

Mobile Commerce Opportunities in the Airline Industry

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Abstract: Mobile commerce will provide opportunities to improve business values in the airline industry; however, it has been slowly adopted and has not been implemented widely. This paper develops a mobile commerce model for air travel companies that can be used to study features necessary to perform m-commerce using wireless devices. Twenty-eight interface features are identified based on this developed model. The implementation of these features for the existing web-based airline ticketing in the top ten airline companies are examined. These features are important to develop an efficient and user friendly mobile commerce for airline industry in the near future. The beneficiaries of the findings from the current research are the existing airline companies, future mobile commerce airline companies, and the developers of mobile commerce systems.

Keywords: Mobile Commerce, Electronic Commerce, Airline Industry, and Mobile Ticket

I. Introduction

Some might say that the U.S. domestic airline industry is on the brink of disaster. It is a complex situation, complicated by world events, economic forces, management and labor disagreements, national policy, intense intra-industry competition and consumer preference. The airline industry lost 15 billion in 2002 and 2003 and probably will lose 5 billion in 2004 (Will, 2004). Most organizations in the airline industry have attempted to respond to the financial turmoil through drastic evolution. Since the September 2001, the network or legacy carriers have scrambled to minimize losses by cutting jobs, eliminating routes, and decreasing infrastructure. Conversely, many of the low-fare airlines have increased routes, expanded hiring, and worked aggressively to gain market share by offering lower ticket prices. The low-cost carriers' share of the market has gone from 16 percent in the year of 2003 to 25 percent in 2004, and some analysts are predicting that they could account for as much as 40 percent of the market next year (Marks, 2004). The leadership at most airlines is now showing an understanding that despite the inability to control world events, positive results can be influenced through value chain analysis. By seeking ways to improve its value chain, the airlines have an opportunity to streamline production costs, improve customer service, and create a profitable market in spite of the global turmoil.

E-Commerce

Common to each of the above functional business areas is electric or e-commerce. E-commerce is as defined as the conduct of financial transactions by electronic means (Will, 2004). Essentially, e-commerce is about using the power of the Internet to make money. The airlines have all leveraged the power of the Internet to reach customers. In the past ten years, company websites have gone from an anomaly to a commodity.

Prior to the Internet boom, airlines relied heavily on ticketing agents and reservationists in order to sell and distribute tickets. Through company web pages, airlines are now able to sell and distribute tickets. Many airlines even offer discounts to customers who purchase their tickets online. "Today, airline tickets are one of the most popular items bought on the Internet worldwide, accounting for over a quarter of consumer online spending in the United States alone." (Hanke & Teo, 2003) Airlines utilize website technology to book passengers on flights, make reservations, check baggage, and expedite the boarding process. Through the expanded use of the Internet, airlines are able to reduce labor costs and in some cases eliminate commissions all together.

Technology and the Internet have been critical to the success of JetBlue. In 2003, 73% of all tickets were purchased through JetBlue's on-line website. Another 24.6% of tickets were booked through JetBlue's reservation agents (2003 JetBlue Annual Report). Unique to JetBlue is the fact that 100% of the company's reservation agents are part-time employees who generally work from home. To operate a traditional call center in the U.S. costs about \$31 per employee hour (including overhead and training). Conversely, home-based agents cost an average of \$21 an hour. "After wiring its agents' homes into its reservation system, JetBlue pays its agents starting wages of \$8.25 an hour plus benefits." (Whalen, 2004) The cost savings achieved by maintaining infrastructure (buildings, electricity, and employee benefits) are able to be passed along to the consumer in the form of lower fares.

The Internet also allows the airlines to reach new customers. Customer relationship marketing technologies are used to build customer relationships and improve profit margins. United Airlines launched United.com in 1997. In 2000, United created a separate e-commerce division within the organizational hierarchy that was "dedicated to maximizing the sale of travel products over the Internet and Internet-enabled devices." (Hanke & Teo, 2003) Many airlines currently use their own websites to market and sell

their use of technology to current and potential customers.

From E-Commerce to M-Commerce

Innovation and product differentiation through new products and services are critical in sustaining a significant competitive advantage (Hanke & Teo, 2003). The next opportunity for airlines to reach new markets, maintain low distribution costs, and enhance customer value can be achieved through the use of mobile or M-commerce technologies.

