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Impact on Travelers Hedonic and Utilitarian Shopping Behavior by Adoption of Mobile Application: Results from a Quasi-experiment

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Completed Research Paper

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Abstract

The continuing development of mobile technology has led to an explosion of mobile applications, which have exposed a broader consumer base to mobile consumption. It is currently unclear how mobile apps using will affect travelers' shopping behavior, particularly from the perspective of the hedonic and utilitarian shopping behavior of travelers. Using a special quasi-experiment launching by an airline, we collected the datasets of more than 10000 travelers and to investigate the impact of mobile app on the travelers' shopping behavior. The results suggested that mobile apps adoption improved travelers' hedonic shopping behavior (e.g., ancillary services purchasing), while the utilitarian shopping conduct (e.g. booking tickets in advance) decreased. It was also found that the mobile app adoption increased hedonic shopping in males but decreased hedonic and utilitarian shopping in frequent flyers and members. This investigation can help with the management of travelers' purchasing habits and provide guidance for industrial decision makers.

Keywords: Mobile application, Quasi-experiment, Shopping behavior, Difference-in-difference

Introduction

As a result of the rapid adoption and use of smartphones and mobile devices in tourism, the methods used by travelers for shopping has shifted (Shaw & Sergueeva, 2019). To better interact with more consumers via multiple platforms, many e-retailers have extended their existing business models to include mobile apps

by providing multi-platform shopping services (Huang et al, 2016). Especially to the low-cost carrier, most of them have also provided mobile apps to customers to decrease marketing costs and the maximize revenue while maintaining a dominant position in service (Lin, 2012). Compared with traditional e-commence, the unique features of m-commerce (e.g. ubiquity) have shown that travelers' behavior using mobile apps has changed (Wu & Law, 2019). Since most travelers increasingly choose to use mobile apps to manage their traveling options, so it is critical to appreciate how a mobile app might influence a traveler's purchasing behavior on multiple incumbent platforms.

According to the dimensions of perceived value, hedonic and utilitarian values appear to be the common dimensions used in recent marketing and tourism literature (Taşçıoğlu & Yener, 2021). Hedonic value reflects the affective and emotional aspects of a person who chooses to shop based on fun and excitement. Utilitarian values reflect the economic or efficient aspects of shopping (Nusair & Parsa, 2011). Hedonic and utilitarian shopping values have been extensively explored as being significant to travelers' purchase decisions, attitudes and behavior (Taşçıoğlu & Yener, 2021). Most of the previous research on this topic has focused on antecedents and consequences of hedonic and utilitarian values in terms of tourism perceptions in diverse settings (Lee & Kim, 2018). However, this research aimed to investigate the impact of mobile apps' adoption on the hedonic and utilitarian shopping value of travelers in the low-cost carriers. In addition, this paper explores the causal relationship rather than a correlation between mobile app and tourists' perceived value.

To increase revenue, the airline industry has charged passengers for ancillary services in addition to fares since the 1990s. Ancillary services can be divided into two categories: bundled, on the same order as air tickets (e.g. carry-on baggage) or; unbundled, i.e. checked-baggage (Vinod & Moore, 2009). This study centered on the latter. These types of unbundled ancillary services are only sold on direct e-commerce platforms (e.g. PC platform) (Kwon et al., 2021). Some scholars believed that hedonic and utilitarian shopping behavior can be interchangeable in different situations (Lu, 2017). In our context, traveler purchase ancillary services that is the unbundled is usually more personal. For travelers, purchasing air tickets is a basic service supported by airlines, the propose is to transfer travelers from one location to another. While comparing to purchasing air tickets, purchasing ancillary services is a service to meet one's non-basic needs, and trends to increase adding hedonic perceived values. From this perspective, the ancillary services purchasing behavior is a kind of hedonic shopping hehavior. Similarly, airline ticket purchasing, including booking tickets in advance, can be regarded as a utilitarian shopping behavior, because purchasing tickets is the main "task" of a passenger when traveling.

Given that, the goal of this study was to clarify the effect of mobile apps adoption on the shopping behavior of tourists in airlines. Specifically, a quasi-experiment was used where the X Airline chose to sell tickets using their Android App in China and was combined with econometric methods to determine the causal inference. The results showed that, by controlling other covariates, the use of an airline mobile app increased the rate of purchase of ancillary services, while decreasing the time to purchase tickets in advance. In other words, using the mobile app increased the hedonic shopping of travelers, but decreased their utilitarian shopping behavior. Moreover, the heterogeneous effects of individual passenger are also discussed. Numerous important implications for academics and industry decision-makers are formulated.

