

MOBILE BUSINESS - COMPREHENSIVE MARKETING STRATEGIES OR MERELY IT EXPENSES? A CASE STUDY OF THE US AIRLINE INDUSTRY

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ABSTRACT

This paper analyzes mobile business in the context of the US airline industry as a strategic tool to create a sustainable competitive advantage through the implementation of an effective mobile business model. The analysis is based on the assumption that such strategies must create a strategic fit with the business environment, as seen from an airline perspective. The analysis adopts classic strategic frameworks to suggest a most appropriate approach to airline practices and vision. Key success factors for creating value to airline customers through m-business are user experience, the value contribution of mobile technology, and customer requirements. Crucial elements found for matching these factors are expedite facilitating processes (i.e., process improvements), the ability to integrate systems into a mobile infrastructure, and the utilization of devices that consumers already use with quick and inexpensive results.

Keywords: Customer support; Focus group; Mobile business strategy; U.S. Airlines; SCA

1. Introduction

The US airline industry due primarily to the unique characteristics of services (i.e., intangibility, inseparability, lack of inventory, etc.) could be considered a model of mature service sectors that go through dynamic strategic transformations unparallel to traditional product or goods markets. Since the deregulation of the airline industry in 1978, uncertainty, risk, and open competition among airlines have risen dramatically. These trends have continued with increased volatility to the present day environment, illustrated by some major air carriers reporting record financial losses and bankruptcies, while others are following a successful strategy of growth and financial stability. To effectively compete in the industry, air carriers have expanded various differentiation strategies to cover services, revenue yield techniques, operational efficiencies, and labor relations. Yet, despite these intense efforts, most consumer studies relating to major US airlines have shown little difference in perception of service quality [Rhoades and Waguespack 2001]. This implies that “switching costs” for passengers between competing airlines are relatively low, making the industry vulnerable to price wars, especially in low demand periods. Das and Reisel [1997] explain the over-reliance on price competition and cost reductions as natural developments of a mature industry.

In terms of its structure, the airline industry is characterized by a trend towards consolidation. From an operating point of view, such strategies have not generated any significant cost savings. Facing a demand that is greatly influenced by general economic factors [Shearman 1992], it remains an important task for airlines to increase operating efficiency and to reduce process costs in order to retain profit margins [Suzuki 1998]. On the service side, the US airline industry faces numerous shortcomings, the most important of which are record levels of passenger complaints due to poor service and overcrowded infrastructure, especially at large hub airports [Taylor 2001].

In order to develop an edge over competitors, companies in general need to create a sustainable competitive advantage, based on increased operational effectiveness and adequate strategic positioning [Porter 1996]. If integrated properly into the value chain, a “mobile” technology business model can increase an airline’s operating efficiency and customer satisfaction by facilitating business processes, providing customers with value added services and by creating synergies between an airline’s core competencies and mobile technology [Zobel 2001]. Furthermore, implementing a mobile business model can increase the level of personalization of a company’s

business relations, which in turn creates new possibilities of customer segmentation. It might even allow companies to pursue a focused one-to-one marketing approach [Barwise 2001].

This paper examines the application of mobile technologies as business tools by airlines, analyzes the potential opportunities and threats for mobile business in the context of the US airline industry as an imperative to create a “strategic fit” between mobile strategy and the business environment, and suggests the incorporation of a customer point of view into the design and implementation of such programs.

2. M-Business

In recent years, many major US airlines have implemented first generation initiatives emphasizing the potential of m-business to differentiate their product and to reduce process costs. Most applications of m-business simply provide travelers with information. In addition, some airlines have reconfigured existing processes to allow the purchase of tickets, perform basic check-in functions, and aircraft boarding via a wireless device. As next generation communication networks emerge and the wired Internet evolves into a ubiquitous infrastructure, the future success of an airline is likely to be substantially influenced by the effectiveness with which a mobile business strategy is interweaved into the existing business model.

M-commerce and mobile e-commerce may be interpreted as an extension of electronic commerce, which relates to all business transactions performed over the fixed-line Internet. A company emphasizing m-commerce focuses on mobilizing the wire-based Internet, making the web available to consumers [Louis 2000]. Yet, this view limits understanding that some mobile applications may be very different from the ones that have been utilized as e-commerce activities over the Internet as they create new processes, not previously possible.

