Demystifying The Role of Information Provision in Travellers' Satisfaction: Insights from a Randomized Controlled Trial

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Abstract

We conduct a randomized controlled trial (RCT) to explore whether providing tourists with information about the weather conditions in the destination country has a positive impact on their satisfaction level. We show that providing accurate weather information enables tourists to form more correct expectations i.e., closer to the actual weather conditions in the destination country – which in turn improves their satisfaction and makes them more likely to recommend relatives and friends to make the same trip. These findings reveal the role of information provision in improving tourists' satisfaction. Finally, our study encourages the application of the RCT approach as it addresses interesting questions in tourism research.

Keywords: Randomized controlled trial, tourist perception, information provision, weather, tourist satisfaction, Vietnam.

1. Introduction

An insight from extant literature is that consumers form expectations about a product or service before the actual consumption of it (Oliver, 1980; Sajtos et al., 2010; Cai and Chi, 2021). This expectation will in turn have an effect on consumers' satisfaction (Tang and Yu, 2021). If a product or service meets expectation, satisfaction follows. Likewise, if a product or service falls short of expectation, consumers are likely to be dissatisfied (Diehl and Poynor, 2010; Oliver, 1980; Spreng et al., 1996). A correct expectation, hence, plays an important role in affecting customer satisfaction. In many cases, consumers' expectations are based on 'externally' derived information including images, text, and verbal communications by third parties (Fotis, 2015; Gössling et al., 2012; Li et al., 2021). For example, they can rely on advertisements, guidebooks and other media to form prior expectations about the quality of products or services (e.g., Xu et al., 2021). Given that consumers can have access to a great variety of information, a natural question arises: which kind of information will assist consumers to form correct expectations before the actual consumption of a product or service? Relatedly, it would be interesting to examine whether providing consumers with such kind of information would improve their satisfaction.

To explore the aforementioned questions, we focus our analysis on the tourism sector considering its two interesting features. The first feature is that a tourist's expectation - prior to traveling - plays a crucial role in his/her satisfaction level (Wang et al., 2009; Vavra, 1997). The second feature is that a tourist's satisfaction depends not only on service quality but also on the weather conditions in a tourism destination (Becken and Wilson, 2013; Gnanapala, 2015; Han et al., 2017; Tang et al., 2021). A number of studies have highlighted the intrinsic importance of weather for tourist decision-making, including motivation to travel, destination choice, timing of travel, as

well as travel experience (Scott & Lemieux, 2010; Tang et al., 2021; Bausch, Gartner and Humpe, 2021). Similarly, Denstadli et al., (2011) note that expectations about weather conditions may influence how tourists actually perceive weather conditions at their destination – which in turn has an effect on satisfaction levels.

Taken together, this study aims to examine the effect of information provision on consumer satisfaction and how the type of information about the destination (weather condition versus culture versus tour's logistics) affects the travellers' satisfaction, word of mouth and revisit intention by a novel conceptualization that incorporates weather into a framework of consumers' expectation-satisfaction. This research offers significant theoretical, practical, and methodological contributions. First, grounded in Prospect Theory (Kahneman and Tversky, 1979) and reference dependent preferences (Kőszegi and Rabin, 2006), this study proposes that the prior expectation about weather condition in the destination country acts as a reference point for influencing a tourist's satisfaction level. If the actual weather condition is not as pleasant as the tourist expected – i.e., lower than the reference point - the tourist's level of satisfaction will be reduced. Likewise, a tourist's satisfaction will be enhanced if the weather condition is better than his/her expectation – i.e., higher than the reference point. Another main feature of Prospect Theory is loss aversion i.e., consumers are more sensitive to loss than to gain; hence, the value function is steeper in the loss than in the gain domain. Along this line, Nicolau et al., (2020) and Kostyk et al., (2017) note that consumers may be more risk loving in the loss domain – even in non-monetary domain. Building upon this insight, we show that the smaller the difference between the tourist's prior expectation and the actual weather condition, the more likely the she or he feels more satisfied.

Methodologically, in line with an important strand of recent studies (e.g., Cozzio et al., 2021), we conduct a Randomized Controlled Trial (RCT) to explore the link between information provision and consumer satisfaction. Tourists in our study went on a trip to a foreign country and spent most of their time participating in outdoor activities, such as going to parks, exploring gardens, and hiking. From the baseline survey, we found that numerous tourists in our study had incorrect prior expectation about weather condition in the destination country. Much of such incorrect expectation could be attributed to tourists' unawareness of weather information in the destination country. Such unawareness may have a negative effect on a tourist's satisfaction.

In addition, our study highlights the importance of providing relevant information to improve consumer satisfaction. Specifically, providing tourists with accurate information about weather condition in the destination country would enable them to form expectations closer to actual conditions, which would in turn improve their satisfaction level. On the other hand, providing information about culture of the destination country shows no effect on the tourists' satisfaction. Our study provides evidence that providing weather information can influence consumers' expectation and impact their satisfaction level. We appear to be the first to conduct a randomized controlled trial (RCT) to explore the causal link between tourists' prior expectation of weather condition in the destination and their travelling satisfaction. Angrist and Pischke (2009) and Imbens and Angrist (1994) have considered the RCT approach as the gold standard for identifying causal effects in field settings – including services related phenomena. We implement RCT to address empirical challenges regarding the causal effect of providing information on consumers' satisfaction. The randomization of tourists into treatment and control groups allows us to explicitly address endogeneity, self-selection, and omitted variable bias – which are very common in empirical studies.

In addition, we show that a simple intervention - such as providing weather information to tourists - could have a great impact on tourists' satisfaction. Second, we contribute to the literature on quantitative approaches to services related studies, and inter-disciplinary research in tourism through the adoption of RCT. Practically, analytical results offer insights for destination brand management and customer relationship management.

2. Literature Review, Theoretical Framework, and Hypotheses Development

2.1. Customer/Tourist Satisfaction

In this study we focus on tourists who participated in outdoor recreation. Bentz et al., (2016) note that an important approach for measuring satisfaction in outdoor recreation is expectancy theory. According to this theory, consumers establish an initial expectation of the product/service before making a purchase. de Rojas and Camarero (2008) define expectations as beliefs about a specific product or service that function as standards to evaluate its performance. Expectations play an important role in determining tourist satisfaction (Wang et al., 2016; Lee et al., 2011; Pizam et al., 1978; Agyeiwaah et al., 2016; Campo-Martínez et al., 2010).