Literature Review

Consumers Mobile Shopping and Multi-channel Shopping

Prior research on mobile shopping focused on themes such as mobile marketing (Xu et al., 2019); mobile channel usage, value, behavior, motivation (Sun et al., 2019). Most of these studies focused on the effects of m-commerce, such as ubiquity, personalization, and functionality, on the customer satisfaction, loyalty and purchase intention in the retail industry (Sun & Schuckert, 2020). Some studies on the mobile shopping habits of tourists have focused on different antecedents or second components that influence travelers' perceived values, such as price, and perceived risk (Taşçıoğlu & Yener, 2021). In particular, there is currently no pertinent literature in the travel industry regarding quantitative research that considers the causal effect of the use of mobile applications on travelers' shopping behavior.

To airlines, multi-channel marketing means using two or more integrated channels to sell products and services to customers (Lewis et al., 2014). New marketing channels have recently emerged based on the

development of IT technology (Morosan & DeFranco, 2016). Most of the literature suggests that following the adoption of a new channel, sales would decrease on an incumbent channel (Narang & Shankar, 2019). A significant amount of this research has considered the interdependencies and the interaction of different marketing channels. These include substitution effects or complement effects (Choi et al., 2010); cannibalization or synergy effect (Huang et al, 2016). This is called the cannibalization effect or substitution effect, which occurs when a new channel absorbs consumers from the incumbent channel (Choi et al., 2010). Other situations are the synergy effect or the complimentary effect, which when a new channel produces higher overall sales for the incumbent platforms (Wagner et al., 2013). In the travel industry, many types of mobile apps are emerging to meet travelers' need. However, few studies that have focused on the effect of the adoption of new platform' on consumers' shopping behavior.

Travelers Shopping Behavior and Shopping Value in Tourism Industry

Previous researchers noted that hedonic and utilitarian value are a dimension of perceived value (Young et al., 2012), shopping value or shopping motivation (Scarpi, 2020). A tourist's hedonic purpose is based on the potential entertainment and enjoyment of the purchase, while those who seek a utilitarian purpose for their purchase are more likely to be concerned with efficiency and timeliness of that purchase (Chiu et al., 2014). For travelers, purchasing ancillary services, such as seat selection are subjective and personal because these services make a journey more enjoyable and satisfying (Han et al., 2019). Some reports also have described the effect of hedonic and utilitarian shopping values on the satisfaction (Han & Ryu, 2012), loyalty (Lee & Kim, 2018), intention to use/purchase (Shaw & Sergueeva, 2019) and travelers shopping preferences (Overby & Lee, 2006).

Utilitarian value incorporates more cognitive aspects of attitude, such as the economic value of the purchase and personal judgments concerning convenience and time savings (Overby & Lee, 2006). Most of the literature detailing previous research focused on time urgency and the utilitarian aspects of shopping (Peng et al., 2019). Compared to using a traditional e-commerce platform, airline mobile apps allow a traveler to immediately buy airline tickets after accepting their itinerary. Extending this line of research into this study, we focused on the number days needed to book advanced airline tickets as the utilitarian shopping behavior of travelers. While marketers are concentrated on hedonic and utilitarian aspects of purchasing to meet customers' increasingly changing behavior, academic research is lacking in studying the changes in traveler s' hedonic and utilitarian attitudes and practices and how these effect shopping behavior (Taylor et al., 2019), particularly in the tourism industry.

Hypotheses Development

Hedonic Shopping Behavior and Purchasing of Ancillary Services

The purchase of ancillary services in the tourism industry has long been an issue for marketing managers and social science researchers. Previous research on ancillary services focused on the supply and demand. In the case of services supply side (e.g. airlines), previous work focused on ancillary services and revenue management (Warnock-Smith et al., 2017), and the price elasticity and price response of ancillary services (Zou et al., 2017). From the perspective of the demand side (e.g. travelers), prior studies investigated the antecedents and consequences of travelers' purchasing of ancillary services (Leon & Uddin, 2017), travelers' segmentation and purchasing behavior (Curras-Perez & Sanchez-Garcia, 2016). There is no consistent industry standard definition for ancillary services in airline industry. Ancillary services are those offered pre-travel, during, and post-travel including seat selection, meals, baggage, in-flight entertainment and so on (Vinod & Moore, 2009). Ancillary services represent an important part of airline revenue and; therefore, must be considered closely when new platforms are introduced (e.g. Mobile app platform) (Garrow et al., 2012).

