The Adoption of Smartphone Applications by Airlines

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Abstract

Given the increasing number of smartphone users worldwide, the use of applications as marketing tools can have a significant impact on the tourism industry. More tourism businesses, especially airlines, have begun using smartphone applications as a corporate marketing strategy to cater for customer needs. This article presents the findings of a study of the adoption of such applications in the airline industry. Data on 453 airlines were accessed to investigate whether the company provided smartphone applications and the influence on this decision of different characteristics (such as location and business coverage). The results show that the type of airline has a significant impact on its adoption of smartphone applications. This paper serves as a guide for airline enterprises considering adopting this new technology to enhance future innovation and competitiveness.

Keywords: Smartphone application; Airline; Marketing tool

1   Introduction

The number of smartphone users worldwide has increased rapidly in recent years, with the devices seeming to have gradually come to dominate the mobile phone market. Smartphones are a type of mobile handset with higher connectivity and more advanced computing capabilities than ordinary feature phones. A smartphone is often regarded as a "pocket/handheld computer" due to its capacity to install and run more advanced applications on particular platforms (Raaum, 2010). People in general are expected to increase their use of smart devices in daily life (Lopez & Bustos, 2006). According to a study conducted by ComScore (2012), smartphones are the fastest-growing segment of the mobile phone market and by February 2012, over 104 million people in the US owned one. Smartphone applications (in this study, only those available from the Apple App Store are considered), which were first developed in 2008 by Apple, Inc., have developed rapidly in recent years and are now considered one of the most salient functions for smartphones. The increasing popularity of such applications also seems to have had a significant impact on tourism. One study shows that smartphones have changed tourists' preference and behavior (Wang, Park, & Fesenmaier, 2011). Moreover, nearly one in five (19%) Americans have downloaded travel-related applications to their smartphones (Ypartnership & Harrison Group, 2010).

In the context of the airline industry, smartphone applications have become a new marketing tool which can provide online flight booking, baggage services, and flight information search functionality to travelers. In order to gain competitive advantage and succeed in a highly competitive airline market, many airline companies have created such applications. Through this new communication and distribution technology, tourism companies may increase customer loyalty, reduce internal

operating costs, decrease delivery costs to intermediaries, and enhance corporate culture. Although airline products have some limitations, such as rapidly changing prices, perishability, and scarcity in quantity, smartphone applications can help vendors effectively overcome these limitations.

Smartphone applications provide a more convenient way for customers to access real-time flight information and manage their travel. It is therefore not surprising that flight information applications account for 17% (the largest number) of the top 100 tourism applications in the App Store (Wang et al., 2011). One reason for their popularity is that they allow both business and leisure travelers to book flights more quickly and conveniently. Business travelers use advanced smartphone applications as a source of flight information and as a tool to manage their trips more efficiently. Apps also help leisure travelers, who are usually price sensitive, to find cheaper flights, many of which are offered by airline companies directly. Many large and technology-friendly airline companies have actively adopted this new platform to broaden their service offering. For example, United Airlines' smartphone application has numerous features allowing tourists to book flights, search for airport maps, gather relative information, and use mobile boarding passes.

Some airline companies provide even more powerful applications. For instance, Alaska Air's "Travel App" allows passengers to book and modify their seat selections, add notes to their hotel and car rental services, and enable mobile flight check in. Through these applications, airlines can also collect feedback from tourists in the form of user ratings and comments, which are valuable information for companies seeking to understand their customers better.

With these numerous user-friendly functions and the rapidly developing market for smartphones and other mobile devices, these applications have become a very "hot" new topic in the tourism industry. However, as yet no study has been carried out looking at their adoption by airlines, so there is a lack of information about this innovation in this context. The purpose of this study is therefore to examine and understand the current application and development status of smartphone applications in the airline industry. This paper starts with a comprehensive literature review covering the development of smartphone applications in tourism. It then presents an analysis of airline information and their adoption of smartphone applications in order to understand the stage of development of this area. Finally, it proposes suggestions for managers and areas for further research. These recommendations are provided to help airline companies to make better use of smartphone application technologies to deliver their products smoothly, operate efficiently, increase customer loyalty, and provide a better service to tourists. They also set forth a solid foundation for further studies on this topic.