While m-commerce suggests functions that are rather limited to the purchase of goods, m-business provides a broader definition encompassing internal business processes and transactions partially operated in the off-line world [Zobel 2001]. The most common applications of mobile business focus on exchanges between a business and its consumers (B2C), between a business and its employees (B2E), and between two or multiple businesses (B2B). Other advanced applications include consumer-to-consumer (C2C), consumer-to-government (C2G) or between a business and professionals (B2P.) Of increasing importance is also the exchange between machines (M2M).

In post-September 11th developments, one should not underestimate the potential range of m-business connected with a secure identification. In the transportation industry in particular, passenger verification based on pattern comparisons between templates stored on mobile devices, and the real passenger might have a tremendous impact on the efficiency of the process and its quick adaptability by business customers.

In order for m-business to be successful, it must meet multi-dimensional customer needs. Zobel [2001] suggests that the basic customer requirements that mobile business activities provide are value-added, must be easy and convenient to use, and transactions need to be executed within a short period of time. Customers are likely to perceive value-added if m-business enabled them to be in control of activities, if processes are facilitated and expedited, and if the performance of activities is secure.

M-business contributes to technology-based value creation for consumers by emphasizing ubiquity and context-based applications. Ubiquity refers to the performance of tasks regardless of location. A particular example in the airline industry would be a mobile check-in process, executable away from airports, as for instance in a taxi or from home. Context relates to the function of receiving specific information or applications based on the physical location and environment by which a mobile user is surrounded. An example of context in terms of an airport environment would be the release of an electronic boarding pass through a specific token as a traveler approaches the airport. Context is closely related to what is often referred to as data pro-activity. Flight paging applications, where a traveler receives information based on context (“flight X is delayed”) without having to actively request such information (data pro-activity), is a typical example. The attribute of location has always been a critical component of traditional retailers, and with recent technological developments, it can be described as L-commerce [Jerney 2001]. However, despite a range of new opportunities in connection to this term, the low tolerance for junk or “spam mail” and unwanted “push content” is likely to be even lower as compared to the wired Internet [Keating-Chisholm 2001].

2.1. The mobile business model in the airline industry

For the purposes of this study, a thorough survey of major US-based airlines explored the strategies and applications incorporating a mobile business model within their operations. The results of this research reveal an interesting spectrum of strategies, addressing various customer market segments while performing a variety of core and supporting services. Most mobile airline applications are available for both business and leisure travelers. Since customers must possess a mobile device to use m-business applications, it can be argued that these applications mainly target customers in the business and frequent flyer segments, typically the segment with the highest profit yields for airlines. Also plausible is the suggestion that by capitalizing on the cost reduction potential of mobile

applications, the leisure segment could appreciate the cost savings, as business travelers focus on the convenience benefit.

The first long term profit source in the mobile business model is increased customer satisfaction and loyalty, given the established connection that increased satisfaction leads to repeat business, which in turn lead to increased revenues and reduced costs [Kotler 2003]. The second profit source is associated with cost reductions through the streamlining of business processes. Most frequent m-business applications focus on the provision and processing of information. In the airline industry, the profit stream is presently indirect through increased loyalty and repeat business, and direct through potential cost reductions. Network operators charging for airtime will most likely capture the major portion of tangible revenues [Standage 2001]. However, current emerging m-business airline applications also allow technology providers to capture tangible revenue targeting directly the end user, rather than charging the airlines to recover development costs. In general, a unique selling proposition (USP) is essential to differentiate products from competitors [Boyd et al. 2002]. In order to be successful, a USP should propose a benefit to the customer, it needs to be unique in a way that it cannot be easily replicated by competitors, and it has to be strong enough to attract new customers [Kotler 2003]. The selling proposition for m-business made by airlines could be implicitly derived from the “branding” of products in the wireless service portfolio. For instance, United calls its line of services “EasyInfo,” Sabre refers to its wireless product as “virtuallythere,” and Alaska Airlines named its services “Alaska.anywhere.”