In light of expectation confirmation theory, satisfaction is deemed as a consumer's overall judgement on the performance of a product or service. Consumers feel satisfaction when they cognitively evaluate their actual experience higher than the prior expectation (Oliver, 1980). Equivalently, tourist satisfaction can be assessed by the association between tourist expectations and the quality of tourist services and products received (Hollebeek and Rather, 2019). Additionally, tourists' satisfaction is the positive emotional state resulting from the evaluation of their traveling experiences, influenced by their pre-trip expectation (Wang et al., 2016). For instance, Oh, Fiore and

Jeoung (2007) reported a significant relationship between tourists' experiences and satisfaction. Previous studies have also shown that destination attachment (e.g., Veasna, Wu and Huang, 2013) and destination image (e.g., Chi and Qu, 2008) positively influences tourists' satisfaction. High level of satisfaction with the tours often leads to the more frequent use of tour services or revisiting destinations, which is likely to cultivate more loyal tourists (e.g., Rather, 2017; Rather and Hollebeek, 2019).

2.2 Climate and destination choice

Tourists often rely on official travel destination websites to search for information when making travel arrangements (Hernández-Méndez, Muñoz-Leiva and Sánchez-Fernández, 2013). Sirakaya and Woodside (2005) indicated that individuals select destinations based on both psychological (e.g., attitudes, motivation, and personality traits) and non-psychological (i.e., time and monetary costs). Climate and weather conditions have been considered important attributes that influence tourists' decisions (Goh, 2012; Gössling et al. 2012; Chen and Liu 2019; Kim et al., 2017; Kim et al., 2021; Tang et al., 2021). The climate/weather establishes part of the destination image, which in turn forms tourists' expectations and affects the degree of tourists' satisfaction (Gómez Martín, 2005). Additionally, scholars observed that tourists' decision to visit specific destinations is significantly determined by destination image (Lin et al. 2007) and previous travel experiences (Pavesi, Gartner and Denizci-Guillet, 2015). Tourist's economic decisions or actions are also influenced by the amount of information related to climate change in tourist destinations (León, & Araña, 2016). For example, temperature has a significant effect on tourism spending (Wilkins et.al, 2017) and traffic (Shih and Nicholls, 2011, 2012; Chen et al., 2017). Joo, Kang and Moon (2012) indicated that pricing strategies of theme packs may be impacted by the

rains. In the tourism literature, little attention has been paid to the influence of expectation on tourism service evaluation and judgment in relation to climate change.

2.3 A theoretical framework

a. Some background

Building upon the above studies, we explore an interesting aspect of consumer satisfaction – i.e., it may depend not only on the quality of a product and service – but also on states such as emotion, mood, and/or weather etc. In the context of our study, a tourist's satisfaction in many ways can be considered weather-dependent, because weather conditions influence how much the tourist enjoys the experience (Becken and Wilson, 2013; Gnanapala, 2015). [1]

In what follows, we propose a simple theoretical framework incorporating weather and expectation - as two determinants of a tourist's satisfaction. Specifically, we ground our theory on the Prospect Theory. An essential element of Prospect Theory is the reference point (Mothersbaugh et al., 2012). In addition, Prospect Theory incorporates **loss aversion**, such that the value function is steeper in the negative domain than in the positive domain (Bacon, 2012; Ahrholdt et al., 2019). Using consumers' prior expectation as a reference point, Wang (2011) and Finn (2012) have shown that such expectation is a main driver of consumer satisfaction. Specifically, a lower than expected level of service quality would result in a consumer's loss aversion – which has a negative impact on the consumer's satisfaction.

[1] In economics, this kind of consumer satisfaction is referred to as state-dependent preference – i.e., preference in which utility depends on the state such as weather.

In this study, we show that a tourist's expectation of the weather condition – prior to travelling - plays a role in driving his/her satisfaction. To be precise, the tourist will compare his/her expectation of the weather condition with the actual condition. If the latter happened to be worse than the former, the tourist would experience **loss aversion** - which makes his/her unsatisfied with the travelling experience. Hence, providing the tourist with information about weather condition would support him/her to have a more correct expectation of the weather condition. This in turn narrows the difference between a tourist's prior expectation and the actual weather condition, hence improve his/her satisfaction.

b. A formal framework and hypotheses development

For simplicity, let us consider a tourist's utility level from travelling, which depends on the weather condition as follows:

$$u(s,w) = sw$$

where s represents the tourist's inherent satisfaction - from the travel experience,
w represents the weather condition.

We can notice from the above formula - a more pleasant weather condition i.e., **w** is a great number - would enhance the tourist's satisfaction from traveling experience. For example, a sunny day would greatly enhance a tourist's outdoor activities. On the other hand, a rainy day could have a negative impact on his/her experience – though the tour operator had given great services in all aspects.

Before the tour, the tourist forms an expectation of w_0 about the weather condition in the foreign country to which they travel. The actual weather condition

when the tourist arrives at the foreign country is w_τ. There may exist a difference between the expected and actual weather condition - due to lack of information about weather in the foreign destination. For simplicity, we assume with probably of 0.5 that the actual weather condition w_τ is better than what the tourist expected w_0 - and with probably of 0.5 that it is worse.

Building upon Prospect Theory (Kahneman and Tversky, 1979) and reference dependent preferences (Kőszegi and Rabin, 2006), we can express the tourist's utility as:

$$u(s; w_0, w_\tau) = sw_\tau + \frac{1}{2}(w_\tau - w_0) - \frac{1}{2}\lambda(w_0 - w_\tau)$$

$$\Rightarrow u(s; w_0, w_\tau) = sw_\tau - \frac{1}{2}(\lambda - 1)|w_\tau - w_0|$$

where:

$|w_\tau - w_t|$ represents the difference in absolute term between the expected weather (prior to traveling) and the actual weather at time τ.

λ is the loss aversion parameter which is assumed be greater than 1 - implying that value function is steeper in the negative domain than in the positive domain (Fin 2012; Bacon, 2012).