In this study, we focused on unbundled ancillary services that is extra baggage fee, because baggage fee account for the largest share of ancillary service revenue (Garrow et al., 2012). These types of unbundled ancillary services are only sold on direct e-commerce platforms (e.g. PC platform). The use of mobile apps by airlines will attract many travelers to purchase air tickets on the mobile apps' platform (Huang et al., 2016). Mobile commerce is not constrained by time or location, and it makes it easier for consumers to make impulsive purchases. The growth in the use of mobile apps may produce an increase in the sales of

air tickets on the mobile commerce, corresponding ancillary services purchasing will increase. Based on that, one study hypothesis is:

H1: The use of the mobile app will result in a greater number of travelers purchasing auxiliary services.

Utilitarian Shopping Behavior and Booking Tickets in Advance

Use of mobile apps allows travelers to buy airline tickets anytime, anywhere so long as they have an Internet connection. Sun et al. (2019) noted that the introduction of new application platforms could attract new demographic groups, which would benefits airline companies. The increase in of m-commerce (mobile apps) sales may easily dwarf any revenue lost from the decrease in e-commerce sales (Lee et al., 2019). The time constraints on m-commerce customers are far less than e-commerce customers. Booking tickets in advance represents difference between the booking time and the departure time. As a passenger, booking tickets in advance is a necessary process when they need to take the airline, but the time difference of booking tickets in advance was usually regarded as time pressure (Rastegary & Landy, 1993). Time pressure will affect a consumers' judgment and decision marking (Baek & Yoon, 2020). Time pressure is usually seen as a determinant to utilitarianism, and as one of its components (Scarpi, 2020). Utilitarian shopping behavior is sensitive to negative attitudes, such as saving money, judging time saving and convenience (Lee & Kim, 2018).

Compared with official website on PC, the adoption of mobile app can increase the flexibility of purchase decisions (Wang et al., 2016). It can also decrease passengers' perceived time urgency. Consequently, advance ticket purchasing should decrease in the future with the adoption of purchasing using a mobile app. In this study, booking tickets in advance was viewed as traveler utilitarian shopping behavior. Furthermore, we investigated the impact of mobile app adoption on travelers' utilitarian shopping behavior. Hence, the hypothesis is as follows:

H2: Mobile app adoption will shorten the number of days needed by consumers to book advanced tickets.

Empirical Methodology and Analysis

Identification Strategy

To establish a causal relationship between the adoption of mobile applications and travelers' shopping behavior, we utilized a quasi-experimental approach to verify our hypotheses. The timeline for the airlines' sales platforms' adoption is shown in Figure 1.

In this study, the treatment group is travelers who always purchase tickets using Android app during the study period. In order to reduce endogeneity of the causal effect, the control group should have the same intention of using mobile devices. As far as we know, travelers who used IOS apps had the same motivation as them who employed Android apps after the IOS apps adoption. Because they wanted to purchase tickets from their mobile devices, but the IOS app was not released, and had to use the PC platform to purchase tickets. Therefore, two groups could be compared in this context. One was the "treatment" group who booked tickets using the mobile Android app after it was launched. The other is the "control" group who booked tickets using the PC platform but used the mobile phone of IOS system after it was launched by X Airlines.

All in all, it was found that 3352 travelers used the IOS app to purchase tickets after the launched of the IOS application (from September 7, 2011, to August 10, 2012), but they used a PC platform to purchase tickets before using the IOS application (from August 10, 2010, to September 7, 2011) without the missing values. From August 10, 2010, to August 10, 2012, there were 7760 travelers who consistently always used the Android app to purchase tickets. These 7760 travelers comprised the treatment group in this study. The sample ranged is from August 10, 2010, to August 10, 2012.