2 Literature Review

With the growing popularity of mobile devices, many studies have looked at the role of mobile technology applications in tourism. The development of wireless technology and mobile networks means that cellular phones now not only provide voice communication, but also allow customers to access relevant data through the Internet (Buhalis, 2003; Buhalis & Law, 2008). Mobile phones were firstly used and

studied as multimedia electronic guides for destinations such as museums and urban areas. In June 2007, Apple, Inc. launched its first iPhone, which featured the first generation of advanced applications used in smartphones. Since then, many more smartphone applications have been developed for travelers. Based on statistics from iTunes (2012), around 17,000 smartphone applications designed for tourism were available from the Hong Kong App Store in August 2012. Using such applications, travelers can search for and track flights, reserve hotels and cars, obtain information about a destination or an attraction such as Hong Kong or Disneyland, access details of local facilities such as cheap gas stations, carry out conversions between time zones, and access language translation services (Wang et al., 2011).

As the study of smartphone applications is still at its early stage, there is limited prior work to draw on. Some studies give us a first glance at the adoption of smartphone applications by the tourism industry and demonstrate the huge potential for further research. Kim and Adler (2011) look at the relationship between the use of hotel mobile applications and their effects on brand loyalty to help managers develop a better knowledge of such new technologies in marketing. Hafele (2011) shows that smartphone applications can improve the quality of customer service in theme or amusement parks by pinpointing exact locations, automatically planning a journey, making online reservations, and enabling information searches. Smartphone applications can also be used as a strategic tool to help theme and amusement parks generate revenue, increase the efficiency of communication with customers, and enhance customer loyalty.

Apart from the hotel and theme park industries, one study focuses on the travel industry and examines the use of smartphone applications in the tourist experience. It shows that Apps can help tourists gain a wide range of information, solve problems efficiently, share their experiences, and store memories (Wang, Park, & Fesenmaier, 2012). These studies examine the use of smartphone applications in particular areas such as hotels, theme parks, and travel. Additionally, Wang et al. (2011) provide an overview of smartphone applications used in the tourism industry and propose that the most frequently used Apps relate to flight information management. They also show that tourists make heavy use of airlines' smartphone applications.

Smartphones have only come to be widely used in recent years. Based on the diffusion theory proposed by Rogers (2003), the population can be divided into five segments; innovators, early adopters, early majorities, late majorities, and laggards, according to their adoption of a specific innovation. It seems that airlines are currently transiting from early adopters to early majority. As such, many companies may not have sufficient knowledge of smartphone applications. As they are a useful tool for airlines, many airlines may use or consider using this new technology in their marketing. In order to help airline companies make the right decisions, the first step is to develop a general understanding of the current adoption of smartphone applications in the airline industry worldwide.

3   Methodology

This study focuses on the use of smartphone applications by airline companies, as the industry seems to be heavily influenced by new technologies and to be one of the

most active adopters of such tools. Thus, by studying the smartphone applications used in the airline industry, this research will help stakeholders to understand the adoption issues in this sector.

In this study, airline information was collected in two ways. Company details were firstly gathered from the International Air Transport Association (IATA) website (http://www.iata.org/Pages/default.aspx [Jun. 10, 2012]). IATA has 240 airline company members in over 115 countries, including the world's leading passenger and cargo airlines (IATA, 2012). However, this list is not exhaustive, since some major airline companies, such as Air Asia, are not members of IATA. Hence, we also collected information by looking up the airline lists provided by the top-50 largest airports worldwide, based on the 2011 annual passenger traffic figures from Airports Council International (ACI). A total of 453 airlines were identified in this study through these approaches.

In order to differentiate the 453 airlines, we classified them according to the following categories. Only passenger scheduled airlines were analyzed in this study.

Location. This was determined by the location of airlines' headquarters and categorized into six regions; North America, Europe, Asia, Oceania, Latin America, and Africa.

Business coverage. We divided airlines into three categories; international, regional, and domestic, according to the area covered. International airlines operate flights among multiple continents. Those operating within a continent but across two or more countries are considered regional. Domestic airlines provide flights within a single country only.

Destination. The number of flight destinations of the airlines ranged from 4 to 378. We divided them into eight categories; 0-50, 51-100, 101-150, 151-200, 201-250, 251-300, 301-350, and 351-400 destinations.