The main insight from this framework is that given $\lambda > 1$ an increase in the difference between a tourist's expectation and the actual weather conditions $|w_\tau - w_t|$ would lower his/her satisfaction.

Additionally, Oliver (1980) suggests that the difference between expectations and the perceived experience of a product or service has a significant reference effect

in fostering customer satisfaction. Relatedly, tour satisfaction is impacted by tourists' expectation (e.g., Park et al., 2018). As such, we put forth the following hypothesis:

Hypothesis 1: The difference between a tourist's prior expectation and actual weather condition has a negative relationship with his/her satisfaction. The closer the gap, the greater his/her satisfaction.

Our next Hypothesis explores an informational intervention to close the gap between prior expectation and actual weather condition. Specifically, we focus on the tourist's lack of information about the weather condition in the destination country. Despite the increased availability of weather forecasts worldwide, it is not common among tourists to misperceive weather conditions (Becken and Wilson, 2013). Along this line, we examine the role of information intervention – i.e., providing tourists with more correct weather information in the destination country. Doing so would enable tourists to form a more correct prior expectation of the weather conditions; and hence improve their satisfaction level.

Similarly, tourists' satisfaction is motivated heavily by the quality of the weather (Kim et al. 2017; Jeuring, 2017). Furthermore, prior studies have indicated that relevant, accurate and timely information is a reliable indicator of customer satisfaction in various contexts; for example, mobile government services (Wang and Teo, 2020) and destination management organizations' websites (Chung et al., 2015). Relatedly, Kim, Lee, Shin, and Yang (2017) empirically demonstrated that relevant information contents posted in social media is imperative in forming both cognitive and affective destination image. Likewise, Kullada and Michelle Kurniadjie (2021) empirically proved that digital information quality determines tourists' experiences in pre-trip,

during trip and after trip. Crucially, high quality of information on a destination website can attract tourists to visit a destination (Chung et al., 2015). Hence, we posit the following hypothesis:

Hypothesis 2: Providing information about weather in the destination country improves a tourist's satisfaction.

3. Methodology

We collaborated with major travel agencies (tour operators) in Hanoi to conduct the experiment. These operators have been offering 7-day package tours to visit Singapore for more than 5 years. Our experiment focuses on the package tours for customers in Hanoi, Vietnam in February. A feature of these tours is that the tour operators arrange all activities – which are mostly outdoor recreational. The activities are fixed and independent of the weather conditions. In other words, the tourists do not have the flexibility to change their scheduled activity to make it more suitable with the weather condition. This aspect highlights the role of the gap between the expected and actual weather conditions in driving consumer satisfaction.

It is also worth noting that the weather in Hanoi during this period differs much from Singapore. Such differences would likely influence how tourists in Hanoi form expectations about the weather in Singapore before they travel. For example, tourists with attribution bias (e.g., Haggag et al., 2019) may expect the weather in Singapore to be much the same as in Hanoi. A novel aspect of our study is to explore the role of information provision in reducing such bias to improve tourists' satisfaction.

For our purpose, we collaborated with the tour operators to invite 310 tourists from 28 package tours to participate in our study [2]. Out of these 310 tourists, 242 agreed to participate. We randomly assigned these tourists to different groups as follows:[3]

TG0: The control group

TG0 includes 10 package tours with 84 tourists in total. Tourists in the control group received only information about the tour's logistics before departure date.

TG1: The treatment group

TG1 consists of 10 package tours with 88 tourists in total. Tourists in this group not only received information about the tour's logistics before departure date – but also information about typical weather (forecasting) conditions in Singapore in February. Naturally, we want to know whether information about weather in Singapore would cause tourists to cancel their trip, for example due to bad weather conditions (forecasted). We contacted the tour operators who confirmed that no tourists in the treatment group, nor control and placebo groups canceled their travel.

TG2: Placebo Group

To validate the casual impact of providing weather information on consumer's satisfaction, it is important to examine whether providing any kind of information – rather than weather information – would also have a positive impact on

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[2] It is worth noting that the tourists in the package tour rely heavily on the tour operator for their traveling experience. They have a fixed schedule – which is rarely changed regardless of the weather conditions.

[3] We purposely assigned groups in such a way that they have the same actual weather experience during the trip. For example, we had 20 tourists in control group, 22 tourists in treatment group, and 18 tourists in placebo group - taking part in the package tours occurred around the first week of February. Given the same actual weather experience, differences in consumer satisfaction may be attributed to the information provision.

the tourists' satisfaction. In addition, we would like to examine what kind of information the tour operators could focus on providing to tourists, given its beneficial impact on their satisfaction. To address these questions, we included a placebo group. This group includes 70 tourists. Participants in the placebo group received information about **culture** in Singapore. Hence, the main difference between the treatment group (TG1) and the placebo group (TG2) is the difference in information that was provided to tourists: weather versus culture information. If there is a significant difference in satisfaction by tourists in the treatment and placebo groups, we could infer the significant effect of providing information about weather conditions – rather than other kind of information such as culture information – on the tourists' satisfaction.

3.1 Randomization check

An important feature of our experiment is that it randomizes participants to different groups: TG0, TG1 and TG2. To check if the groups were properly randomized, we explored whether any difference exists between groups at the baseline. To do so, we run regressions using the baseline's variables – including perception of weather conditions – as the dependent variables. The independent variables are binaries representing each group. The reference is the placebo group TG2. If the estimated coefficient for treatment group TG1 is not significant, there is insignificant difference between TG1 and TG2. Table 2 represents the findings. As expected, given the randomized design of our study, all these variables are statistically indistinguishable across the treatment group TG1, control group TG0, and placebo group TG2. For example, column 1 explores whether the groups had a different perception of weather condition in Singapore at the baseline. The coefficients for treatment group TG1 and placebo group TG2 are insignificant indicating tourists in these two groups do not have

significant difference in weather perception. By the same token, we did not observe any significant difference between tourists in TG1 and TG2 groups regarding the main variables at the baseline.