M-commerce can be defined as a transaction that takes place via wireless internet-enabled technology (through handheld computers, cellular phones, personal digital assistants (PDA), or palm) and that allows for freedom of movement for the end-user. Wireless fidelity (Wi-Fi), the transmission of short-ranged radio signals between a fixed based station and an end-user's mobile device, is the driving technology that facilitates m-commerce (Wireless computing, 2003). In 2003, 79 million users from around the world accessed the Internet via wireless technology. It was an increase of 145% from the previous year (Converging Markets, 2004).

II. Methodology

A Model for Web-based Mobile Commerce

The value chain as described by Michael Porter is an analytical tool used to identify and examine value-adding activities within the individual firm and between firms. The value chain is composed of primary and supporting functional business activities. Primary activities are those designed to bring the product, or service in this case to market. Primary activities include customer service before, during, and after-ticket sales. For the airline industry, typical five primary activities and their examples of IT adoptions value chain activities include (Huber et al. 2004):

Inbound logistics: passenger accountability, passenger security, etc. Examples of e-value chain for airline industry include Logistics Management Systems, Enterprise Resource Planning, and B2B E-Commerce

Operations: aircraft maintenance, aircraft availability, aircrew scheduling, etc. Examples of e-value chain for airline industry include Enterprise Resource Planning, and Computer Aided Manufacturing

Outbound logistics: baggage tracking, international and domestic passenger connection, frequent flyer mileage, etc. Examples of e-value chain for airline industry include B2B E-Commerce, B2C E-Commerce, Logistics Management Systems, Customer Relationship Management, Transaction Processing Systems, and Enterprise Resource Planning.

Marketing and Sales: Reservationists/travel agents, website management, promotions, fare pricing, etc. Examples of e-value chain for airline industry include B2B E-commerce, B2C E-Commerce, Customer Relationship Management, Transaction Processing Systems, and Enterprise Resource planning.

Service: Aircraft custodial care, customer support agents,

etc. Examples of e-value chain for airline industry include Enterprise Resource Planning, B2C E-Commerce, B2B E-Commerce, and Customer Relationship Management

The role of information technologies (IT) cannot be overstated as a key enabler of activities in the airlines' value chain. It demonstrates the functional areas that are influenced by effective IT.

Based on the analysis of the five primary activities of airline industrial value chain above, the current research analyzes the proliferation of tools designed to facilitate electronic and mobile commerce in the U.S. scheduled passenger airline industry. Specifically, the activities inside mobile airline ticketing system could be part of the primary activities inside airline industrial value chain described above.

Figure 1 presents a model for booking airline ticket using mobile devices that would be facilitated through the use of M-commerce technologies in order to increase business values in the airline industry. This model could all be accomplished while the customer is driving his/her car to the airport in order to catch the next flight. In Figure 1, there are eight steps:

Step 1. A mobile customer wants to book an airline ticket via a mobile device.

Step 2. The customer uses a wireless device to log onto m-commerce site of major airline that available.

Step 3. After evaluating the various flight options and their respective fares, the customer enters a personal identification number (PIN), credit card information (if not already on file), and selects his/her flight.

Step 4. The data is sent via encrypted signal to the respective airline to ensure that the seat remains available during the transaction process.

Step 5. The encrypted signal is simultaneously transmitted to the credit card company to ensure that sufficient funds are available and no account discrepancies are present.

Steps 6 and 7. Upon positive indication from the credit card company, the airline accepts the customer's travel request and issues a confirmation number.

Step 8. The confirmation number, m-ticket, m-receipt, and paper receipt are sent to the customer. A m-receipt is also sent to the credit card company. The customer can also get m-boarding pass through a wireless device.

Primary Features of Web-based Mobile Ticketing

Chun and Wei (2004) identified mobile ticketing features for air ticket agencies. In the current research, the focus is on mobile commerce in airline companies. The functional components in Figure 1 are mapped into features required for mobile commerce and presented in Table 1. Some of these features were modified and adopted from Chun and Wei (2004) for air travel agencies. By mapping the model developed in Figure 1 into features, there are twenty eight features developed in Table 1. In Table 1, there are four categories: basic attributes, customer relationship attributes, collaboration attributes, and m-commerce special attributes.

