 Chat_{ij} * Price_{ij} + \gamma_1 Prod_{char} + \gamma_2 Cons_{char} + \varepsilon_1 \quad (1)$$

Among them, $Purchase_{ij}$ is the purchase decision made by consumer i after browsing product j. If the product is purchased on the same day, the value is 1, otherwise it is 0; $Chat_{ij}$ is the purchase decision made by consumer i after browsing product j. Whether online customer service is used, if used, it is 1, otherwise it is 0; $Chat_{ij} * Sales_j$ is the interaction item for hybrid customer service and product price, $Chat_{ij} * Price_j$ is the interaction item between online customer service and product price. $Prod_Char$ is other product feature, mainly including product accident medical insurance amount and accidental injury insurance amount, etc. $Cons_Char$ is the consumer characteristics, includes personal characteristics, historical purchase behavior characteristics, the average amount, and whether the user has purchased the browsed product before, browsing behavior characteristics,

etc. $\beta_i(i = 0,1,2,3,4,5)$. $\gamma_i(i = 0,1,2,3,4,5)$ are parameters or vectors to be estimated respectively, ε_1 is a random bias.

In Equation (1), if the variable $Chat_{ij}$ that reflects whether the user uses online customer service is exogenous, the least squares (OLS) method can be used to estimate the formula directly to analyze the user's use of online customer service to determine the final purchase conversion. However, whether users use online customer service is determined by many factors, such as the user's familiarity with the website, the user's previous satisfaction with the website's customer service, etc. or not is not sure. It is necessary to introduce instrumental variables to correct the endogenous bias. error:

$$Chat_{ij} = \theta_2 + \varepsilon_2 = \alpha_0 + \alpha_1 IVintensity_i + \alpha_2 IVRob_{chat_i} + \gamma_3 Prod_{char} + \gamma_4 Cons_{char} + \varepsilon_2 \quad (2)$$

Among them, $Chat_{ij}$. $Prod_Char$. $Cons_Char$ respectively have the same meaning as in equation (1). $IVintensity_i$ Indicates the number of non-travel insurance products users browsed on the previous day, $IVRob_chat_i$ Indicates whether the user has used robot customer service before, which is a set of instrumental variables for using online customer service. In addition, in the decision equation of online customer service use, the relationship between the user's browsing behavior, a control scalar, and whether to use customer service is not discussed. $\alpha_i(i = 0,1,2)$. $\gamma_i(i = 3,4)$ are respectively the parameters or vectors to be estimated, ε_2 is a random bias.

4 Empirical research

4.1 Data processing

The data source of this research is an online B2C insurance agency platform. It involves the following four aspects: user browsing product data, user purchasing product data, user pre-sales customer service data and user demographic data. This study extracted all user and product information with a total sample of 66,490. Descriptive statistics for the variables are given in **Table 2**.

Table 2. Descriptive statistics

	sample size	average value	standard deviation	min	Median	max
Purchase _{ij}	66490	0.1214769	0.3266831	0	0	1
Chat _{ij}	66490	0.0213716	0.1421591	0	0	1
Sale _j	66490	1118.068	2251.122	0	189	23762
Price _j	66490	57.48738	177.2569	0.7	25	4300
IVintensity _i	66490	0.9695443	2.932478	0	0	66
IVRob_before _i	66490	0.0896225	0.2856423	0	0	1
Buy_before _{ij}	66490	0.1033539	0.3044228	0	0	1
Buy_num _i	66490	5.144774	9.233056	0	2	129
Buy_amt _i	66490	390.999	809.9368	0	14.205	18320
Gender _i	66490	0.5352835	0.4987573	0	1	1

4.2 Analysis of results

The dependent variable in this chapter is the user's purchase decision. After controlling for endogeneity, two interactive items, online customer service and sales (Chat*Sale) and online customer service and price (Chat*Price), are added. The estimated results of the treatment effect model are presented in **Table 3**.