** Table 2 is about here **

4. Analysis and results

4.1 Summary statistics

To facilitate the data analysis, we conducted two surveys with our participants: the baseline and post-travel surveys. The baseline survey was conducted one month before the tourists traveled. This survey collected information about the participants' demographic characteristics, their travel experience, and level of loss aversion building upon an experimental design by Tanaka et al., (2010). We also asked respondents about their expectations of weather conditions in Singapore in February – including average temperature, number of rainy days, number of sunny hours during a typical day, and humidity. The post-travel survey was conducted one week after the tourists completed the travel. In this survey, we asked tourists about their satisfaction and tour operator's loyalty; any change in the travel plans; and whether prior perception of weather differed from actual experience. To encourage our tourists to participate in the two surveys, we let them know that 10 participants will be randomly selected to receive 100 US dollars. Following Podsakoff et al. (2003), some procedural remedies were adopted to eliminate common method bias from self-reported responses and cross-sectional survey questionnaire. Scale items were kept simple, clear, and concise. Also, no double-barreled questions included in the questionnaire. Finally, at the beginning of the survey, participants were assured of anonymity and confidentiality (Rather, 2020).

** Table 1 is about here **

Table 1 presents the summary statistics of the main variables in our study. These variables are collected from the baseline survey. We first notice a balanced allocation of tourists into control, treatment, and placebo groups. On average, tourists in our study did not have much foreign travel experience (around 1.5 trips). This may attribute to the lack of using weather forecasts in a foreign destination before travel – leading to misperception about weather conditions in foreign destinations. Most importantly, the average level of loss aversion among our participants is significantly greater than 1. This result is in line with the assumption we made when deriving hypothesis 1.

A variable of interest is the tourist's expectations about weather condition in Singapore – at the time of travel i.e., in February. We collected information about the tourist's perception about temperature, rainfall, humid level we generate an index of weather quality. From these perceptions, we build upon Mieczkowski (1985) to calculate the tourist's comfort indices (TCI) index as follows:

$$TCI = 2 \text{ x } \left[(4 \text{ x } CID) + CIA + (2 \text{ x } P) + (2 \text{ x } S) + W \right]$$

where CID = index of thermal comfort during the day (° C), CIA = daily thermal comfort index (° C), P = total monthly rainfall (mm), S = sunshine (h/day) and W = wind speed (km/h). Day time comfort index (CID) score was determined by two parameters including monthly maximum dry temperature and the minimum relative humidity.

The TCI index ranges from 1 to 100; a higher value indicates more pleasant weather for outdoor activities. Based on the tourists' perception of the CID, CIA, P, S, and W, we can estimate the mean value of the CID index for Singapore in February –

as perceived by our tourists – to be 76.26. This is significantly higher than 50.26 - which is the CID index estimated according to the Singapore's *weather forecast* in February. Such misperception about weather conditions in Singapore may imply some level of projection bias among our consumers– i.e., the tendency among consumers to assume the future state is the same as at the time they make prediction.

The tourist's perceived TCI is also significantly higher than the actual TCI of 56.48 ($p\text{-}value < 0.002$) – which was estimated based on *actual weather* conditions during the travel period. Graphically, Figure 1 shows the distribution of errors—predicted minus actual TCI —in respondents' best guess. Overall, we can notice tourists tend to overestimate the TCI. Also, the baseline perceived TCI do not move one to one with true TCI, and that this is balanced across the treatment and control groups. These results imply that tourists in our study misperceived the weather conditions in the destination country. As such, they highlight the role of providing information about weather forecast to tourists before their travel.

** Figure 1 is about here **

4.2 Investigating the impacts of information provision

In this section, we explore the following inter-related questions:

1. Does providing information about weather conditions improve the gap between the tourist's perceived level of weather quality (pleasantness) – and the actual weather quality he/she experience during the trip?
2. Does providing information about weather condition increase the tourist's satisfaction level?

3. Does providing information about weather condition increase the tourist's likelihood of taking another trip in future?
4. Does providing information about weather condition increase the tourist's likelihood to recommend taking the trip to relatives and friends?

To do so, in line with the feature of the experiment, we implemented the following econometric model specifications:

$$Y_i = \alpha + \gamma Information_i + \varsigma Placebo_i + \delta X_i + \eta Y_{BL} + \varepsilon_i$$

where Y_i is the outcome variable for tourist *i.* Specifically, Y_i can be one of the following: satisfaction level; recommending to family and friends; and likelihood of taking another same trip. $Information_i$ is a binary variable indicating whether consumer *i* receives the weather information prior to travelling. Our coefficient of interest is γ, which is the average treatment effect of the information intervention.

$Placebo_i$ indicates whether the tourist is in the *placebo* group. X_i refers to a vector of the tourist's specific variables including age, gender, education level, foreign travel experience. $Y_{i,BL}$ is the baseline level of the tourist's perception about the weather conditions in Singapore i.e., prior to traveling.

4.2.1 Determinants of the tourist's misperception of weather condition

The previous section showed that our tourist participants had misperceptions about weather conditions in Singapore prior to the travelling. It is interesting to explore the factors that determine such misperceptions. Table 3 presents

the determinants of the tourist's perception. The main result is that having experience in foreign travelling improves the perception of weather conditions. Tourists who have never traveled to a foreign country showed a greater level of misperception. This finding suggests that providing information about weather is likely more beneficial to inexperienced tourists. We will examine if this is the case in the next section.

** Table 3 is about here **

4.2.2 Does information provision reduce the difference between expected and actual weather condition?

An insight from our theoretical framework is that the difference between a tourist's prior expectation and the actual weather conditions has a negative relationship with the tourist's satisfaction. As such, it would be interesting to explore whether providing tourists with information about weather in a foreign country reduces such a gap. To do this, we examine the determinants of the gap between tourists' expected weather condition (before his travel) and the actual weather condition (when they have arrived in Singapore). The dependent variable is based on the following question in our survey:

"Do you think the weather conditions during your last trip to Singapore were as pleasant as you expected before travelling?"

We generate a binary variable whose value is 1 if the tourist answers "no" to this question. Next, we run a Probit model to identify the main factors affecting this variable.

** Table 4 is about here **

Table 4, column 1 (weather perception gap) presents the main results. Most noteworthy is the negative and highly significant effect of the Treatment Group variable ($\beta = -0.22,\ p < 0.02$). This finding implies that tourists in the treatment group – to whom weather information is provided – are less likely to perceive the actual weather condition as less pleasant than what they expected before traveling.