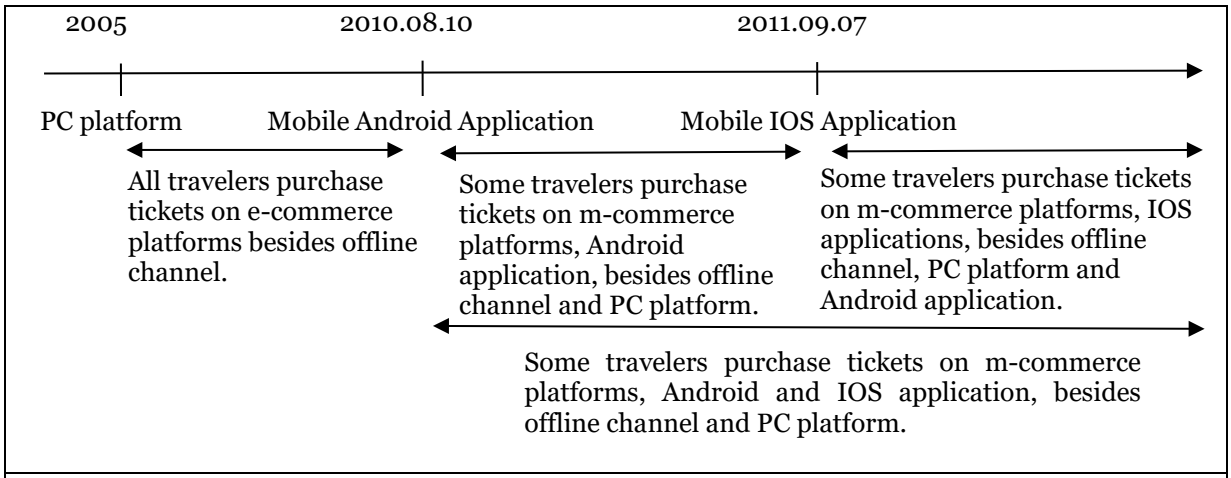

Figure 1. Timeline of Mobile Apps' Adoption

Data Collection

To reduce the endogeneity that influences causal effects, we obtained a sample of 11112 travelers with 7760 passengers in the treatment group and 3352 travelers in the control group with 8 periods (a period for 3 months) without the missing values. The variable definition as follows (Table 1):

Variables	Variable definition
Dependent variables	
$AncillaryService_{jt}$	The average frequency of travelers j buying ancillary services in period t;
$Urgency_{jt}$	The average number of days travelers j buying ticket in advance in period t;
Independent variables	
$Time_{jt}$	The periods t before or after the travelers j buying tickets on mobile app; Before=0, After=1;
$TreatP_j$	Travelers j is in the treatment or control group; Control=0, Treatment=1;
Control variables	
Edu_j	Educational status of travelers j; 0=Primary, 1=Junior, 2=Senior, 3=College, 4=Master, 5=Doctor;
$Member_j$	Is travelers j a senior member, 0=No, 1=Yes;
$Gender_j$	Dummy Variable, 1=Man, 0=Woman;
Age_j	The age of travelers j;
$Trip_{jt}$	The average frequency of traveling travelers j in period t-1;

Table 1. Variable Definition

Variables	Observations	Mean	SD	Min	Max
AncillaryService	11, 112	0.398	0.654	0	7

Urgency	11, 112	9.935	9.070	0	97.333
Time	11, 112	0.239	0.426	0	1
TreatP	11, 112	0.698	0.459	0	1
Edu	11, 112	2.210	1.460	0	5
Member	11, 112	0.0634	0.236	0	1
Gender	11, 112	0.731	0.443	0	1
Age	11, 112	42.561	7.721	10	74
Trip	11, 112	12.381	29.058	1	59.429

Table 2. Descriptive Statistics

Model Development

Propensity Score Matching

To reduce the interference caused by individual heterogeneity, we equated the shopping values by ensuring that both groups' shopping fields were comparable prior to use of the launched mobile apps. In other words, we estimated the regulation effect for matched pairs of treatment and control groups (Yang et al., 2019). We conducted PSM analysis following the standard steps outlined in previous studies (Rishika et al., 2013).

First, we employed a logit model using the optimal pair-matching technique to estimate the probability of travelers' purchase tickets using mobile apps. These results show that the observable variables had significantly influenced the travelers' ticket purchase using mobile apps (Table 2).

Second, we matched the travelers in the treatment and control groups using the nearest neighborhood without caliper pair matching algorithm (Austin, 2011). Finally, 3352 travelers were generated in the treatment group and the control group, respectively.

Third, to ensure the common support condition, we performed a visual analysis of the propensity score distributions via histogram plots and box plots (Yang et al., 2019) (Figure 2 and Figure 5). This showed that after the matching the covariates achieved balance and the matching between the control and the treatment groups met the common support requirement (Austin, 2011).

Fourth, the quality of the matching was checked and a balancing test was conducted (Table 3 and Table 4). The results showed that after matching, an absolute value of the deviation in covariates between the treatment and control group was not more than 10 (Heckman et al., 1998). As well as, the T-value after the matching was also lower than before the matching. The results of PSM show that there was no significant difference between the treatment group and the control group after matching.

