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**Conference Paper**

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2015 Regional Conference of the International Telecommunications Society (ITS): "The Intelligent World: Realizing Hopes, Overcoming Challenges", Los Angeles, USA, 25th-28th October, 2015

**Provided in Cooperation with:**

International Telecommunications Society (ITS)

*Suggested Citation:* Han, So Yeon; Chang, Younghoon; Wong, Siew Fan; Chong, Hon Qui; Lee, Sangman (2015) : Uncertainty mitigation in online ticketing purchase: The moderating effect of analytics information, 2015 Regional Conference of the International Telecommunications Society (ITS): "The Intelligent World: Realizing Hopes, Overcoming Challenges", Los Angeles, USA, 25th-28th October, 2015, International Telecommunications Society (ITS), Calgary

This Version is available at:

<https://hdl.handle.net/10419/146315>

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# Uncertainty mitigation in online ticketing purchase: The moderating effect of analytics information

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## Abstract

The process of purchasing air tickets is often hovered with much uncertainties. Such uncertainties are introduced by complex pricing strategies and algorithms used by airline companies which vary ticket price based on dates, time of purchase and different routes selected. In order to reduce perceived uncertainties among consumers, agents such as Kayak.com try to present analytics information to assist consumer decision-making. This study seeks to understand the effect of analytics information on consumers' perceived uncertainty and decision to purchase airline tickets. Survey data will be collected from online air ticket buyers. Structural equation modeling technique will be used to analyze the data. Based on the results, we will suggest academic and practical implications.

Keywords: Business Analytics, Uncertainty Mitigation, Online ticket purchase, Trust, Perceived Behavioral Control, Information Quality

## Introduction

Making sound decisions is crucial. Every day, we make countless decisions, from simple decisions of what to eat for lunch to complex decisions of which stock to invest in. Regardless of the complexity level, decisions are often made after a person has considered all available data and information. However, having too much information (i.e., information overload) may not be good. Instead of having

only useful and relevant information, an average person is often bombarded with large amount of non-relevant information. This inevitably increases the difficulty of decision-making process because too much information leads to higher level of uncertainty.

In the airline industry, consumer decision to purchase an air ticket is complex because it is affected by many factors such as constant price fluctuations, numerous airline choices and potential flight times (Escobar-Rodríguez and Carvajal-Trujillo, 2013; Granados et al., 2012). The decision is further complicated by the numbers of online air ticketing agents. Depending on the agents, the numbers of choices available may vary and the prices may fluctuate (Granados et al., 2012). Even from the same agent, buying a ticket on different dates, day of the week or time, or following slightly varying routes may result in different pricing. This presents difficulties for consumers who wish to ensure they purchase the best priced ticket.

Due to large fluctuation in air ticket prices, some agents such as Kayak.com incorporates data analytics information on their sites to reduce consumer uncertainty and aid in their decision making process (Sharma et al., 2014). Data analytics allows online air ticket agents to aggregate, collect, compare and choose the best air ticket option based on past pricing records. It also allows the agents to forecast future pricing and inform customers on the possibility of pricing increase or decrease.

Even though some online air ticketing agents have incorporated data analytics features, it is unclear if the presence of the features affect consumers' perceived uncertainty and decision to purchase airline tickets. This study investigates if data analytics information provided by aggregator websites will affect consumers' decision making. The overarching framework is the uncertainty mitigation concepts (Pavlou et al., 2007). We will focus on three uncertainty mitigators: trust, perceived behavioral control and information quality and examine their role in reducing perceived uncertainty. In addition, we will examine the moderating effect of business analytics information on reducing perceived uncertainty and increasing purchase intention.