The customer relationship attributes depict features that are designed to increase customer value through convenience. The goal of these attributes is to build customer loyalty. Collaboration attributes imply the importance of strategic alliances and exemplifies the airlines' attempt to provide one-stop vacation shopping for prospective travelers. M-commerce special attribute depict possible characteristics and services offered to mobile customers.

Table 1 is also a compilation of the various features

available on airline web pages. They have been drilled down according to levels of sophistication and complexity. When selecting website content, it is critical that an airline chooses attributes are appropriate and that provide values to the customer served. Features in Table 1 contain basic or expected features that enable an end-user to view available flights and make a flight/fare selection. They are features designed to facilitate and simplify the transaction process.

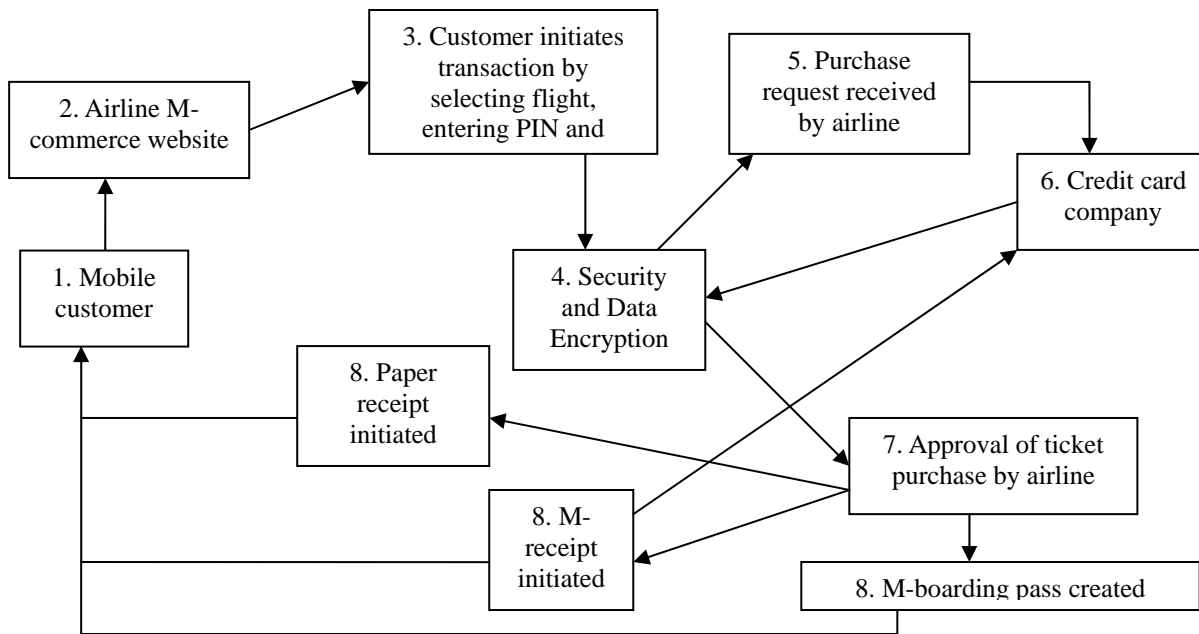


Figure 1. Typical M-Commerce Transaction

Table 1. Features for Mobile Commerce

Categories	Features	Feature Descriptions
Basic Attributes	A	Search begins at the homepage
	B	Dropdown menu available for the city code
	C	Dropdown calendar available
	D	Specific travel times can be chosen
	E	Both one way and round trip arrangements available
	F	Number of passengers traveling
	G	Point of contact phone numbers accessible within 1 click of homepage
	H	Domestic and International travel option
	I	Ability to select class of service (business, coach, etc.)
	J	Flights are sorted by price
	K	Both e-ticket and paper ticket offered
	L	Processing fee other than paper delivery charge is applied
	M	Source of credit card security is available
Customer relationship attributes	N	Membership is required to book tickets
	O	Memory function available to view "my account" information
	P	Redeemable coupons are available
	Q	Other options on similar schedules are available
	R	Frequent flyer miles from other airlines can be used

	S	Currency converter is available
	T	Travel itinerary e-mailed or faxed to passenger
	U	On-line check in offered
	V	Links available to destination weather forecast sites
	W	Airport maps/diagrams are downloadable
	X	Native language option available
Collaboration attributes	Y	Vacation packages available
	Z	Rental cars and hotel reservations links
	AA	Links to other websites (credit cards, etc.)
M-commerce special attributes	BB	Wireless ticket purchasing through wireless devices such as PDAs, cell phones.