Variables	Coefficient	Std. error
Gender	-0.710***	0.134
Age	0.020*	0.077
Edu	0.118**	0.042
Member	1.444*	0.563
Trip	-1.407***	0.297
Constant	-1.659***	0.353
Log likelihood	-808.92	

Table 3. Logistic Regression Model

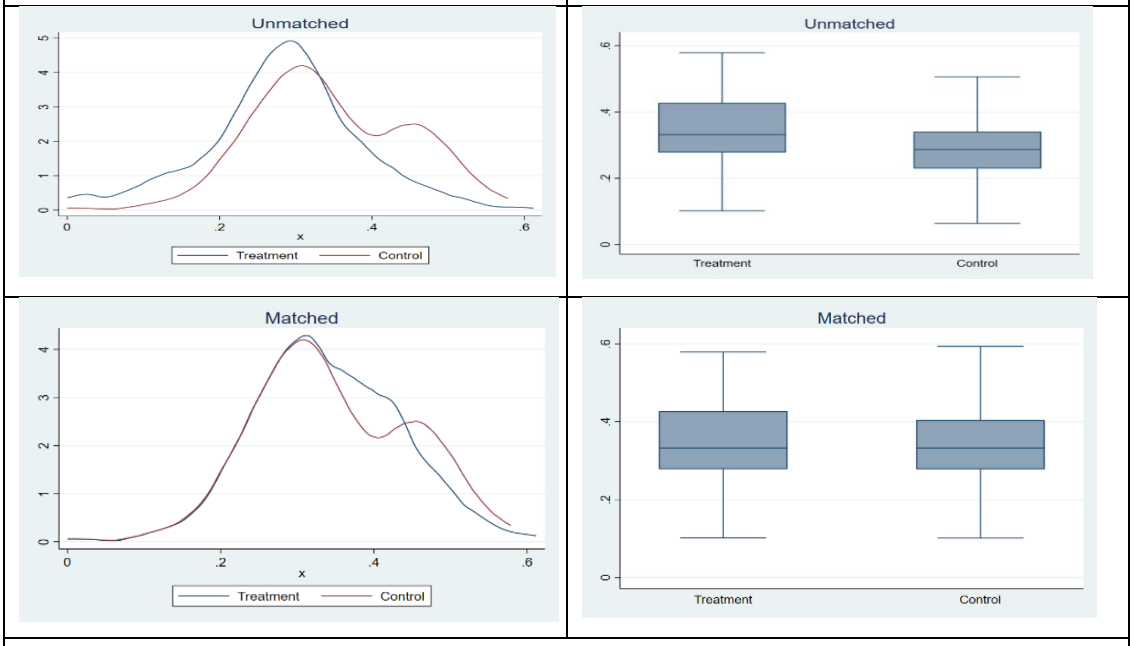

Figure 2. Distribution of Propensity Score Before and After Matching

Variable		Mean		%Bias	T-value
		Treatment	Control		
Gender	Unmatched	0.652	0.766	-25.4	-4.44
	Matched	0.652	0.652	0.00	0.00
Age	Unmatched	43.356	42.218	14.6	2.53
	Matched	43.356	43.687	-4.20	-0.60
Edu	Unmatched	2.372	2.140	16.0	2.72
	Matched	2.372	2.346	1.8	0.26
Member	Unmatched	0.029	0.078	-22.2	-3.50
	Matched	0.029	0.024	2.1	0.43
Trip	Unmatched	-0.171	0.074	-27.5	-4.21
	Matched	-0.171	-0.152	-2.1	-0.48

Table 4. Covariate Comparison Before and After Matching

Difference-in-difference Analysis

Our final data set is a panel data including 6704 travelers with 3352 travelers in the treatment group and 3352 travelers in the control group from 8 periods (from August 10, 2010 to August 10, 2012) after PSM. A DID model was been used in order to estimate the causal effect of the launched mobile apps on travelers shopping value.

Hedonic shopping behavior model:

$$AuxiliaryService_{jt} = \alpha_j + \delta_1 * Time_{jt} + \delta_2 * TreatP_j \times Time_{jt} + \zeta_{1jt} \quad (1)$$

Utilitarian shopping behavior model:

$$Urgency_{jt} = \alpha_j + \delta_1 * Time_{jt} + \delta_2 * TreatP_j \times Time_{jt} + \zeta_{2jt} \quad (2)$$

Where, j denotes a traveler who belong to treatment or control group, and t denotes the period of travelers' first purchase tickets on mobile apps. $TreatP_j$ is the treatment dummy that indicates whether traveler j is in the treatment group ($TreatP_j$=1) or the control group ($TreatP_j$=0). $Time_{jt}$ is a dummy variable that indicates if the period is before ($Time_{jt}$ =0) or after mobile app adoption ($Time_{jt}$ =1), respective. α_j is a traveler fixed effects that help to control the unobserved heterogeneity of travelers.

Results of DID Models

A sequence of DID analyses was run with fixed effects including travelers and fixed time effects, the results are reported in Table 5. Regarding the DID results for the hedonic shopping behavior model, the estimated coefficient of the interaction effect is statistically positively significant ($\delta_{TreatP \times Time}$=0.118, P<0.001). This confirms that use of the mobile app significantly increased the number of travelers who purchased ancillary services. This results support H1.

