Effect of ETA Format on Service Satisfaction in Online Food Delivery

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The Effect of ETA Format on Service Satisfaction in Online Food Delivery

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Abstract

The online food delivery (OFD) service market is growing rapidly. Anchored on the expectation disconfirmation theory, this study explores the effect of the estimated time of arrival (ETA) format on service satisfaction in the context of OFD. The results from an online experiment reveal that when the delivery is late, ETAs presented in the interval format can significantly reduce consumers’ expectation disconfirmation and service dissatisfaction than those presented in the point format. Besides, when the delivery is on time, ETA format has no significant effect on either expectation disconfirmation or satisfaction. These findings provide OFD service providers with design guidelines for the presentation format of ETAs.

Keywords: Online food delivery (OFD), forecast format, expectation disconfirmation theory, service satisfaction

Introduction

The online food delivery (OFD) service market is growing rapidly. According to Statista (2021), the revenue of the global OFD industry has reached $293.6 billion in 2021. For OFD consumers, prompt and on-time delivery is one critical factor that affects service satisfaction (Annaraud and Berezina 2020). A recent survey shows that 39.9% of OFD customers consider delivery speed or on-time delivery the most important factor when choosing OFD service providers (DCCI 2020).

Besides trying their best to deliver orders on time, OFD service providers can improve customer satisfaction through expectation management. Marketing studies have found that consumers’ service satisfaction depends on how well the actual service performance matches their expectations (Oliver 1980), which are formed based on what the service providers tell or promise (Hui and Tse 1996). Companies can improve customer satisfaction and sales by manipulating consumers’ expectations (Kopalle and Lehmann 2006). For example, providing information about estimated waiting time can reduce perceived waiting time (Antonides et al. 2002) and improve service experience (Larson 1987) and satisfaction (Bielen and Demoulin 2007). Therefore, OFD service providers can also manage consumers’ expectations by providing an estimated time of arrival (ETA) of delivery.

Nowadays, most OFD players offer an ETA when consumers place orders. However, the ETA is presented in different formats. One format describes the ETA with a definite timepoint (the point format), for example, “Your order is expected to arrive at 12:00 pm.” The other format describes the ETA with an interval (the interval format), for example, “Your order is expected to arrive between 11:55 am and 12:05 pm.” However, whether or not the ETA format may affect consumers’ expectations is not clear because prior studies on
forecast formats have produced mixed findings. For example, Onkal and Bolger (2004) have found that consumers find a forecast presented in a point format suggests a higher certainty than that presented in an interval format. However, they deem a forecast presented in the interval format more useful as it contains more information by providing a set of possible values. In addition, an estimation presented in the interval format can help readers better distinguish between possible and impossible situations (Savelli and Joslyn 2013).

Moreover, existing studies exploring the effects of forecast format were mostly conducted in the contexts of weather, medical, and financial forecasts and they focused on users’ willingness to accept a forecast when the outcome is unknown. The effects of ETA format (point vs. interval) on customer expectations and satisfaction have yet been examined in the context of OFD. Besides, no research has investigated how forecast format influences people’s satisfaction when the outcome is given. To fill these gaps, we attempt to answer the following research questions in this study: (1) Does the ETA format affect consumer perceived uncertainty? (2) When the delivery is late, does the ETA format affect consumers’ expectation confirmation and disconfirmation? (3) Does the ETA format affect service satisfaction?

The rest of the paper is organized as follows. We first review the literature related to the expectation disconfirmation theory and forecasting format, then propose our research hypotheses. Afterward, we introduce the experimental design and procedures and report the results of data analysis. Finally, we summarize the contributions and the limitations of this study.

**Theoretical Background and Hypotheses Development**

The expectation disconfirmation theory (EDT), which is widely accepted in the consumer behavior literature, states that there are four steps for consumers to evaluate a product or service: first, they form some expectations about a product or service before purchasing based on previous experience (Hui and Tse 1996). Second, after experiencing the product or the service, they form their actual perceptions about the performance. Third, they compare the actual performance with their initial expectations, resulting in positive, negative, or zero expectation disconfirmation (Oliver 2010). Finally, they evaluate the product or service based on initial expectation and the degree of expectation (dis)confirmation (Bhattacherjee 2001).

Furthermore, researchers have also found that when consumers find that the product or service does not meet their expectations, they may lower their post hoc expectations in order to avoid cognitive dissonance (Bhattacherjee 2001). According to the post-purchase dissonance theory, after purchasing, consumers will take actions to reduce the psychological discomfort caused by the inconsistency between expectations and outcomes (Kassarjian and Cohen 1965; Keng and Liao 2013; O’Neill and Palmer 2004). For example, they may change the inconsistent cognitions, seek additional information (Festinger 1957; Festinger 1964), or selectively seek confirmative information and avoid disconfirmative information (Oliver 2010).