4.2.3 Linking information provision and tourist's satisfaction

In this section, we explore whether providing tourists with weather information in the destination country would improve their satisfaction. We then examine the link between information provision and other measures relating to tourist's satisfaction, such as the likelihood of recommending the same trip to family and friends and the likelihood of using the same service in the future.

4.2.4 Does information about weather condition increase the tourist's satisfaction level?

We first explore the role of weather information on a tourist's satisfaction. The dependent variable corresponds to the following question in our survey:

"How enjoyable was your experience during your trip to Singapore?." The enjoyable level ranges from 1 to 7 on the Likert scale (1=Not at all, 7 = Very).

Figure 2 presents the Cumulative Density Function (CDF) for tourists' satisfaction for both treatment (TG1) and placebo (TG2) groups compared to the control group. It is worth noting the CDF shows a greater rightward shift for the TG1 group - implying that tourists in the TG1 group experience the higher satisfaction than those in

control (TG0) and placebo (TG2) groups. Consistent with our graphical illustration, Table 4, column 2 shows a significant effect of the TG1 variable i.e., information provision on the tourist's satisfaction ($\beta = 0.15,\ p < 0.007$). These findings indicate that compared to control and placebo groups, tourists in the treatment group – i.e., those receiving information about weather - have a higher level of satisfaction.

*** Figure 2 is about here ***

4.2.5 Does information about weather conditions increase the likelihood the tourist will recommend friends and relatives to take the same trip?

Related to satisfaction of consumers is their inclination of making recommendations to relatives and friends to take the same trip. To explore this, we use the following question from the survey as the dependent variable:

"How likely are you to recommend the same tour package to Singapore to your friends and family?"

This variable ranges from 1 to 7 in the Likert scale. Table 4, column 3 presents the main results. Most interestingly, we find that tourists in the treatment group are more likely to make recommendations to relatives and friends to take the same trip to Singapore ($\beta = 0.16,\ p < 0.008$).

4.2.6 Does information about weather conditions increase the likelihood of taking another same kind of trip in future?

This section explores whether information provision has impact on other measures related to consumer satisfaction. Specifically, we want to know whether tourists in the Treatment group are more likely to make the same kind of trip in the future. For this purpose, we focus on the following question in the post-experiment survey:

"How likely are you to make the same kind of trip to Singapore in the next 24 months?".

Table 4, column 4 presents the main determinants of the likelihood that a tourist makes the same trip in future. It is worth noting the significant effect of the Treatment variable TG1 ($\beta = 1.58,\ p < 0.006$). This result indicates that tourists who received information about the weather conditions in Singapore are more likely to state their intention of making the same trip in future. Our finding is also consistent with studies indicating a positive relationship between tourist's satisfaction and repeating visits (e.g., Jarvis, Stoeckl, & Liu, 2016; Agyeiwaah et al., 2016).

4.3. Moderation effect of travelling experience and loss aversion

In the previous section, we found that tourists who have less foreign traveling experience are more likely to misperceive weather condition in the destination country. Similarly, we find evidence of loss aversion among our tourists. As such, it would be interesting to explore whether these tourists who do not have much foreign travel experience – as well as those with a high level of loss aversion - would benefit from the information intervention. To do so we implement the following model specification:

$$Y_i = \alpha + \gamma_1 \text{ Information }_i + \gamma_2 \text{ Placebo }_i + \gamma_3 \text{ Experience }_i + \gamma_4 Loss$$
$$+\gamma_5 \text{ Information }_i * \text{ Experience }_i + \gamma_6 \text{ Information }_i * \text{ Loss }_i + \delta X_i + \eta Y_{BL} + \varepsilon_i$$

We are particularly interested in the coefficient for the interaction term γ_5. A positive γ_5 indicates the information intervention has a stronger effect on tourists who do not have much foreign travelling experience. Table 5 presents the main results. As expected, we noticed the interaction term between information intervention and inexperience is significant and has positive sign. This finding suggests that the intervention is advantageous to tourists who lack foreign traveling experience. Further, it highlights the role of weather information provision to improve the satisfaction among tourists with less foreign traveling experience (Scott and Lemieux, 2010). Finally, we can note that the interaction γ_6 is positive and non-significant.

** Table 5 is about here **

4.4 Does providing information about culture have impact on tourist's satisfaction

Given that the tour operators could provide consumers with various kinds of information – in addition to weather condition – it would be of great interest to examine what information would result in greater satisfaction for tourists. This is a relevant question because it helps tour operators prioritizing information to be provided to tourists. To address this question, we focus on the **Placebo group (TG2)**. Recall that tourists in TG2 group received information about **culture** in Singapore. The main difference between tourists in TG2 and those in the control group TG0 is whether they received information about Singaporean culture from the tour operators. If there is a significant difference in satisfaction by tourists in the placebo group (TG2) and control group (TG0), we could infer the significant effect of providing information about culture information on tourists' satisfaction.

Along this line, to explore the effect of providing **culture** information on tourists' satisfaction we can focus on the coefficient of the *TG0* variable in Table 4. This coefficient shows a comparison of satisfaction between the tourists in control group TG0 and those in placebo group TG2. For example, in column 2 we can notice a coefficient of – 0.11 for TG0 – indicating tourists in the control group are somewhat less satisfied than those in the placebo group. However, the effect is not significant □ $(p > 0.22)$. Similarly, we can find that there are insignificant differences between TG0 and TG2 in terms of weather perception (column 1), and other measures for recommendation and revisit intention (column 3 and 4).

In sum, we uncover that providing information about culture of the destination country would have no effect on tourists' satisfaction.