Note: Some of these features are adapted from Chun and Wei (2004)

Table 2. Ranks of Airline Industry Leaders based on Market Shares (Corridore, 2004)

Rank	Year: 2004	Market Share (%)	Rank	Year: 1993	Market Share (%)
1	American	18.4	1	United	21.2
2	United	16.5	2	American	20.4
3	Delta	10.9	3	Delta	17.4
4	Continental	10.5	4	Northwest	12.2
5	Northwest	10.4	5	Continental	8.9
6	Southwest	7.5	6	US Airways	7.4
7	US Airways	5.7	7	TWA	4.8
8	America West	3.3	8	Southwest	3.5
9	Alaska Airlines	2.5	9	American West	2.4
10	JetBlue	2.3	10	Alaska Airlines	1.2

Table 3. Individual Website Attributes

Feature	American	United	Delta	Continental	North west	South west	U.S. Airways	America West	Alaska Airline	Jet Blue	total	%
A	X	X	X	X	X		X	X		X	8	80
B	X	X	X	X	X	X		X		X	8	80
C	X	X	X	X		X	X			X	7	70
D	X	X	X	X	X	X	X	X	X		9	90
E	X	X	X	X	X	X	X	X	X	X	10	100
F	X	X	X	X	X	X	X	X	X	X	10	100
G			X							X	2	20
H	X	X	X	X	X		X			X	7	70
I	X		X	X			X	X			5	50
J	X	X		X		X	X	X		X	7	70
K	X	X	X	X	X	X	X	X	X		9	90
L	X	X	X	X	X	X	X	X	X	X	10	100
M	X	X	X	X	X	X	X	X	X	X	10	100
N											0	0
O	X	X	X	X	X	X	X	X	X	X	10	100
P	X	X	X	X	X	X				X	7	70
Q	X	X		X		X	X				5	50
R	X	X	X	X	X		X	X	X		8	80

S										X	1	10
T	X	X	X	X	X	X	X	X	X	X	10	100
U	X		X	X			X				4	40
V											0	0
W			X								1	10
X											0	0
Y	X	X	X	X	X	X	X				7	70
Z	X	X	X	X	X	X	X	X	X	X	10	100
AA	X	X	X	X	X	X	X	X	X	X	10	100
BB		X									1	10
Totals	21	20	21	21	16	15	18	15	11	16		
%	75.0	71.4	75.0	75.0	57.1	53.6	64.3	53.6	39.3	57.1		

Data Collections

The U.S. Department of Transportation defines a major airline as one that has annual revenues over 1 billion. As of December 2002, the industry consisted of 83 large commercial air carriers. Of that total, 15 were major airlines (with annual revenues exceeding \$1 billion), 33 were nationals (\$100 million to \$1 billion), and 35 were mid-to-large sized regional airlines (\$20 million to \$100 million) (Corridore, 2004). Table 2 presents the airline industrial leaders based on market shares in 1993 and 2004, respectively.

The current study analyzes the features of these 28 features in the U.S. airline travel companies' websites that offer electronic airline tickets. M-commerce itself is a relatively new area and, undoubtedly, mobile airline ticketing is not yet available worldwide. As many scholars and industry analysts have claimed, mobile commerce is derived from electronic commerce (Coursaris et al 2003, Ozok & Wei 2003, Lee and Benbasat 2003); therefore, electronic airline ticketing that is more widely and popularly used should provide good guidelines on how mobile airline ticketing may be approached.

A total of twenty-eight features were gathered and tallied from the airline companies' websites, and the results are summarized in Table 3.

In Table 3, the websites of ten of the industry leaders in 2004 (Table 2) are examined. Almost unanimously from one company's website to another, the basic attributes are available. There is however several features that are used to help differentiate each website as well.