To reduce cognitive dissonance, when the delivery is late, consumers facing an ETA in the interval format may adjust their prior expectations by using the right endpoint of the interval as the reference point. Assuming that the interval’s midpoint is identical to the timepoint in the point format\(^1\), it means that consumers facing an ETA presented in the interval format can adjust their expectations to a later time point than those facing an ETA presented in the point format. As a result, when they encounter late delivery, their expectation disconfirmation will be less significant than those facing an ETA presented in the point format. Thus, we propose:

\[ H1: \text{When encountering late delivery, consumers' negative expectation disconfirmation is less significant when the ETA is presented in the interval (vs. point) format.} \]

As discussed above, expectation disconfirmation is the primary driver of service satisfaction (Darke et al. 2010). When negative expectation disconfirmation occurs, people feel dissatisfied (Cardozo 1965; Fullerton and Taylor 2015; Oliver 1980). The higher the negative expectation disconfirmation is, the more dissatisfied consumers are with the service. Therefore, we posit:

\[ H2: \text{Consumers’ expectation disconfirmation is negatively associated with service satisfaction.} \]

\(^1\) In previous studies on forecast format, interval estimation is mostly manipulated by employing a small range around the point estimation (Onkal and Bolger 2004; Du et al. 2011; Joslyn et al. 2013).
Besides expectations on service outcome, consumers would also assess whether service providers could deliver their services as promised in the ETAs. In this study, we argue that consumers’ perceptions of service uncertainty can be also affected by the ETA format. Onkal and Bolger (2004) have found that an estimation presented in the interval format conveys a higher level of uncertainty and a lower level of precision than the same estimation presented in the point format. Prior studies have also revealed that the interval format is commonly used to convey uncertainty or ambiguity (Kuhn 1997; Savelli and Joslyn 2013). In addition, the point prediction was considered more precise than the range prediction in medical forecasts (Du et al. 2011). Therefore, we propose:

**H3:** Consumers’ perceived service uncertainty is higher when the ETA is presented in the interval (vs. point) format.

In addition, uncertainty may reduce service satisfaction due to people’s preference for accurate information and aversion to ambiguous predictions (Du et al. 2011; Yaniv and Foster 1995). According to Camerer and Weber (1992), most people prefer accurate information, and the ambiguity about an event lowers the utility. Uncertainty can also cause anxiety (Macleod et al. 1991) and thus reduce service experience. Thus, we propose:

**H4:** Consumers’ perceived service uncertainty is negatively associated with service satisfaction.

The research model is summarized in Figure 1.

**Research Method**

**Experimental Design and Stimuli**

The experiment was conducted online. A total of 200 registered users of Credamo, a Chinese online survey company, participated in the experiment. They were randomly assigned to one of the four conditions in a 2 (delivery outcome: late vs. on-time) × 2 (ETA format: interval vs. point) between-subjects design. Ten participants who either failed to pass the attention check, were not familiar with OFD, or had a very high tolerance for delivery lateness were excluded, leaving 190 valid samples. Among them, 54.2% were females, and the average age was 27. The samples’ demographic information is reported in Table 1.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Type</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>87</td>
<td>45.8%</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>103</td>
<td>54.2%</td>
</tr>
<tr>
<td>Age</td>
<td>&lt;20 years old</td>
<td>9</td>
<td>4.7%</td>
</tr>
<tr>
<td></td>
<td>20-30 years old</td>
<td>128</td>
<td>67.4%</td>
</tr>
<tr>
<td></td>
<td>30-40 years old</td>
<td>43</td>
<td>22.6%</td>
</tr>
</tbody>
</table>

Figure 1. Research Model
Table 1. Demographic Information

<table>
<thead>
<tr>
<th>Education</th>
<th>40-50 years old</th>
<th>&gt;50 years old</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior high school</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>College degree</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td>Bachelor’s degree</td>
<td>140</td>
<td>33</td>
</tr>
<tr>
<td>Master’s degree</td>
<td>33</td>
<td>17.4%</td>
</tr>
</tbody>
</table>

No significant difference was found on age \((p = 0.653)\), gender \((p = 0.528)\), education \((p = 0.672)\), familiarity with OFD APPs \((p = 0.546)\), and frequency of using OFD APPs \((p = 0.511)\) across the four experimental groups.

**Procedures**

Subjects were first asked to imagine that they were using an OFD APP to order their lunch from a new restaurant. By stating that it was a new restaurant, we could exclude the possible confounding effect of subjects’ past experience and ensure that their expectations are exclusively based on the ETA provided. Subjects were told that they placed their orders at “11:43 am”, and the OFD APP confirmed their orders by providing an ETA of delivery. The ETA was presented as “12:15 pm” in the point condition and “12:07-12:22 pm” in the interval condition. At this point, subjects were asked to answer questions about perceived service uncertainty.