5. Discussion

To improve consumer's satisfaction, it is crucial for a company to gain insight into customers' assessments of their experiences and their perceived value from the company's service (Sajtos et al., 2010; Suhartanto et al, 2020). Meanwhile, as Becken and Wilson (2013) noticed that, although weather plays a role in tourism, empirical research on how tourists respond to the weather conditions they encounter is relatively limited, especially for studies that give a deeper insight into behavioral responses by tourists. We addressed the significant literature gap by integrating weather into a framework of consumers' expectation-satisfaction. Specifically, we developed a theoretical framework rooted in Prospect Theory (Kahneman and Tversky, 1979) and reference dependent preferences (Kőszegi and Rabin, 2006) to explain the effect of weather information on tourists' expectation, satisfaction, referral, and revisit intentions. This research further highlights the impact of types of tourism information

on the formation of tourists' satisfaction, intention to recommend and revisit the destination. First, the results suggest that an unrealistic prior expectation of weather - i.e., too high, or too low compared to the actual condition - reduces the tourist's satisfaction. In particular, the study reveals that tourists who have less foreign travelling experience are more likely to misperceive weather condition in the destination country. In addition, the finding highlights that the weather information provision can significantly improve the satisfaction among tourists with less foreign travelling experience. Hence, to have a correct expectation, tourists must have reliable information about weather conditions in the destination country before their trips as tourists' expectations have a strong effect on tourists' satisfaction (Muntean, Sorcaru and Manea, 2023). This finding appears to support the study by Kullada and Michelle Kurniadjie (2020) suggesting relevant information related to their upcoming traveling experience can lead to higher levels of satisfaction and loyalty. Second, this study confirms that those tourists receiving weather information rather than culture information of the destination country have a greater level of satisfaction, higher likelihood of revisit intention and positive recommendations. Based on this discussion, this research proves that our integrative framework is effective in explaining the importance of information quality in influencing tourists' satisfaction, advocacy, and revisit intentions.

5.1 Theoretical Implications

The study adds knowledge to literature and contributes to several valuable theoretical implications. First, while tourist satisfaction and its determinants and consequences have been widely studied in the past (e.g., Muntean, Sorcaru and Manea, 2023), less is known about the impact of weather information on tourist satisfaction,

recommendation, and revisit intention. The results of this research can make a useful contribution to the tourism literature by proposing a new integrative research framework under the theoretical support of Prospect Theory (Kahneman, 1991) and reference dependent preferences (Kőszegi and Rabin, 2006) to study the role of weather information in tourists' experiences. Our study reveals that providing tourists with information about weather conditions improves satisfaction levels. By providing accurate information about the weather, tourists' expectations may be adjusted to better align with the actual weather conditions, which may reduce the likelihood of tourists' disappointment and increase their satisfaction. We contribute further understanding to the role of information quality in nurturing tourist's destination experience, which enriches the body of knowledge about destination marketing and management.

Second, while focusing on tourists, our study has broader implications for consumer behavior theory. Specifically, we contribute to the strand of literature on the link between consumer expectations and satisfaction. This study provides empirical evidence that managing the consumer expectations to keep them more in line with the actual quality of the goods and services provided play a significant role in determining a consumer's satisfaction and loyalty, particularly in the tourism context.

Third, we complement and expand the literature on relationship marketing and customer relationship management (CRM) – which aims to optimize revenue, increase customer value, improve the relationship with customers, and heighten profitability through increasing customer satisfaction and loyalty (Soltani and Navimipour, 2016; Pike et al., 2011; Hollebeek and Rather, 2019). Lastly, from a methodological perspective, our results expand existing evidence on the applicability of a randomized controlled trial (RCT) in tourism research.

5.2 Managerial Implications

This study offers tourism/destination marketers and managers specifically several practical implications to increase travellers' satisfaction, positive recommendations, and revisit intention. Our study highlights the role of weather information in driving tourists' satisfaction and loyalty, which is critical for tourism destination marketing and management. At the same time, providing information about culture would have no impact on tourists' satisfaction. Thus, destination managers and tour operators should work together to cautiously cope with customer expectations by offering accurate weather information to tourists prior to their trips to reduce customer dissatisfaction but enhance the onsite experience at a destination (Rather, 2020). Destination managers can promote better destination image to attract international tourists by posting more accurate information about the weather on the digital media (e.g., tourism websites, application and/or social networking sites) (Veasna, Wu and Huang, 2013), which are adopted extensively by tourists for their travel planning (Hernández-Méndez, Muñoz-Leiva and Sánchez-Fernández, 2015). Relatedly, the up-to-date and complete weather information is of vital importance for destination marketers in creating a more personalized, distinctive, and novel experience to tourists (Rather, Najar and Jaziri, 2020). In doing so, the highly interactive and pleasant experiences with the destination may generate favorable destination image (Li et al., 2021), tourists' attachment towards the destination, destination advocacy, and destination loyalty (Rasoolimanesh et al., 2022; Rather and Hollebeek, 2021).

As satisfied customers may become more committed to the tour service (Rather, 2019; Rather et al., 2019), travel agencies may strive to develop an enduring relationship with these customers and establish a loyal customer base (Rather, 2017; Rather and Hollebeek, 2019). Along this line, Woodside and Lysonski (1989) note that

tour operators (and travel agents) can provide vital information about destinations for travelers to make decisions. Findings from our paper suggest that to provide complete tourism services, tour operators should understand customers' needs in the target market and provide travel-related information, e.g., weather condition of destinations. By offering complete and timely information that meets travelers' demands, our operators can avoid the negative impact of unexpected weather change on traveling experiences (Lin et al., 2009) and improve tourists' attitude towards visiting that destination.

5.3 Direction for future studies

In this study, we explore the effect of providing information about weather conditions on tourists' satisfaction. However, other kinds of information, such as information about foods and prices in the destination country, also play a role in consumer satisfaction. In addition, how information is provided plays a role in the consumer's perception (Gössling et al., 2012). It would be interesting for future research to identify more effective communication and marketing campaigns to correct consumers' misperceptions about the products. Likewise, researchers can explore what source of information brings the most positive effect on consumer satisfaction.

Methodologically, we apply a randomized controlled trial (RCT) to explore the effect of an information intervention on tourists' satisfaction. Using a RCT can help overcome challenges that otherwise make it difficult to study tourism related phenomena. The randomization addresses the potential endogeneity and omits variables bias, which is very common in empirical studies. Implementing a RCT, we provide an unbiased estimation of the effect providing weather information on traveling experience. Likewise, researchers can apply RCT to arrive at clearly identified cause-

and-effect relationships of important travel/tourism related phenomena. Along with Cozzio et al., (2021) our study encourages researchers to apply RCT approach to conduct field studies with numerous firms and consumers as the unit of analysis. Using RCTs with such a large number of firms and consumers is a promising direction to address important service research questions.