While profit sources (USP and understanding the targeted segment) appear to be well defined in the airline mobile business model, the underlying strategic framework is not quite evident. When airlines describe the objectives driving their m-business service innovations, most claim customer satisfaction and cost reduction as their main goals. Cost reduction, however, is not necessarily a long-term strategy; it may barely be a tactic [Porter 1996]. Cost reductions may increase operational effectiveness. This can lead to a “new best practice” in the industry, which eventually might be adopted by competitors [Porter 2001]. Table 1 illustrates airline applications of mobile processes in the 2 areas of “Information” (flight-specific and general) and core airline travel “Process.” The sparsely populated table illustrates the relative newness of this business model to airlines and the tremendous potential there exists to develop first-comer strategic advantages in significant areas of customer interaction. The key to this process is the creation of perceived value into the minds of consumers as a unique differentiator in selecting a particular airline.

2.2. Mobile business airline applications

Airlines provide a range of mobile applications and tools offering a variety of functionalities along the travel process. Table 1 below provides an overview of consumer-focused applications currently in place by US based carriers. These applications can be categorized as information focused or process focused. The majority of applications are information focused, which can be either general or flight specific. General information focused applications range from providing weather and contact information, airport maps, and locating airport lounges. Flight related information applications typically provide flight status updates, view schedules and itineraries. In contrast, process oriented applications focus on mobilizing existing business processes such as changing reservations, purchasing tickets, or checking-in for a flight.

2.3. M-Business Value Chain

Table 2 below provides a simplified process view of the key stages of an m-business value chain, and its 5 key components of Infrastructure, Operator/Carrier, Content, Application, and Portal. The development of an efficient infrastructure includes device manufacturers and vendors, network service providers, software developers, system integrators, and wireless application providers. An example of companies predominantly engaged in this segment of the value chain is Ericson and Motorola, who manufacture devices and build network infrastructure in terms of communication satellites and radio access networks.

The most leverage in the m-business chain is attributed to companies active in the second element, network operators such as Sprint PCS, Verizon, Cingular/AT&T, and Voicestream. These wireless carriers can choose to either operate their own network, or to function as virtual operators purchasing network capacity from primary operators and selling it under their own brand name. An example of this would be Virgin Mobile USA, which uses its Virgin consumer brand to provide service using network capacity from a primary network operator, Sprint PCS. Network operators have a dominant position in the m-value chain because they provide the “touch points” with customers. This in turn facilitates direct revenue collection for the use of services through the monthly phone bill for every transmission of data, whether charged by the amount or by time. Operators have access to critical customer information including localization data through database management, the core element of Customer Relationship Programs (CRM), especially in its mobile application version [Martyn 2001].

Table 1: Mobile Airline Application Overview

		Alaska	American	America West	ATA	Delta	Continental	Frontier ⁽¹⁾	JetBlue	Northwest	United	
Information Focus	General	View Offers & Promotions	✓						✓			
		Get Weather Information			x			✓		✓		
		Lookup Airport City Codes			x			✓				
		Get Contact Information	✓			✓	✓				✓	
		See Airport Maps	✓			✓				✓		
		Locate Airport Lounges	✓			✓	✓			✓		
	Flight Related	See Flight Status/Paging	✓	✓		x	✓	✓	✓		✓	✓
		View Flight Schedule	✓	✓	✓	x	✓	✓	✓		✓	✓
		Crete/View Itinerary		✓		x	✓	✓	✓		✓	✓
		Get Gate Information						✓			✓	
		Check Mileage Balance					✓				✓	✓
		Check Seat/Award Availability					✓					✓
		View Upgrade Status									✓	✓
Process Focus	Change Existing Reservation									✓	✓	
	Make New Reservation										✓	
	Purchase Ticket										✓	
	Agent w/ Wireless Device	✓	✓						✓	✓		
	Wireless Curbside Check-in								✓			
	Check-in for Flight	✓			x	x				x	✓ ⁽²⁾	
	Receive Boarding Pass	✓			x	x				x	✓ ⁽³⁾	

(1) Service provided by third party supplier, Sabre’s “virtuallythere”, (2) Roll out planned for June 2005 in SFO (3) Roll out planned for Q1 2006; x: Service suspended

The third element is the provision of mobile content. This service may be conceptualized as a 3-level hierarchy of direct information content, synthesis of content from different application providers (i.e., customizing it to different devices such as mobile phone, or PDAs), and the distribution of it in the form of a mobile gateway - the translation of Internet content into wireless content and sending it “on-air.”