Alliance. Some airlines are members of strategic alliances which facilitate cooperation to build a network of connectivity for international services. Oneworld, Star Alliance, and SkyTeam are the three largest such alliances in the world.

Frequent-flyer programs (FFP). A FFP is a marketing program provided by airlines to keep and attract customers. One of the advantages of smartphone applications is the functionality they provide to serve loyal customers. Some smartphone applications from airlines provide services to FFP members only.

The smartphone applications offered by the airlines in this study were identified from the Apple Hong Kong App Store for iPhone, since they are considered as the most active applications (Wang, 2011). As at 10 July, 2012 at 22:00, 57 airlines offered some form of smartphone application to their customers via this AppStore. Some airlines had created more than one program. For instance, Air France have not only launched a smartphone application for flight-related services but also one called "Travel Book by Air France" for travelers to write down stories during their trips and share their experiences with friends on Facebook.

4   Research Findings

The adoption status of smartphone applications for the 453 airline companies in this study was examined. As noted above, the airlines were categorized in terms of location, service area, flight destination, airline alliance, and FFP. The likelihood of airlines in different categories offering smartphone applications was analyzed.

4.1 Adoption of smartphone applications in different locations

Table 1 summarizes the number of airlines worldwide with and without smartphone applications. It can be seen that the distribution is uneven. For instance, 28 airlines in Asia provide applications, constituting 49.1% of all airlines worldwide doing so. However, although only seven airlines in North America provide smartphone applications, the percentage of airlines doing so in North America is the second highest. Latin America and Africa have the lowest numbers of airlines offering applications, implying that the rate of adoption in these locations is lower than in other regions. However, the results of a chi-squared test show that there is no significant difference (p=.357 >.05) between the six regions in terms of the adoption rate of smartphone applications.

Table 1. Total number of airlines offering smartphone applications by region

Region	All airlines			Airlines with smartphone applications (ASA)				
	Total no.	%	No. of ASA	%	% ASA based on total no. of airlines	χ^2	Sig.
North America	40	8.8	7	12.3	15.0	.826	.363
Europe	145	32.0	16	28.1	11.0	.465	.495
Asia	182	40.2	28	49.1	15.9	2.40	.121
Oceania	15	3.3	2	3.5	13.3	.008	.929
Latin America	35	7.7	2	3.5	5.7	3.11	.078
Africa	36	7.9	2	3.5	5.6	1.76	.185
Total	453	100	57	100	12.6	5.56	.351

One of the possible reasons why there are no significant regional differences is the imbalance between countries in terms of economic development. We might expect that airlines based in the developed countries are more likely to offer smartphone applications to their customers. For instance, Hong Kong, Japan, Korea, and Singapore are more developed than other parts of Asia, and many applications have been developed in these countries. However, the development status of Apps in these areas cannot represent that in Asia as a whole. It appears that the location of airline headquarters is not a strong impetus for companies to adopt Apps. In general, as a new technology, smartphone applications have not yet been widely adopted across the world. The competitive advantage and value they offer are still waiting to be discovered and developed by companies.

4.2 Adoption of smartphone applications in terms of business coverage

Table 2 shows that 41 international airlines (71.9%) have adopted smartphone application technologies, the highest percentage. The result of a chi-squared test indicates that this difference is statistically significant (p=.002< .05). This shows that the provision of international services is one of the major characteristics of airlines offering smartphone applications. Four domestic airlines, including three from mainland China and one from the US, also use smartphone applications as marketing tools. The US and China are the third and fourth largest countries in the world, so will have a broader domestic air travel market. This suggests that the larger the business coverage of airlines, the more likely they will be to use smartphone applications as a marketing tool. In other words, applications create more benefit for airlines with larger business coverage.