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Table 1: Allocation of tourists by group and summary statistics at baseline

Control group	TG0: 84 tourists
Treatment group	TG1: 88 tourists
Placebo group	TG2: 70 tourists

	Mean	Std. Dev.	Obs
	(1)	(2)	(3)
Panel A: Tourist Variables			
Age	35.67	11.84	242
Number of foreign countries visited	1.51	0.26	242
Years of employee schooling	8.16	1.15	242
Month income (VND)	15,500	8,200	242
Loss aversion	2.42	1.14	242
Perception of weather quality	76.26	15.56	242
Panel B: Tour operator Variables			
Manager Age	42.48	9.46	242
Years in operation	6.4	2.26	242
Manager tenure at the current agent	6.60	2.11	242
Manager years of schooling	15.88	5.47	242
Number of package tours to Singapore monthly	15.68	6.62	242

Note: these statistics were collected in the baseline survey.

Perception of weather quality is measured in TCI index ranging from 1 to 100 – where 100 represents the most pleasant weather condition for outdoor activities.

Table 2: Baseline Differences across Groups

	Dependent variables					
	Perception of weather quality	Tourist's years of schooling	Tourist's experience of traveling abroad	Tourist's income	Tour operator's number of employees	Tour operator's years in operation
	(1)	(2)	(3)	(4)	(5)	(6)
TG1 = Information	0.06	1.15	1.184	557.45	1.17	1.25
	(0.17)	(0.22)	(0.14)	(0.28)	(0.16)	(0.25)
TG0 = control	0.02	0.687	1.51	- 95.55	1.22	1.16
	(0.17)	(0.15)	(0.18)	(0.16)	(0.22)	(0.18)
Constant	0.67	0.74	1.76	684.46	2.84	2.46
	(0.12)	(0.16)	(0.25)	(0.24)	(0.16)	(0.24)
Observations	242	242	242	242	242	242
F-stat (joint significance)	1.08	1.25	1.76	2.16	2.26	1.57

Note: This table explores whether significant differences exist between groups. To do so, we present OLS results from regressing the baseline consumer's characteristics on different treatment group dummies.

We also control for package tour fixed effect.
Reference category: Placebo group TG2
p values are in bracket. Robust standard errors are clustered at the package tour group level.

Table 3: Determinants of weather misperception

	Coef	p value
Panel A: Tourist Variables		
Age	0.22	0.15
Experience of travelling to foreign countries	-1.15	0.007
Years of schooling	-0.56	0.15
Month income (VND)	0.46	0.22
Number of times travelling to Singapore	-0.17	0.11
Control for tour operator's fixed effect	Yes	
Number of observations	242	
Adjusted R squared	0.32	

Table 4: Impact of the Information Provision

	Weather perception gap	Satisfaction	Recommend ation	Likelihood of taking another trip
	(1)	(2)	(3)	(4)
Information intervention (TG1)	- 0.22	0.15	0.16	1.58
	(0.002)	(0.007)	(0.008)	(0.006)
Control (TG0)	0.04	- 0.11	0.19	- 0.22
	(0.17)	(0.22)	(0.22)	(0.14)
Number of observations	242	242	242	242
Adjusted R squared	0.16	0.22	0.28	0.42

Notes:

Reference category: Placebo group **TG2**
p values are in parentheses. Robust standard errors are clustered at the package tour group level.

Regressions all control for the baseline level of consumer's perception of weather condition. The regressions control for tourist's specifics including: age, gender, education, and foreign travel experience – and tour operator's specifics.
We also control for package tour fixed effect.

Table 5: Heterogeneous Treatment Effect of Information Provision

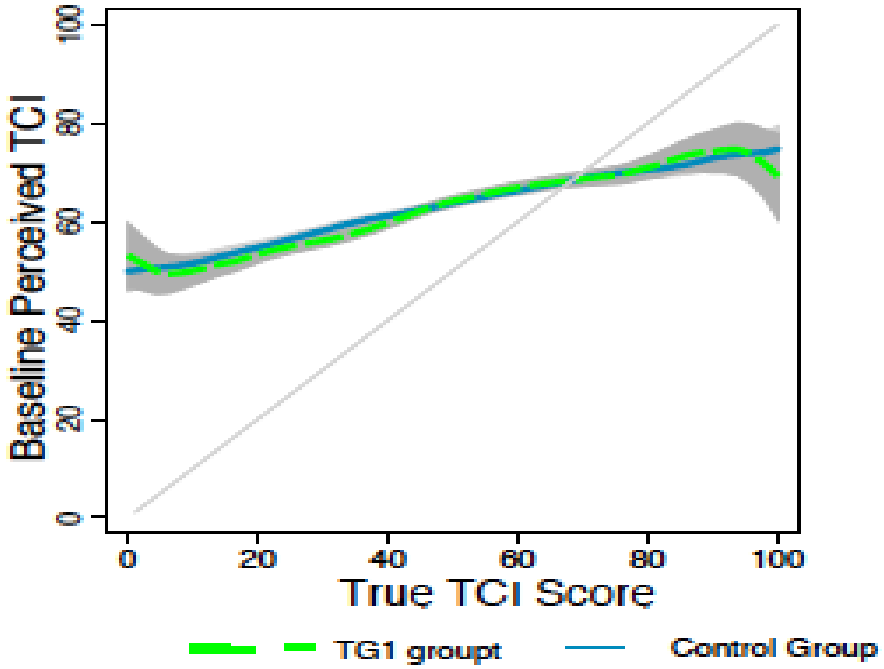
	Satisfaction	Recommendation	Likelihood of taking another trip
	(1)	(2)	(3)
Information intervention (TG1)	0.20	0.14	1.26
	(0.006)	(0.001)	(0.01)
Control (TG0)	0.10	0.08	0.42
	(0.22)	(0.22)	(0.22)
Inexperience of foreign travel	0.06	0.11	1.02
	(0.22)	(0.16)	(0.11)
Inexperience * TG1	0.14	0.20	1.18
	(0.06)	(0.04)	(0.42)
Loss aversion	-0.10	-0.16	-0.22
	(0.19)	(0.24)	(0.31)
Loss aversion * TG1	0.28	0.34	1.42
	(0.11)	(0.14)	(0.42)
Number of observations	242	242	242
Adjusted R squared	0.26	0.32	0.28

Notes:

Reference category: Placebo group **TG2**
P values are in parentheses. Robust standard errors are clustered at the package tour group level.