Mobile applications present the fourth element in the m-value chain. Frequent applications are advertisements, entertainment, news, financial services, information, and the function to execute payments, which in turn allows/facilitates wireless shopping. In this area, the potential for revenue generation is significantly underestimated and as a result underutilized, especially in the U.S. market.

The final element of the value chain is the function of mobile portals. In general terms, a portal is a service designed as central starting point for the use of wireless devices. A portal can provide a portfolio of mobile applications from different providers, which has the potential to generate value to users given the difficulties to navigate through wireless-web pages. Portals can be distinguished as being horizontal or vertical. While horizontal portals seek to provide a rather general and broad scope of applications and services, vertical portals target special user segments providing in-depth information in a particular area or field of interest.

2.4. Technology effects on value creation

The framework of table 3 below reflects key elements of the airline industry and suggests that mobile technologies provide unique opportunities to enhance customer value in the complex process of traveling by breaking compromises inherent in current business processes. Seven features of mobile technology are distinguished and mapped against key activities. The combination of features creating technology value with imperfections in the process chain are marked where mobile technology has the potential to break inherent compromises. For instance, when making flight reservations offline, customers need to contact the airline’s reservation center, often put on hold for the next available service agent.

Table 2: The M-Business Generic Value Chain

Infrastructure	Operator/ Carrier	Content	Application	Portal
Device manufacturer	Telecom/WLAN network operator	Information provider	Advertisement	Horizontal Portal
Network service provider			Entertainment	
Software developer			News	
Device vendors	Virtual Network Operator	Aggregator	Financial Services	Vertical Portal
System Integrator			Information	
Wireless Application Service Provider (WASP)	Reseller	Distributor	Payments	
			Shopping	

Based on Mobile Business, 122.

Table 3: Technology Value Contribution

Simplified Process Chain		Booking/ Reservation	Get Ticket	Check- in	Wait for Departure	Board Flight
Breaking Compromises		Waiting time, need for quick information (fares, schedule, etc.)	Time spent to retrieve ticket, Inconvenience, waiting	Waiting in line, need to proceed to central location	Un-productive time, limited access to real-time info	Waiting in line
Technology Value Contribution	Ubiquity	X	X	X	X	X
	Context	X	X	X	X	X
	Data Pro-Activity	X		X	X	X
	Payment Function	X				
	Interaction Function	X		X	X	
	Entertainment Function				X	
	Remote Control Function	X		X		

Mobile technology has the potential to break this set of compromises by allowing processes to be executed regardless of location (ubiquity). Similarly, when arriving at a destination airport, a traveler's mobile device could receive availability updates and flight schedules for the return flight (context). Seamlessly, relevant information

could be sent to the traveler's device avoiding the necessity of having to explicitly request the information (data proactivity). By using a biometric application, travelers could identify themselves and execute a payment wirelessly, similar to the functionality of a credit card (payment function). Using a wireless application, customers could for example interact with the airline's inventory and reservations system, change reservations, request upgrades, etc. (interaction). Once a flight is selected and the payment is authorized, travelers could finalize the booking, which initiates a process in the backbone of the airline's computer reservations system (CRS). Hence, travelers are in charge of initiating a remote process (remote control).

It is important to note that Table 3 only addresses a limited spectrum of travel processes. In international contexts, immigration boarder control and arrival services would need to be incorporated. In addition, diverse airport services such as ground transportation, a hair salon in the terminal and the gift shop could be integrated into the analysis of technology value in the m-travel chain.