Table 2. Total number of airlines offering smartphone applications by service area

| Service area | All Airlines | | Airlines with smartphone applications (ASA) | | | |
	Total no.	%	No. of ASA	% ASA based on total no. of airlines	χ^2	Sig.
International	240	53	41	71.9	9.40	.002
Regional	166	36.6	12	21.1	6.65	.010
Domestic	47	10.4	4	7.0	.791	.375

4.3 Adoption of smartphone applications in terms of flight destinations

Looking at the number of flight destinations, 90.7% of airlines offered no more than 100. However, Table 3 shows that the cumulative percentage of smartphone applications used in airlines offering fewer than 100 destinations as compared to all airlines is 68.4%. However, all four airlines (100%) providing more than 250 flight destinations also offered applications. The percentage of airlines offering Apps in a certain range (under 200 destinations) shows a tendency for the number of destinations to be positively related to App availability. A chi-squared test indicates that there is a significant difference (p=.000< .05) between the number of flight destinations and whether or not an airline provides smartphone applications. Similar to the previous section, it can be seen that airlines with more flight destinations are more willing to use smartphone technologies in marketing.

Table 3. Comparison of total number of airlines with airlines offering smartphone applications in terms of number of flight destinations

	All Airlines						Airlines with smartphone app. (ASA)		
No. of flight destin.	No. of Airlines	%	Cumul ative %	No. of ASA	%	Cumul ative %	% ASA in range	χ^2	Sig.
1-50	299	66	66.0	15	26.3	26.3	5.0	72.68	.000
51-100	112	24.7	90.7	24	42.1	68.4	21.4		
101-150	20	4.4	95.1	7	12.3	80.7	35.0		
151-200	14	3.1	98.2	6	10.5	91.2	42.9		
201-250	4	0.9	99.1	1	1.8	93.0	25.0		
251-300	2	.4	99.6	2	3.5	96.5	100		
301-350	1	.2	99.8	1	1.8	98.2	100		
351-400	1	.2	100	1	1.8	100	100		

It is easy to understand that it is costly for airlines with a large number of destinations to market their services in each location using traditional tools such as advertisements, brochures, and marketing campaigns. However, by adopting smartphone applications, airlines can connect with customers anywhere there is Internet access. This approach can also help international airlines reduce marketing costs and enhance their corporate image.

4.4 Adoption of smartphone applications in relation to alliances and FFP

It can be seen from Table 4 that 134 airlines (29.6%) are members of at least one alliance and 35 of these (61.4%) provide smartphone application services. A chi-squared test shows that there is a significant difference (p=.000<.05) between airlines in alliances and airlines providing smartphone applications. Airlines which are not members of any alliances are less willing to invest in applications.

Table 4. Comparison of total number of airlines with airlines offering smartphone applications in terms of alliances and FFPs

	Total airlines		Airlines with smartphone applications (ASA)				
	No. of Airlines	%	No. of ASA	%	% ASA based on total no. of airlines	χ^2	Sig.
In alliances	134	29.6	35	61.4	26.1	31.70	.000
Not in any alliance	319	70.4	22	38.6	6.8		
With a FFPs	271	59.8	51	89.5	18.8	23.85	.000
Without a FFPs	182	40.2	6	10.5	3.3		

Table 4 also shows that 271 airlines (59.8%) had FFPs, of which 51 provided smartphone applications, accounting for almost 90% of all the airlines offering Apps. Only six airlines without FFPs provided applications. The results of a chi-squared test indicate a significant difference between airlines providing FFPs and those with smartphone applications (p=.000<.05). This suggests that airlines which provide FFPs are more able to understand the importance of applications and hence more willing to focus time and resources on their development. Moreover, some of the smartphone applications launched by airlines can be considered part of their FFP. For instance, Alaska Airlines allows customers to use their Mileage Plan number to make an online reservation. Such functionality, created for loyal customers, may encourage airlines already providing FFPs to make more use of smartphones.

5 Conclusion

With the rapid advances in information technology and the increase in the user population, smartphones are having a significant impact on consumer behavior and daily lives. People seem to like to manage their flights using smartphones rather than desktop computers during their trips. Companies and managers in the airline industry should start to consider using smartphone applications as a critical marketing tool to connect with their customers. The growing population of users is also a potential market for the airline industry. Travelers anticipate that Apps will give them a more convenient way to manage their flights, while airline companies can attempt to use them as a more efficient marketing tool. Smartphone applications can help airlines to achieve their goals and meet customers' needs. Since their development is still at its early stage, only 57 airlines (12.6%) in this study used them as marketing tools.