III. Findings

The findings based the features gathered from top ten airline companies' websites are tallied. First, the numbers of websites that provide each feature are tallied to find the most widely used features. Second, the numbers of features that various websites provide are tallied to analyze the versatility of those websites.

Website Features

In Table 3, the most widely used features are Features A, B, D, E, F, K, L, M, O, R, T, Z, and AA (80% or above) (thirteen features), which are usually found in the first search page, whether it is the homepage of the website or not. This observation clearly validates the importance of user-friendliness of the website's interface.

The least commonly used features are Features G, N, S, V, W, X, and BB (20% or below) (seven features). These features do not seem to be directly related to the immediate need of travel, explaining why those features are not very popular among websites studied. For example, Feature BB has been implemented by only one airline company, United Airline. Even though this feature is important and has potential benefits, it still not been widely adopted.

The rest of the other eight features are Features C, H, I, J, P, Q, U, and Y (eight features), which were implemented by some companies (between 20% to 80%). For example, Feature P, "Redeemable coupon" is not as ubiquitous as other features, but it may attract mobile customers, as both e-commerce and m-commerce get more popular.

Website Versatility

Ten airline companies' web sites are studied for the current research. In Table 3, out of these twenty-eight features available, all websites studied for these top ten airline companies have at least 11 or more of the features that are implemented. All these ten airlines have implemented above 50% for these twenty-eight features, except only one airline company, Alaska Airline, which implemented about 40% (lower than 50%) for these twenty-eight features.

Four companies that have implemented features more than the others (above 70%) are American, United, Delta, and Continental airlines. Out of these top ten airline companies, only the United Airline offers mobile ticketing.

IV. Discussions and Conclusions

The current research developed a mobile commerce model for the airline industry and studied the existing e-commerce environment, with a focus on web-based ticketing. The findings from the current research indicate that developing user-friendly m-commerce features is crucial to the success of m-commerce. There are some major findings from the current study.

First, it is not the number of features but the usefulness of the features that is critical to the success of the m-commerce. Thirteen features are most widely used features that were available at 80% or over of the websites, while seven web features were available at 20% or less than of the websites. All airline companies' web sites studied in the current research have at least 15 features, except for Alaska Airlines with 11 features. However, some airline companies streamlined the features better than others so that the users can get the information they want faster than they could have done on other websites.

Second, understanding socio-psychological aspects of m-commerce customers is essential to the success of m-commerce (Palen & Salzman 2002, Lee and Benbasat 2003). To coincide the speed and the ubiquity of m-commerce, the customers of m-commerce are almost always on the go and less patient than those of e-commerce. Therefore, the ideal m-commerce must be able to not only attract new customers but also beat the distractions that are also competing for the user's attention (Chun and Wei, 2004).

Third, the airline industry is just beginning to expand into the Wi-Fi (Wireless Fidelity) arena. United Airlines has recently made m-commerce features available to the general public. Among the m-commerce attributes offered on its website www.united.com, are the ability to book a flight, view personal itinerary, and receive electronic notification of flight status all via a web-enabled cellular phone or through wireless PDA. It even sends electronic boarding pass with bar-code identification. The bar code can be read directly from the passenger's PDA or cell phone using the same machinery currently in use to verify paper boarding passes.

To date, several airlines (Cathay Pacific, Lufthansa, and British Airways) offer passengers the opportunity to access the Internet while in-flight (Shifrin, 2003). Currently, the FAA has not approved the use of in-flight Internet onboard aircraft flying over the United States. However, many airports in the U.S. have established Wi-Fi "hotspots" that enable travelers within the airport to log on to the Internet without the need of a data port.

Despite the current legal prohibitions that restrict Internet access while airborne, m-commerce technology should be on an airline's radar. Business and leisure travelers

alike are rapidly becoming "tech savvy" and would achieve real value through the ability to purchase airline tickets without being tethered to a Local Area Network. In most cases, m-commerce capabilities are in line and consistent with current information systems infrastructure.

The next generation of the Internet enabled commerce is already here. Mobile commerce presents a multitude of opportunities for airlines to expand to new markets, reduce administration expenses, and lower operating costs. It affords airline passengers the freedom to travel effortlessly. No longer are passengers forced to wait in long lines at the airport. Passengers with on the go lifestyles can continue to travel while on the go and not miss a beat.

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