3. Strategic considerations and mobile technologies

During the initial rush of airlines to initiate mobile applications in the year 2000, a survey by O'Toole [2001] concluded that in order for airlines to gain a competitive advantage and reduce costs, they have shifted the strategic focus of information systems toward the use of open systems and the use of the Internet protocol (IP). This survey found that twenty nine percent of worldwide airlines had already introduced the wireless application protocol (WAP) for customers, another 16% planned to install within 12 months, 10% within 2 years, 16% in 3 or more years, 6% never will, and perhaps the most telling of all, 23% answered "don't know." Surprisingly, no newer information is available (either publicly or in private conversations solicited by the authors) regarding the developments during the past few years. Mobile Business appears to have fallen off the radar screens among airlines worldwide. This could perhaps be the result of the dire financial condition of many carriers and their focus on survival vs. a deliberate forward-looking market strategy. However, the mobile trend in the US airline industry has been much more pronounced. Almost all major carriers have introduced mobile applications of some type. A reason for the quick adoption of wireless technologies in the airline industry can be attributed to the fact that they create immediate benefits, typically generating return on investment (ROI) within a year.

From a technological point of view, mobile technologies offer far more advanced applications than the ones currently in use. The main limiting factor for airlines to introduce more advanced applications is the lack of common standards and deficiencies associated with the wireless protocol (WAP), in addition to post September 11th government-imposed security processes mandated by the newly created TSA (Transportation Security Administration). Therefore, current mobile applications appear to be experimental rather than providing real value-added. Typically, the deployment of an IT and m-commerce strategy has some flaws with respect to managing the technology. Salkever [2002] suggests that because of pressures to reduce operating and investment costs, many airlines outsource their IT systems management to specialists, achieving savings of 10% to 20%. However, this practice might deprive airlines from on-line information with direct impact on pro-active marketing strategies. In addition, if m-commerce is interpreted as a mobile version of e-commerce, it would appear logical for e-commerce departments to be responsible for the development of mobile strategies and applications. However, in the airline industry, current mobile business applications are typically initiated and funded by customer service departments and even the responsibility for e-commerce remains rather vague within the organization. For example, American Airlines and America West organize the e-commerce function under the Chief Information Officer (CIO), while Continental, Delta, US Airways, United, and Northwest have allocated e-commerce responsibilities to the marketing department [Bell 2001].

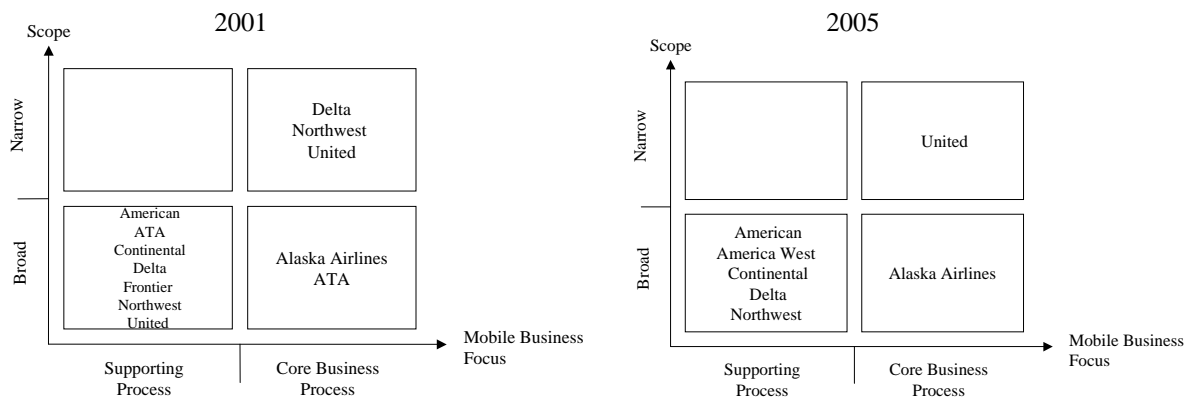
In order to infer which strategy US airlines pursue with respect to mobile initiatives, two perspectives/approaches of strategy should be distinguished: The planning and positioning approach, and the design school perspective. From a positioning point of view, strategy becomes a means of locating an organization in the business environment. In order to aspire a certain position, a company develops a strategic plan, which is the result of an established vision, a mission, and clearly defined objectives [Thomson and Strickland 2001]. In terms of strategic positioning, Porter [1985] identified three generic strategies available to companies to position themselves in order to sustain a competitive advantage: cost/price leadership, quality/attribute differentiation, and focus on particular market niche/segments. Most airlines claim that the driver behind mobile initiatives is to offer customers choices and to improve customer convenience. This appears to be a differentiation strategy. On the other hand, airlines claim to focus on the cost saving potential of mobile business. According to Porter [2001], this will not lead to a successful strategy as companies have to make a choice whether to compete on cost or differentiation in order to yield above average performance [Minzberg and Quinn 1996]. Currently, focus on a particular target segment (a focus or niche approach) remains undefined in the mobile strategies revealed by US airlines.