Table 3. Model estimation results conditioned by information cues

Variable	Coefficient	Standard deviation	z value	P value	Salience
Equation 1 (Purchase)					
Chatij	0.6637947	0.0109208	60.78	0.000	***
Salej	5.18e-06	5.60e-07	9.24	0.000	***
Pricej	-0.0000367	7.52e-06	-4.88	0.000	***
Chatij*Salej	1.09e-06	2.89e-06	1.38	0.005	**
Chatij*Pricej	0.000121	0.0000571	2.12	0.034	*
Buy beforeij	0.2011897	0.0041787	48.15	0.000	***
Buy numi	0.0017183	0.0001374	12.50	0.000	***
Buy amti	-0.0000345	9.97e-06	-3.47	0.001	**
Genderi	-0.016108	0.0024618	-6.54	0.000	***
cons	0.0099272	0.0032281	3.08	0.002	**
Equation 2 (Chat)					
IVintensityi	-0.0268283	0.0050714	-5.29	0.000	***
IVRob beforei	0.2731218	0.0263377	10.37	0.000	***
Salej	9.71e-06	4.12e-06	2.35	0.019	*
Pricej	-0.0003215	0.0001224	-2.63	0.009	**
Buy beforeij	-0.2022391	0.030035	-6.73	0.000	***
Buy numi	-0.0059612	0.0012291	-4.85	0.000	***
Buy amti	0.0002483	0.000067	3.71	0.000	***
Genderi	-0.0681529	0.0201543	-3.38	0.001	**
cons	-1.795836	.0277845	-64.63	0.000	***
Wald test of indep. eqns. (rho = 0): chi2(1) = 2637.66 Prob > chi2 = 0.0000					
Ps:* p < 0.05; ** p < 0.01; *** p < 0.001.					

First, the p-value of the likelihood ratio test results shows that the model has an endogenous problem, so it is reasonable to choose a treatment effect model. It can be seen from the results that when the two interaction items of online customer service and sales (Chat*Sale) and online customer service and price (Chat*Price) are added, the use of online customer service (Chat) and the purchase decision of users are at a significant level of 0.001. This shows that the online customer service system has a significant positive impact on the user's subsequent purchase conversion behavior. For other control variables, the number of times users browsed product detail pages (Visit_num), the total time users browsed product detail pages (Visit_time), the number of times users historically purchased travel insurance products (Buy_num) and user gender (Gender) are positively correlated with the purchase decision at a significance level of 0.001, indicating that women are more likely to purchase travel insurance products.

It can be seen that the interaction item (Chat*Sale) of online customer service and sales is significantly positively correlated with the purchase decision at the significance level of 0.01, and the interaction item (Chat*Price) of online customer service and price and the purchase decision are at the significance level of 0.05. significantly positively correlated. It shows that the effect of online customer service is moderated by the two information cues of product sales and price. This paper next studies the marginal effect of online customer service when the sales volume and price take different values, in order to test Hypotheses 1 and 2.

Finally, in order to further verify the impact of online customer service on consumer purchase conversion, this paper can calculate the average treatment effect (ATE) represents the benefit of users using online customer service. And calculate the marginal purchase probability by the average purchase probability of users who use online customer service and the average purchase probability of users who do not use online customer service (average purchase probability of all users using customer service-average purchase probability of all users not using customer service) / (The average purchase probability of all users who use customer service × 100%), the results are shown in **Table 4.**

Table 4. Average treatment effect and marginal purchase probability

	online service		ATE	Z value	Marginal Purchase Probability (%)
	use	Not use			
Purchase probability	0.7795	0.1076	0.6719***	70.51	86.2%
Ps:*** p < 0.001.					

The results show that the higher the sales volume of the product inquired by consumers, the higher their perception of product quality, and the easier it is to complete purchase conversion after exchanging more product information with online customer service. Therefore, the model results support Hypothesis 1. And the results show that after exchanging more information with online customer service, consumers are more willing to purchase higher priced products. Therefore, the model results reject Hypothesis 2.

5 Conclusions

It is found that the service effect of online customer service is positively moderated by product sales. Compared with products with low sales, products with high sales are more likely to be purchased after communication between buyers and sellers. The service effect of online customer service is also positively moderated by product prices. After communicating with online customer service, products with higher prices are more likely to be purchased by consumers. These findings can help customer service agents change their communication strategies when faced with inquiries about different products.

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