## **Literature Review**

### **Uncertainty and Perceived Risk in Purchasing Air Ticket**

When consumers book air tickets via online booking systems, they often experience uncertainty in pricing and seat availability. Most airline companies use complex pricing schemes and categorizing algorithms to maximize profit (Etzioni et al. 2003). This type of pricing strategy leads to constant fluctuation in air tickets, which makes it difficult for consumers to know what is the best ticket price and when is the best time to purchase tickets (Wohlfarth et al. 2011). One of four most studied factors influencing price uncertainty is intangibility (De Ruyter et al. 2001). When purchasing air tickets, consumers are buying intangible services they will only experience at the time of consumption. This characteristic leads to increased uncertainty, and risks of financial and benefit lost (Punj 2012; Kim et al. 2009).

In the marketing field, uncertainty and perceived risks have long been associated with consumers' decision-making and purchase intentions. Studies have shown that lower levels of uncertainty and perceived risks tend to lead to a better consumer decision-making and improved purchase intention (Kim et al. 2009). According to Mitchell et al. (1999), consumers have often adopted risk-reduction

strategies to decrease the uncertainty or consequences of an unsatisfactory decision. Among the main risk-reduction strategies is selecting the lowest price possible to alleviate the potential financial risk. Perceived risks can also be alleviated by seeking and accepting online recommendations as well as the availability of additional useful information (Punj 2012; Mitchell et al. 1999). Hence, consumers stand to benefit by using extra information such as pricing history and price forecasts to help reduce their uncertainty and perceived risks.

#### Analytics Information for Air Ticket Price

In the age of big data, data mining and analysis on air ticket prices is not only a possibility but a reality. Past studies have shown that data on air ticket prices can be mined and analyzed to provide beneficial information such as price forecasts, given sufficient input data. Analytics information can then be used to assist consumers to find an optimal purchase price (Groves & Gini 2013). For example, Etzioni et al. (2003) were able to construct a successful data mining algorithm called HAMLET to analyze historical air ticket prices to predict future price changes. Based on a calculated optimal amount of net savings, HAMLET was able to generate a maximum net savings amount of 61.8% and an average net savings of 4.4% for all its ticket purchase simulation. Despite the low percentage of net savings, travellers spend up to billions of dollars each year which translates into a significant amount of savings. HAMLET was able to accrue the savings despite the lack of certain information such as seat availability, the complex price setting algorithms used by the airlines, assumptions and controlled settings used during the simulations. This study showed the potential of data mining and analytics in assisting consumers to purchase air tickets. With the push towards big data analytics, better and more accurate algorithms can be developed to further benefit the consumers in their air ticket purchases.

Based on Etzioni et al. (2003), Wohlfarth et al. (2011) tried to gain insights into the use of data mining to forecast air ticket prices with the support of Liligo.com, a real-time travel search engine. Instead of running purchase simulations, Wohlfarth et al. (2011) utilized the records of the result pages from actual consumer searches on the Liligo.com website. This study managed to create a prediction application almost as efficient as HAMLET, with a more convenient price prediction which includes flexible price predictions, a confidence measure on the prediction and a visual interpretation of the prediction (Wohlfarth et al. 2011).

The success of data mining and analytics on air ticket prices had enabled websites such as Farecast.com and Kayak.com to launch their own price prediction tools on their websites to attract and ultimately benefit their consumers. The success of Farecast.com caught the attention of Microsoft, which bought the company for \$115 million to incorporate into their search engine, Bing.com. However, Microsoft's travel search service was soon overshadowed and eventually shut down (Cooper 2015). Presently, only Kayak.com provides its consumers with data analytics which includes a confidence level for the purchase of an air ticket. Figure 1 shows the pricing forecast on Kayak.com.