Regarding the DID results for the utilitarian shopping behavior model (dependent variable is *Urgency*), the estimated coefficients of the interaction effect were statistically significant. Specifically, use of the mobile app had a significantly negative impact on travelers who booked advanced airline tickets ($\delta_{TreatP \times Time}$=-0.990, P<0.001). This confirmed that using the mobile app significantly reduced the number days of traveler advanced ticket. These results support H2.

Based on the results of the DID analysis, it appeared that, on one side, the mobile app adoption significantly promoted travelers' hedonic shopping behavior. For example, the frequency of traveler s purchasing ancillary services increased. On the other side, travelers' utilitarian shopping behavior significantly decreased when they used the mobile airline app. For example, the number days of travelers booked advanced tickets was significantly reduced.

	Hedonic shopping behavior model	Utilitarian shopping behavior model
DV	(1) AncillaryService	(2) Urgency
TreatP × Time	0.118*** (0.026)	-0.990*** (0.378)
Time	0.0422*** (0.004)	-0.344*** (0.0597)
Constant	0.228*** (0.017)	11.59*** (0.316)
Traveler fixed effects	Y	Y
Time fixed effects	Y	Y
Clustered error	Y	Y
Number of passengers	3,352	3,352
R-squared	0.041	0.040

Table 5. Results of DID Models

Heterogeneous Effects

After estimating the main effects of mobile app adoption on travelers shopping behavior in airlines, we further investigated how traveler-level covariates moderate the use of the mobile app. In terms of continuous variables, including Age and Trip, the variables were initially mean-centered before the interaction terms were constructed. The results showed that the different individual characteristics had different moderate effects (Table 6).

Models	Hedonic shopping behavior model	Utilitarian shopping behavior model
Panel A. Moderation effects of Gender	(1) AncillaryService	(2) Urgency
TreatP × Time	0.114*** (0.0219)	-1.867*** (0.290)
TreatP × Time × Gender	0.108*** (0.0374)	0.528 (0.521)
Number of passengers	3,352	3,352
Traveler fixed effects	Y	Y
Time fixed effects	Y	Y
Panel B. Moderation effects of Age		
TreatP × Time	0.103*** (0.0213)	-1.846*** (0.286)
TreatP × Time × Age	0.00236 (0.00229)	0.0272 (0.0343)
Number of passengers	3,352	3,352
Traveler fixed effects	Y	Y
Time fixed effects	Y	Y
Panel C. Moderation effects of Edu		
TreatP × Time	0.0899*** (0.0207)	-1.833*** (0.285)
TreatP × Time × Edu	-0.00117 (0.0116)	0.146 (0.161)
Number of passengers	3,352	3,352
Traveler fixed effects	Y	Y
Time fixed effects	Y	Y
Panel D. Moderation effects of Member		
TreatP × Time	0.0899*** (0.0207)	-1.957*** (0.277)
TreatP × Time × Member	-0.401*** (0.0539)	-3.541*** (0.505)
Number of passengers	3,352	3,352
Traveler fixed effects	Y	Y
Time fixed effects	Y	Y
Panel E. Moderation effects of Trip		
TreatP × Time	0.0909*** (0.0216)	-1.906*** (0.281)
TreatP × Time × Trip	-0.00407*** (0.00147)	-0.0241*** (0.00845)
Number of passengers	3,352	3,352
Traveler fixed effects	Y	Y
Time fixed effects	Y	Y

Table 6. Moderation Effects

Robustness Checks

Robustness of the PSM Analysis

We conducted PSM analysis based on the commonly used 1:1 nearest neighbor matching algorithm. To verify the robustness of the results, we used additional matching algorithms, for example, the Mahalanobis matching and the nearest neighborhood with caliper (0.25*SD, SD is the standard deviation of propensity score) pair matching. It appeared that these results were consistent with our primary results.