Regressions all control for the baseline level of tourist's perception of weather condition.
The regressions control for tourist's specifics including: age, gender, education, and foreign travel experience – and tour operator's specifics.
We also control for package tour operator fixed effect.

Figure 1: Baseline Perceived Weather Condition using TCI index



Notes: Data sources are baseline data. Lines are locally linear regression lines with perceived TCI score as the dependent variable and true baseline TCI as the x-axis.

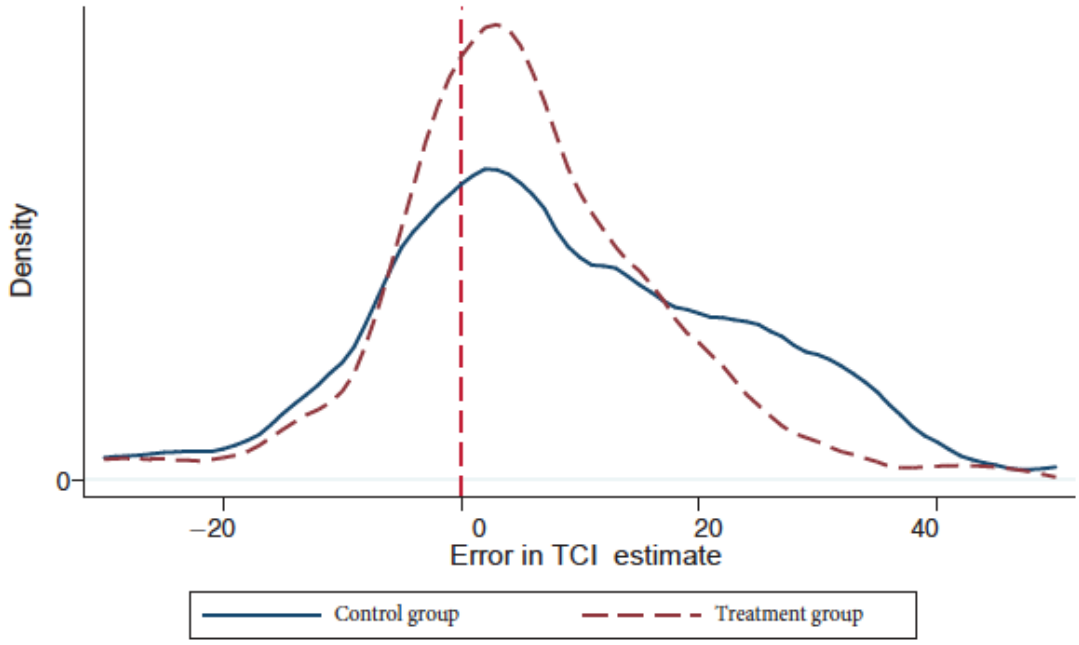
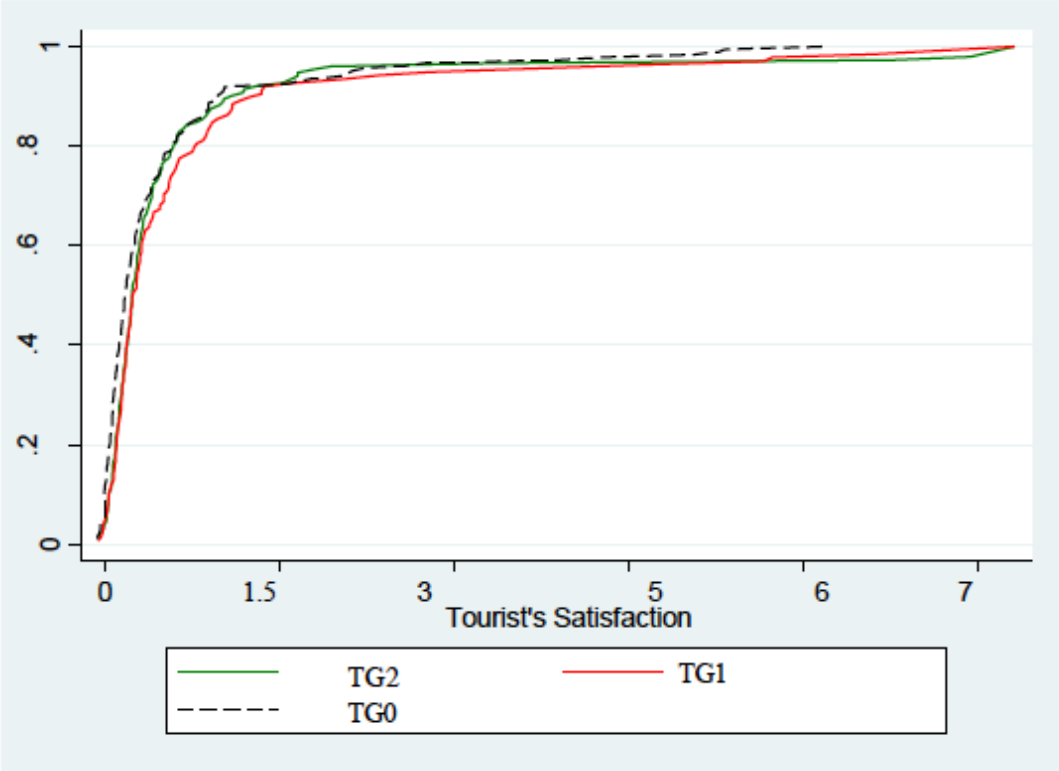


Figure 2: Cumulative Density Function: Tourist's Satisfaction



This figure represents the Cumulative Density Functions (CDFs) for tourist's satisfaction about the travelling experience by treatment (TG1), control (TG0), and placebo (TG2) groups.