Some carriers, such as Delta and Northwest, offered a smart card based mobile check-in solution available exclusively to prime customers. However, after a short trial phase, both initiatives have been suspended. United is currently testing a smart card-based check-in and boarding application that requires pre-registration and an annual fee, targeting mostly frequent business travelers. Nonetheless, most airlines make a majority of value-added or information based applications (see Table 1) available to all customers regardless of segment. For example, Alaska Airlines offers a WAP-based check-in and boarding application that awards 1000 bonus miles to users. Yet, although applications may be available to any customer in advertising, the mere fact that customers require a mobile device in order to make use of wireless services leads to the self-segmentation of potential users. United, for example, offers the possibility to purchase tickets using a PDA. Yet, only a relatively low percentage of travelers possess a PDA that is equipped with a wireless modem necessary to perform the purchasing process.

Summarizing the discussion above, it appears that the main dimensions that distinguish wireless portfolios of US airlines are scope, and the focus of the mobile business model. Figure 1 below synthesizes the analysis above into a strategic framework. Scope of operations is defined as broad or narrow. Focus is distinguished by targeting only supporting business processes or core airline processes. We define core processes as activities that are crucial to fulfill the basic need of transportation, getting from point A to point B. The list of such activities includes ticketing, check-in, and boarding. In contrast to core processes, supporting processes are defined as activities that provide value-added, yet not being immediately essential for fulfilling the basic need of transportation. Most airlines employ m-business to provide value-added services in the category of supporting processes making these services available to all customers (broad scope) who possess an adequate mobile device. In addition to providing information, Delta, Northwest, Alaska Airlines, American Trans Air, and to a certain extent United, reveal a focus on core business processes in their m-business models. An interesting differentiation can be noted with respect to the target group of wireless services. Alaska Airlines clearly intends to serve a broad customer base, while Delta is an example for making its service only available to an elite and sharply distinguished customer segment. It appears that airlines targeting a narrow scope have selected smart cards/ loyalty cards as mobile devices. In contrast, carriers catering to all segments focus on WAP applications.

In a strategic perspective, US airlines do not appear to employ mobile business as a tool to position themselves according to Porter's [1985] three generic strategies. However, mobile service portfolios can be differentiated in terms of scope and the focus of the mobile business model. Although airlines position themselves differently according to these dimensions, it is questionable whether this positioning is of strategic nature. The choice of some airlines to target primarily elite travelers with m-business may make sense considering availability of mobile devices. Yet, the main value contributed by mobile technology might be found in the broad market. Differentiation strategies in high yield segments can be easily justified by the high profit margins. In a move to decrease waiting time for premium customers, for example, most major US airlines have established separate security lines during peak hours. Such initiatives, however, are impossible in segments where yields are close to unit costs, or even below. This supports the argument that airlines are likely to reposition themselves in the future towards a broader scope, considering the positioning categories as described above.

Figure 1: Positioning through m-business on the passenger side 2001 vs. 2005



The fact that the quadrant of narrow scope and supporting processes (upper left corner) is empty is quite plausible and intuitive. Mobilizing supporting processes is likely to contribute relatively little value compared to

core processes, as these are more important in order to fulfill basic needs. Thus, contributing little value to few customers simply makes no business sense and might result to a lower return on investment (ROI).

Summarizing the different views of strategy described above, it can be concluded that US airlines do not follow a mobile strategy from a planning and positioning point of view. Yet, mobile initiatives could be rather explained as “emergent” strategies, which result from a pattern of trials based on availability of technology and general non-quantitative assumptions how mobile technology can improve customer satisfaction.