Table 7. Covariate Comparison Before and After Matching

Variable		Mean		%Bias
		Treatment	Control	
Gender	Unmatched	0.652	0.766	-25.40
	Matched	0.652	0.652	0.00
Age	Unmatched	43.356	42.218	14.60
	Matched	43.356	43.337	-0.20
Edu	Unmatched	2.372	2.140	16.0
	Matched	2.372	2.356	1.20
Member	Unmatched	0.029	0.078	-22.2
	Matched	0.029	0.029	0.00
Trip	Unmatched	-0.171	0.074	-27.5
	Matched	-0.171	-0.162	-0.9

Table 7. Covariate Comparison Before and After Matching

Robustness of the DID Analysis

The validity of DID analysis depends on the parallel trend assumption. It is necessary that the treatment and control group had parallel trends in pre-treatment and to ensure that there was no heterogeneity in the trends between the two groups (Angrist & Pischke, 2008). The relative time model can be used to check the parallel trend assumption of the DID estimation (Greenwood & Wattal, 2016). Specifically, we first created a series of time dummies (e.g. Time_Dummies) to indicate the relative chronological distance between the period t and the treatment time (e.g. the launched of mobile app by airlines). This approach can help determine the existence of pre-treatment heterogeneity in the trends between treatment and control groups (e.g. a significant difference between treatment and control groups before the treatment). The results are shown in Figure 3. As can be seen, there was no indication of a significant pre-treatment difference in the pre-treatment periods, which supports the parallel trend assumption (Figure 3).

Second, the credibility of the DID analysis depends on a placebo analysis (Hu et al., 2019). This constitutes the DID analysis using different periods (e.g. data contains four, three periods before and after, respectively) to confirm that the results were not due to unobservable factors in certain periods. Specifically, a "time placebo" was established which is using the data of the first 4 periods to ensure that the results are robust in the different time windows. We set the T=3 as a dummy time hypothetical adoption of the mobile application. Therefore, there were three periods before "adoption" and one period after "adoption". The results of DID model's placebo analysis are shown in Table 8. In this analysis, it was found that the results of placebo test analysis were not statistically significant. Therefore, it was inferred that there was a causal effect between mobile app's adoption and changes in travelers shopping behavior, especially for travelers' hedonistic and utilitarian shopping behavior.

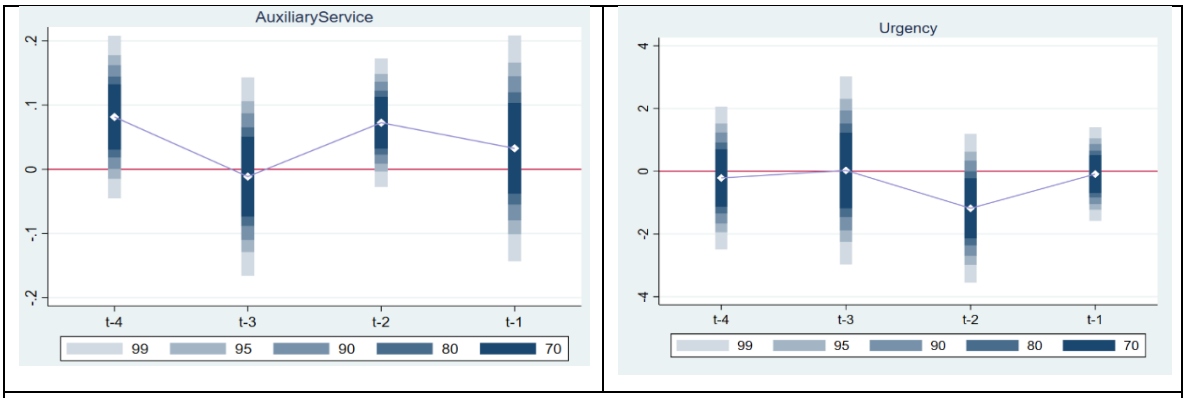

Figure 3. Coefficients of Treatment Effects in Different Periods

Models	Hedonic shopping behavior model	Utilitarian shopping behavior model
Dependent Variables	(3) Ancillary Service	(4) Urgency
TreatP × Time_Dummies	-0.075 (-1.90)	-0.580 (-1.34)
Passengers fixed effects	Y	Y
Time fixed effects	Y	Y
Clustered error	Y	Y
Number of passengers	838	838
R-squared	0.38	0.020

Table 8. DID Placebo Analysis

General Discussion

Theoretical Implications

The results of study have some theoretical implications. First, this study enriches the research on mobile app shopping behavior. Previous studies have established a correlation between new mobile apps' adoption and perceived usefulness or ease of use, usage intention, preference (Shaw & Sergueeva, 2019). In other words, previous studies have focused on the antecedents of mobile app adoption, this study focuses on the post-adoption factors that follow mobile app adoption. This is causal relationship that the mobile apps' adoption on the shopping behavior of travelers. Specifically, the average amount of ancillary service purchases increased, while advanced ticket purchasing decreased after the introduction of mobile apps by a specific airline.