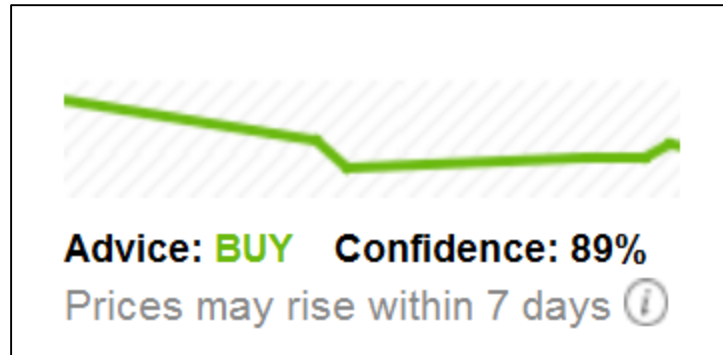


Figure 1: Price forecast on as seen on Kayak.com

### Mitigating Uncertainty

Mitigating uncertainty is an important issue in the B2C and B2B e-commerce sector (Pavlou et al. 2007). When consumers purchase products or services from e-commerce websites, companies have to reduce uncertainties that consumers might face throughout the ordering process in order to increase the rate of purchase (Pavlou, 2003). Pavlou et al. (2007) adopted a principal-agent perspective to address the concept of mitigating uncertainty in e-commerce. The principal-agent perspective refers to “ubiquitous agency relationship in which one entity (the Principal) delegates work to another (the agent) who performs the work according to a mutually agreed contract” (Eisenhardt, 1989; Pavlou et al. 2007). Agency relationship is established by both parties depending on each other’s actions (Pavlou et al. 2007).

The principals (consumers) can make a better purchasing decision when the agents (e-commerce websites) give more information which can be used to mitigate uncertainty underlying the purchase of products and services. In the airline industry, price scheme and pricing strategy change regularly. Therefore, when consumers purchase air tickets, they have to fully embrace uncertainty and risks. However, advanced analytic information which analyses previous pricing history and its pattern can give extra information to help mitigate consumer uncertainty. In this study, we define three uncertainty factors: trust, perceived behavioral control and information quality. If people trust a company’s high quality analytics information, and see themselves as having control of their own decision and behavior, then their perceived uncertainty level will be reduced.

### Research Model and Hypotheses

Figure 2 show the research model.

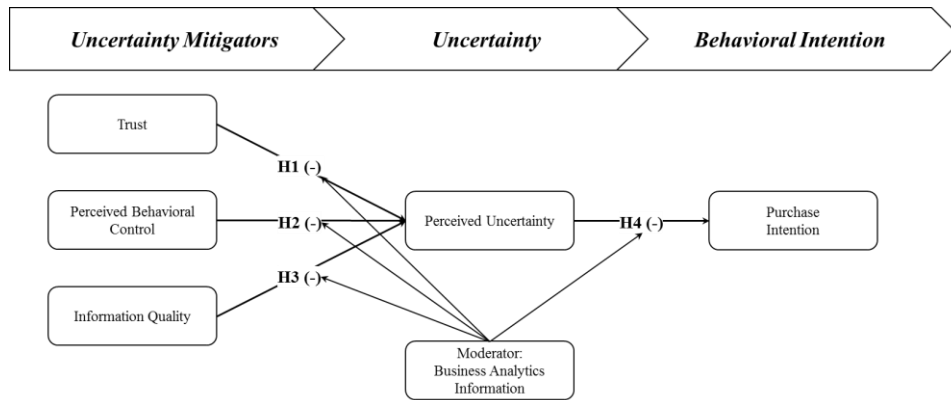


Figure 2. Research Model

H1: Trust negatively influences perceived uncertainty

H2: Perceived behavioral control negatively influences perceived uncertainty

H3: Information quality negatively influences perceived uncertainty

H4: Perceived uncertainty negatively influences purchase intention

## Methodology

The measurement items were adopted from previous studies and modified to fit our research context. Measurement items for trust were adapted from Susanto and Chang (2014). Items for perceived behavioral control came from Aizen (1991). Items for information quality were from Wixom and Todd (2005). Perceived uncertainty and purchase intention were adapted from Pavlou et al. (2007). All the items were measured using 7-point Likert scales that range from “1: Strongly Disagree” to “7: Strongly Agree”.

A pilot test will be conducted to confirm the reliability and validity of the measurement model. After it is confirmed, an online survey of general online air ticket booking in Malaysia will be conducted by using google doc application. Partial least squares (PLS) structural equation modeling technique will be used to analyze the research model.

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