3.1. Key to strategic success - consumer/user requirements through focus group methods

In order to implement mobile applications as a strategic tool successfully, consumer requirements along with forces in the business environment determine the key success factors of a strategic fit with mobile airline strategies. For the purposes of this manuscript, the authors conducted exploratory interviews with middle-upper airline management, aviation consultants, in-depth interviews with aviation expert educators and arranged a focus group exchange comprised of 12 graduate business students in an aviation program.

The focus group session was conducted among a group of 12 business students at a US southeastern private University. The objective of the interview was to extract feedback from a consumer point of view through a typical focus group interaction moderated by one of the authors. The core of the discussion was the potential role of mobile technology in the travel process. Emphasis was put on mobile check-in and boarding, especially with respect to the technological platform to be employed for such application. Smartcard-based and WAP-based mobile check-in applications were explained to the group in a brief presentation as a base for further discussion.

Table 4: Focus Group Framework, Questions, and Responses

Moderator Questions	Respondent Feedback
What is your first impression?	<ul style="list-style-type: none"> • This is going to be big, especially after 9/11 • No benefit, self-service kiosk is enough • Smartcard better suited for leisure travelers
What would you as a customer want to know in order to use mobile check-in/boarding applications?	<ul style="list-style-type: none"> • How much is the time saving?, Can waiting lines really be fully bypassed? • How much do I have to pay in order to be able to participate? • Is the system really reliable, is it secure?
Is there a difference in perceived privacy concerns between smartcards and mobile phones?	<ul style="list-style-type: none"> • No difference • Cell phones can be easily traced, danger of data abuse • Personal information (spending habits, location, etc.) is available to credit card companies anyways
What advantages/ disadvantages do you see with respect to the rivaling technologies?	<ul style="list-style-type: none"> • Change of reservation not possible with smart card • No interaction, otherwise cell phone is required in addition • Smartcard better because it can also be used for international travel, regardless of telecom standards • Smartcard has no communication feature • For frequent flyers, WAP better suited because of cellphone/PDA availability • Smartcards preferable due to risk of mobile phones to be abused by spamming with sales alerts, advertising, etc. • One smartcard for all, integration of check-in application into a soon common device. • Smart card more handy, fits into wallet • Mobile phone to become universal tool • Smart Cards become legacy technology • Government will require a device incorporating biometrics (National identity card). Government can require travelers to possess a smart card, but not a mobile phone. • Smartcard only acceptable if the display offers the same

	informational capabilities as a mobile phone.
Objections towards mobile check-in and boarding	<ul style="list-style-type: none"> • Traveler still has to go through the system • Self-service kiosks already exist, no need for mobile application to bypass waiting lines • Timesaving potential not important to leisure traveler
What would an airline have to “tell” you in order to get you interested in a mobile application?	<ul style="list-style-type: none"> • Technology can incorporate security issues • I hate being at an airport, whatever reduces the time spent there will create value • Both options should be offered, I would like to have the choice
How much would you be willing to spend to use this application (WAP or Mobile)	<ul style="list-style-type: none"> • \$20/\$25 a year • depends on ticket price • 5% of ticket price • Don’t know • Nothing • Wrong question, airlines should pay for it • As a leisure traveler, I would choose the cheapest possibility to get from A to B; time is not a factor justifying higher price.
What factors appear to be decisive to you in order to choose between smart card or WAP platform	<ul style="list-style-type: none"> • Government regulation will decide which platform to use • How durable is the smartcard compared to mobile phone, how long does it last? • Cost of the device, leisure traveler will always opt for cheapest alternative • Is WAP as reliable as a smartcard • Reliability of WAP application • What if there is no signal available, or gets lost on the way to the gate.

The exploratory results listed in Table 4 can be summarized as follows: Most members of the focus group consider mobile check-in and boarding applications to be promising, especially given the dynamically changing airport environment. Some respondents perceive mobile applications to lack the ability to add value as self-service kiosks already exist, and current mobile procedures do not allow travelers to bypass security lines. For the future, all participants predicted that WAP applications will be more promising than smartcards; this however depends on the availability of capable mobile phones as the cost of acquiring a device appears to be a main limiting factor for adopting mobile applications. The majority of respondents suggest that they would opt for a platform that can also be used for all travel and non-travel related processes. If a single device became commonly available allowing integration of all processes, this would be preferred over having to use both technologies in the travel process. If they had a capable mobile phone available, all participants indicated to favor this as a technological platform due to availability of communication features. However, an overlooked aspect in the technological discussion may be the possibility to use a smartcard as a loyalty-marketing tool, especially if it is provided by an airline on a complementary basis.