Second, this work enriches the current literatures that explore the perceived value of travelers in the mobile commerce market. Previous research used questionnaires focused on the impact of perceived value (hedonic and utilitarian value) on purchase intentions, satisfaction (Overby & Lee, 2006), shopping motivation (hedonic and utilitarian) (Li et al., 2021). However, by using a quasi-experimental design in an airline industry app model, it was possible to empirically verify that hedonic shopping of traveler s increased, while the utilitarian shopping decreased after introduction of a mobile app. Besides, studies showed that mobile application is more hedonic (Vayghan et al., 2022), while this study demonstrates the impact of mobile app adoption not only on travellers' hedonistic shopping behaviour, but also on their utilitarian shopping behaviour.

Third, this study showed that some factors had a significant impact on whether travelers choose to purchase products using mobile apps including the demographic characteristics and consumption habits. Davis et al. (2014) concluded that there was no online gender effect between hedonic shopping motivation and purchase intentions. However, our data suggest that male travelers are more likely to purchase hedonic products (ancillary services) after mobile app' adoption. Ng (2004) also found that men were more likely to accept a utilitarian approach towards shopping, while we found that there was no gender bias in a utilitarian shopping behavior when an airline adopted a new mobile app.

In addition, this research adds to the body of work dealing with travelers' multi-channel shopping behavior in airlines. Previous literature focused on the interaction effects of cross-channels (Xu et al., 2019). While few studies have centered on the shopping behavior of travelers in the travel industry. Previous researchers focused on factors that affect travelers' purchasing ancillary services, such as sociodemographic factors (Carlos Martín et al., 2008), product price (Zhang et al., 2015). However, we found that the mobile apps' adoption had a significantly impact on the shopping behavior of travelers in service contexts such as tourism. Furthermore, we concluded that travelers, who do not have a frequent flyer membership, are more likely to purchase ancillary services after mobile app' adoption.

Managerial Implications

Our findings show how decision makers can effectively make decisions based on travelers shopping behavior.

First, regarding the hedonic shopping behavior of travelers, the average frequency of purchasing ancillary services, has increased with the introduction of mobile apps in travel industry. Managers can launch more mobile ancillary services advertisements on mobile apps to improve travelers understand the ancillary services. Advertising can effectively encourage traveler s to repurchase services according to the research of market marketing (Hyun et al., 2011). The increase in average frequency of buying ancillary services is also an indication that use of mobile apps' makes travelers are more interested in hedonic shopping value and high-quality service. Therefore, decision makers should pay more attention to providing high-quality services and cater to the needs of travelers after the introduction of mobile apps.

Second, regarding the utilitarian shopping behavior of travelers, advanced ticket booking has decreased due to the adoption of mobile apps in the travel industry. Based on that, managers can adjust their prices over time when they adopt mobile apps. The decrease in advanced purchase of tickets by traveler, such as frequent flyers, means that travelers are more likely to buy tickets closer to the departure date using a mobile app. Besides, this result also shows that the shopping behavior of travelers is more utilitarian. Hence, the designer of mobile applications should consider an application interface that is easier to use and operate to reduce the inconvenience of travelers.

Third, the findings of our study have management significance the full-service airlines. Although our findings were that the adoption of mobile apps has produced an increase in the average frequency of traveler s purchasing ancillary services in the low-cost airlines, the full-service airlines also offer the ancillary services. The difference is that the ancillary services of low-cost airlines is a separate, unbundled order (need to be additional orders), while the ancillary services of full-service airlines is bundled with the ticket, that is a combined ticket (Curras-Perez & Sanchez-Garcia, 2016). Therefore, in view of the increased hedonistic shopping behavior of travelers, full-service airlines can launch more types of combined ticket with their mobile apps. Meanwhile, in view of the decreased hedonic and utilitarian shopping behavior of members and frequent flyers after mobile apps' adoption, low-cost airlines and full-service airlines need to offer more types of combined tickets to meet they as a member or frequent flyer's needs.

Conclusion and Limitations

In this study, we chose to investigate how the adoption of mobile app affects travelers' shopping behavior based on a quasi-experiment in airlines. The findings show that after the airline introduced a mobile apps for tickets sales, the travelers' purchase of ancillary services increased. This showed that travelers were more willing to do hedonistic shopping using. However, the numbers of days for passengers booking tickets in advance decreased. It showed that the utilitarian shopping motives of travelers to buy tickets was lower after mobile app adoption in airlines.

However, several limitations in our study need to be discussed. First, X Airlines adopted mobile applications in our context many years ago. Though our data is somewhat outdated, we focused on the actual question that the changes of travelers shopping behavior due to the mobile apps' adoption. In this regard, our research is not limited to the data. Second, our research focused on ancillary services as hedonic purchases. However, ancillary services are divided into many types, such as shuttle services. Future research can consider the types of ancillary services to research travelers shopping behavior.

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