With the development of further application functionality, travelers can use their smartphones to check and book their latest flights, check in, pay for baggage, view and change their seat, order meals, manage their flights, and look up aircraft details. Hence, competition between airlines on their smartphone applications is inevitable. From the outset, it is critical to have a better understanding of the current status of the use of applications in the industry. Therefore, the aim of this study was to provide an overview of the adoption of smartphone applications by different types of airlines. It has attempted to provide airline companies and tourism researchers with a basic knowledge of the development status of applications in this sector.

In this empirical study, the characteristics of 453 passenger scheduled airlines and 57 smartphone applications offered by airlines were examined to analyze the use of such applications by different types of airlines and the relationship between airline characteristics and App adoption. The purpose of this was to identify the characteristics of airlines which make them more likely to have already adopted smartphone applications.

Our findings demonstrate that several factors seem to affect whether an airline offers a smartphone application. Firstly, airlines in North America, Europe, Asia, and Oceania are more likely to have done so. Secondly, international airlines are more likely to adopt smartphone applications than regional and domestic airlines, based on chi-squared statistics. However, regional airlines are more willing to provide application services to their customers than domestic airlines. Thirdly, airlines

offering a larger number of flight destinations are more willing to offer mobile applications. Fourthly, airlines who are members of one or more strategic alliance are also more likely to offer smartphone applications. Moreover, in the data collection process, it was found that some alliances had also created applications for their members, such as SkyTeam. This is a great opportunity for airlines which have not yet launched their own smartphone application to develop this side of their marketing. Finally, airlines providing FFPs are more likely to offer a smartphone application.

6 Limitations and recommendations for future research

In this study, the data on airlines' smartphone applications were only current up to 10 July, 2012 at 22:00, and only the Hong Kong App Store was included. The Hong Kong App Store lists most, but not all, Apps available worldwide, but due to constraints of time and resource it was the only App Store accessible to the authors for data collection. The choice of which App Stores a new application will be launched into depends on its target market. Although the Hong Kong App Store lists all Apple applications whose target market is both the world and Hong Kong, it does not cover all the Apps available worldwide. Moreover, it is not known whether the Hong Kong App Store includes all available airline applications for airlines.

By exploring the characteristics of the airlines currently offering smartphone applications, it is recommended that international airlines, airlines with a larger number of destinations (especially those with 100 or more), those which are members of strategic alliances, and those offering a FFP should consider adopting such applications as a tool to enhance their marketing power in a competitive market.

Airlines should also note that the requirements for designing a smartphone application are different from those of a mobile website. The technology and development are more complex because each operating system platform (such as Apple iOS, Google Android, or Microsoft Windows Phone) requires a different application. Therefore, when airline companies decide to develop smartphone applications, they need to consider the various operating systems in use. In addition, future airline applications should provide not only basic information and functionalities for potential customers but also incorporate the incentives and dividend miles account management available for frequent flyers in order to maximize the benefits.

Since the development of smartphone applications is only at an early stage, many more airlines are expected to provide such services in the near future. We may also expect airlines already providing applications to keep updating them. Future research could provide updated data on airlines' adoption to assist other companies in the sector. Since the data for this study came from the Hong Kong App Store only, it is also recommended that future research replicates this approach in other App Stores to improve the comprehensiveness of the findings. Moreover, in this study, only data on scheduled airlines were collected. In fact, many cargo airlines also offer smartphone applications, such as Air France Cargo. Future work may examine these cargo carriers and/or other types of airlines. Besides, although the Apple App Store is the most mature Apps market, currently Google Android has the largest number of customers. It will therefore be desirable to include Android and other operating system platforms such as Microsoft Windows Phone in future research. This study also focused on

evaluating five factors which influence airlines to adopt smartphone applications owing to time and resource constraints. On the basis of the current findings, future work may examine more aspects such as service mode (full service or no-frills carriers), and market capitalization. Such work should provide airlines with more valuable information and help their managers to make better decisions about adoption.

As research on smartphone applications in tourism is still at a preliminary stage, there are many relevant research questions that remain unanswered. Some major questions deserve further exploration. For example, as more and more airlines adopt applications, it is both important and urgent to explore their content and consider how best to use this new marketing tool to attract customers. Moreover, one of the most important functions of airline smartphone applications is to enhance the customer service experience. It would therefore also be of interest to explore the relationship between application adoption and customer satisfaction.

7 References

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8 Acknowledgements