Afterward, subjects in the on-time condition were informed that the delivery arrived at 12:14 pm, while those in the late condition were told the arrival time was 12:28 pm. After that, they were asked to answer the remaining questions about expectation disconfirmation and service satisfaction. At the end of the questionnaire, subjects were asked to fill out demographic information and their past experiences with ordering meals online.

**Measures**

*Expectation disconfirmation.* The expectation disconfirmation scale was adapted from Afifi and Metts (1998) and Burgoon et al. (2016). Subjects were asked: “How consistent is the actual delivery time of the order with your expectation?”, “How well do the delivery time of this order meet your expectation? (reverse)”, and “How surprised do you feel about the actual delivery time of this order?”, where 1= not consistent at all/totally not meet my expectation /not surprised at all and 7= very consistent/totally meet my expectation/ very surprised.

*Perceived service uncertainty.* The perceived service uncertainty scale was adapted from Flavian et al. (2016). Subjects were asked: “How confident do you feel about the platform’s expected delivery time? (reverse)”, “How certain do you feel about the platform’s expected delivery time? (reverse)”, and “How convinced do you feel about the platform’s expected delivery time? (reverse)”, where 1= not confident at all / not certain at all / not convinced at all, and 7= very confident / very certain / very convinced.

*Service satisfaction.* The service satisfaction scale was adapted from Wan et al. (2011). Subjects were asked: “How satisfied are you with this OFD service? ”and “How angry do you think you’ll be? (reverse)”, where 1= very dissatisfied/not angry at all and 7= very satisfied/very angry.

**Results**

We first checked the reliabilities and construct validities of all constructs. The results showed that the Cronbach’s \(\alpha\) and the composite reliability of all constructs were above 0.8. Convergent validity was

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2 According to a recent consulting report, the average waiting time for an online food order in China is 28 minutes (Li 2020). Therefore, the waiting time was set to 31 minutes for the on-time condition and 45 minutes for the late condition.
Examined by the average variance extracted (AVE) for each construct. As shown in Table 2, the AVEs were greater than 0.5 for all constructs. In addition, the square roots of the AVE of each construct were greater than the correlations between the construct with other constructs.

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Item</th>
<th>Loadings</th>
<th>Cronbach’s α</th>
<th>CR</th>
<th>AVE</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expectation disconfirmation</td>
<td>ED1</td>
<td>0.891</td>
<td>0.896</td>
<td>0.935</td>
<td>0.828</td>
<td>0.910</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ED2</td>
<td>0.930</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ED3</td>
<td>0.909</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived service uncertainty</td>
<td>EU1</td>
<td>0.932</td>
<td>0.872</td>
<td>0.922</td>
<td>0.798</td>
<td>-0.129</td>
<td>0.893</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EU2</td>
<td>0.929</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EU3</td>
<td>0.815</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfaction</td>
<td>SAT1</td>
<td>0.953</td>
<td>0.900</td>
<td>0.951</td>
<td>0.908</td>
<td>0.180*</td>
<td>-0.797**</td>
<td>0.952</td>
</tr>
<tr>
<td></td>
<td>SAT2</td>
<td>0.953</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The scores in the diagonal are square roots of AVEs, and the lower triangle represents the correlations between constructs.

**Table 2. Construct Attributes**

The descriptive statistics of all constructs are summarized in Table 3.

**ANOVA Results**

To test the effects of ETA format when the delivery was late, we first conducted one-way ANOVA on expectation disconfirmation, service uncertainty, and service satisfaction. As consumers’ expectations can be influenced by their past service experience (Davis and Heineke 1998; Kumar et al. 1997), we controlled for subjects’ tolerance of late delivery and the proportion of on-time delivery in their past experience as covariates.

The results showed that subjects in the interval condition reported a significantly lower level of expectation disconfirmation ($M_{interval} = 4.35$ vs. $M_{point} = 4.68$, $F(2,95) = 5.027, p = 0.027$) and a significantly higher level of service uncertainty ($M_{interval} = 3.32$ vs. $M_{point} = 2.98$, $F(2,95) = 4.999, p = 0.028$) than those in the point condition. Thus, H1 was supported. Subjects in the interval group also reported a significantly higher level of satisfaction than those in the point group ($M_{interval} = 3.78$ vs. $M_{point} = 3.37$, $F(2,95) = 5.213, p = 0.025$).