The key categories for success are found to be a pleasant user experience, the contribution of value through mobile technology, and fulfillment of customer requirements. User experience relates to the way a user of mobile applications perceives mobile technology in terms of how convenient, fast, costly, and reliable it is to use. Success factors relating to the user experience are the requirement of mobile airline applications to be executed over the Internet or at self-service kiosks, the integration of all applications into as few different devices as possible, the possibility to yield results quick, possibly in less than 3 minutes, reliability of applications, devices, and reception, all at a reasonably low cost.

Thus, it appears that most immediate opportunities are centered on the capabilities of the "Mobile Internet" to break compromises inherent in current airline processes, and the increasing availability of devices that are capable of executing wireless applications. Airlines simply seeking to mobilize existing e-commerce processes, but fail to create new mobile business models, might make the same mistake many retailers made in other industries when they tried to implement e-commerce as extensions of their traditional business models. In that sense, a significant anti-development force is the existence of legacy IT infrastructures, making it very hard for airlines to integrate systems and to adopt standard Internet protocols and new infrastructures (TCP/IP), especially in hard economic times. Summarizing the above discussion, key success factors for m-business in the context of the US airline industry can be described in terms of delivering results quickly and at low cost, to integrate sub-systems and adopt Internet infrastructure, and to provide "easier, faster, or more" services.

4. Conclusion

During the latest technology boom of the late 90s up to early 2000, most airlines rushed to implement mobile applications assuming m-commerce would take off as rapidly as e-commerce had previously done within the broader business environment. Often, these initiatives were less strategic in nature but they were rather based on assumptions of what airlines thought would create value to customers. Yet, given the financial difficulties airlines have been continuously facing since the terrorist attacks of September 11, 2001, many were forced to look at ROI very closely and consolidate resources. Furthermore, heightened security measures at airports have increased the complexity of problems inherent in the travel process that could not be addressed with m-business applications in place at this time. Consequently, many mobile business initiatives have been abandoned since then and m-business has disappeared from many airlines' corporate radar screens. This has been especially true for applications that were targeted to a specific market segment.

While most major U.S. airlines have committed in one form or another to implementing mobile business processes into their existing business models, and have embraced the concept of using m-business as a means of service differentiation, it is evident that there is a general lack of focus of m-business as a part of a company's core business model. Despite advances in technology, and proliferation of mobile business in other industries, to the airline industry m-business is still viewed as a "nice to have" peripheral process rather than a core strategic tool. From a positioning point of view, U.S. airlines do not appear to implement a clear strategy behind their mobile business initiatives that would lead to a sustainable competitive advantage. Given the focus of this study, it is unclear whether or not carriers based in other parts of the world have similar attitudes and strategic views. It would be very interesting to extend our strategic framework and test it against a different setting, in the process explicitly assessing the external validity of our work.

One particular symptom of this situation is that US airlines have yet to decide whether or not to employ m-business as a cost saving tool, or as a tool to improve service quality. Although one direction might lead to the other, it may be necessary for the airlines to position themselves by focusing on one particular direction for either one to occur. Following both approaches at the same time imposes the risk of not achieving either one.

As technologies and market conditions evolve, m-business is likely to be part of nearly all value-creating activities throughout the value- and supply-chains. It will have a significant impact on the way an airline creates value to its customers. The number of touch points will be further reduced. Traditional key drivers of customer satisfaction, such as friendly airport or reservations staff shift over time, placing more importance on how fast, comprehensive, and easy to use digital applications are. Thus, an airline's talent will be increasingly judged by how effectively it can integrate systems and adopt a compatible IT infrastructure, as these are ultimate requirements for mobilizing services from the "offline" world. Focusing carefully on what customers want and are willing to pay, could be an essential driver for m-business as in all other traditionally established business.

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