We then conducted one-way ANOVA for the baseline condition of on-time delivery. The results indicated that ETA format had no significant effect on expectation disconfirmation ($M_{interval} = 2.54$, $M_{point} = 2.64$, $F(2,95) = 0.002, p = 0.962$), service uncertainty ($M_{interval} = 2.60$, $M_{point} = 2.94$, $F(2,95) = 1.374, p = 0.244$), and service satisfaction ($M_{interval} = 6.21$, $M_{point} = 6.04$, $F(2,95) = 0.313, p = 0.577$).
To test H3, we conducted one-way ANOVA using the whole sample. The result showed that the effect of ETA format on service uncertainty was not significant ($M_{\text{interval}} = 2.91, M_{\text{point}} = 2.97, p = 0.594$). Hence, H3 was not supported.

**Mediation Tests**

To test the mediation effect, we employed the data from the late conditions and conducted a parallel mediation analysis with 5000 bootstrapping samples (Hayes 2012) with expectation disconfirmation and service uncertainty as the two mediators.

As shown in Figure 2, the conducted mediated regression analysis showed a positive total effect of interval format on service satisfaction ($\beta = 0.30, p = 0.025$). In addition, the mediation effect of expectation disconfirmation in the relationship between ETA format and service satisfaction was significant (indirect effect = $0.194, 95\% \text{ CI} = [0.019, 0.387]$). The results also indicated that interval format negatively influenced expectation disconfirmation ($\beta = -0.32, p = 0.027$) and that expectation disconfirmation negatively influenced service satisfaction ($\beta = -0.61, p < 0.001$), which supported H1 and H2. Moreover, the direct effect of ETA format on service satisfaction became not significant ($\beta = 0.13, p = 0.218$) after including expectation disconfirmation, implying a full mediation.

The indirect effect of ETA format on service satisfaction through perceived uncertainty was not significant (Indirect effect = $-0.024, 95\% \text{ CI} = [-0.110, 0.026]$). Though the correlation between service uncertainty and service satisfaction was negative, it was not significant ($\beta = -0.11, p = 0.300$). Hence, H4 was not supported.

![Figure 2. Mediation Tests](image)

**Discussion**

**Conclusion**

The experiment results are mostly consistent with our hypotheses. When the delivery was late, consumers’ satisfaction in the interval format condition was higher than those in the point format condition, and this effect was fully mediated by expectation disconfirmation.

Meanwhile, although consumers’ perceived service uncertainty was higher when ETAs were presented in the interval format and when the delivery was late, it had no significant effect on satisfaction. There could be two reasons: 1) Even though the difference between the point and interval format (3.22 vs. 2.98) is statistically significant, it is not adequate to affect service satisfaction; 2) Upon the arrival of their orders, consumers would mainly evaluate their service satisfaction by the actual outcomes. Perceived service uncertainty may only affect their decisions on whether to place an order or not but not their post hoc evaluations.
**Theoretical and Practical Implications**

The present research has some theoretical implications. Although prior studies have suggested that consumers may prefer accurate point estimation to interval estimation due to their preference for certainty and aversion to ambiguity (Du et al. 2011; Yaniv and Foster 1995), few studies have investigated how forecast format may affect people’s evaluations, especially when the outcome does not meet their initial expectations. This study fills this gap by demonstrating the possible positive impact of the interval format on shaping people’s expectations and consequently their evaluations of a less than ideal outcome.

Meanwhile, the findings of this study can help OFD providers optimize the presentation of ETAs. Our research shows that the interval format can significantly enhance service satisfaction when the delivery is late; in the meantime, it has no negative consequence when the delivery is on time. Therefore, OFD providers may consider employing the interval format to display ETAs. This suggestion is also applicable to other online or offline service scenarios when an estimated time of arrival or waiting time is needed for expectation management.

**Limitation and Future Study**

There are still some limitations that need to be addressed in future studies. Firstly, this study adopted a scenario-based online experiment. Future studies may consider employing field experiments or natural experiments to improve the external validity of our findings.

Second, the interval was set to 15 minutes. It is possible that the effects of the interval format are contingent upon the interval width. Previous studies have shown that people do not like interval prediction that was too wide in range (Goodwin et al. 2010) because the wider the interval, the more uncertainties it contains (Savelli and Joslyn 2013). Also, experts who gave wider intervals were perceived as more uncertain, less competent, and less trustworthy (Lohre and Teigen 2017). Therefore, future studies can explore the moderating effects of interval width.

Third, this study only investigated the point and the interval formats. Future research may explore whether other ETA formats, such as probabilistic information alongside point estimate, can affect expectation disconfirmation and service satisfaction.

Fourth, this study did not consider the scenario of positive expectation disconfirmation. Although in the context of OFD, an earlier-than-expected delivery is not always desired, future research can further explore how ETA format may affect service satisfaction when the outcome is a positive surprise.

**References**


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