Investigating Wireless Web Adoption Patterns in the U.S.

Wireless Web providers should roll out new services on an evolutionary rather than revolutionary track.

Many observers predict the next wave of technological revolution will be one of wireless Web-based mobile commerce. Within the U.S. alone, the market for mobile commerce is predicted to reach $25 billion in 2006.\(^1\) This potential has spurred major U.S. carriers to spend hundreds of millions of dollars upgrading and building out the network infrastructure. In Europe, wireless service providers have invested $100 billion in spectrum licenses alone.\(^2\) Along with unbridled optimism, there is also growing concern among businesses that adoption patterns of wireless Web services may be erratic. U.S. consumers have been slow to adopt new services. Clearly, to recover their investments as well as to drive new revenue, service providers must understand the factors that lead to adoption of mobile commerce and the likely trajectory of the technology in terms of consumer need. In particular, some very basic questions must be addressed:

- What causes customers to experiment with and ultimately adopt mobile commerce?
- How do services and form factors influence adoption?
- What is the likely evolution of adoption among user categories?
- What will the “killer app” of mobile commerce be?

Through a broad survey of potential and existing users of mobile commerce, we attempt to address these issues. Our aim is to identify key drivers of use and potential patterns of adoption, and to develop a descriptive context of the technology's future.

Research has shown that adoption of an innovation is a function of the alignment between the innovation’s capabilities and market needs. A useful framework for understanding this alignment is found in research by Rogers [6]. According to this model, the attributes that drive adoption are:

  - **Relative advantage.** Consumers are likely to
adopt wireless devices that offer an obvious advantage over their current device in use.

Behavioral compatibility. For compatibility to be achieved, the innovation (wireless Web) must be consistent with adopters’ existing values and past experiences related to the current technology (landline Web). The higher the compatibility, the lower the perceived behavioral change required by the adopters.

Needs compatibility. This dimension is associated with the ability of the innovation to meet the needs of the adopters (for example, activities that might not be useful to conduct while tethered to a landline, but might be very useful to conduct on the go).

Trialability. This is the ability of adopters to experiment with wireless Web devices and services on a limited basis before making a full commitment.

Complexity. The easier it is to use a wireless Web device, the less complex it is perceived to be. An innovation’s complexity has been shown to inhibit its adoption.

Adopters of the Wireless Web

For many managers, it is tempting to categorize consumers as either adopters or non-adopters. Such simplification often results in a short-term view of market evolution and growth. Viewing adoption as an evolutionary event consisting of differing adoption populations captures important aspects of time that are critical in successfully positioning a product offering. Based on prior research [5–7], we stratify adopters across six ideal-type categories:

Innovators. This group is the first to adopt a new innovation and is characterized by a high degree of technical knowledge. Innovators tend to be best at coping with high degree of uncertainty surrounding the innovation.

Early adopters. This group tends to be the greatest influencer of adoption rates. Early adopters communicate a subjective evaluation of the innovation to the remaining population.

Early majority. This group takes its time in adopt-
ing an innovation. Deliberation is the key characteristic of the early majority.

*Late majority.* This group tends to approach an innovation with a great deal of skepticism and needs to be convinced of its advantages. The late majority tends to be moved by peer pressure and economic necessity.

*Laggards.* This group tends to be suspicious of innovations and therefore takes a lengthy period to adopt. Laggards’ initial awareness of the innovation will typically be very low.

In order to cover a variety of potential adopters and their perceptions of adoption factors related to wireless Web innovations, we sought survey respondents from three pools. First, we surveyed executives attending a large university-sponsored seminar. Second, we surveyed a pool of first-year MBA students at the same university. Together, this gave us responses for the 25-plus age group. Finally, through a kiosk located at another major U.S. university, we invited undergraduate students and graduate students to complete a survey. This sample helped us cover the 18–24 age group. In total we had 321 respondents.

Using cluster analysis methodology, we grouped the sample into five clusters based on responses to the items measuring wireless Web adoption drivers. As a statistical tool, cluster analysis provides a method for detecting natural groupings within a data set [1]. The likelihood of adoption of wireless Web by respondents in each of the clusters was calculated based on their response to three items (averaged across all respondents within a cluster). This allowed us to identify respondents as innovators, early adopters, early majority, late majority, or laggards. We then calculated the means of adoption drivers among the clusters and tested for significant differences across the clusters. The verbal representation of these findings is presented in the table.

The table illustrates each adoption group exhibits a distinct profile of perception with respect to adoption of mobile commerce. Clearly, an important implication of this result is that adoption of mobile commerce within the U.S. may exhibit a staged rather than “big bang” effect. This may contrast with adoption patterns in markets such as Japan, which have experienced an explosion of adoption and use. To better understand the nature and potential adoption patterns in the U.S., we examine each of the adoption attributes across the adoption classes, as well as the pricing factors, since pricing is an important factor in the consumer adoption decision.

**Relative advantage.** We measure the relative advantage of the wireless Web use across three groups of activities: information acquisition, transactions, and entertainment. Across all activities, early adopters scored the relative advantage of the wireless Web as highest followed closely by innovators. Late adopters and laggards perceived the relative advantage of the wireless Web as considerably lower. Clearly, to capture the interest of the adopting populations that drive opinion and subsequent acceptance by later adopters, providers must demonstrate the efficiency of the wireless Web for gathering information, making transactions, and for entertainment. This is a particularly acute challenge for the U.S.-based market. Here, pre-existing technologies have engrained patterns of information and transaction workflow, so users may not be quick to perceive added value as an incentive to shift commerce activities to the wireless domain.

**Behavioral compatibility.** Early adopters perceive a high level of behavioral change required for the use of mobile commerce in information acquisition, transactions, and entertainment. Laggards considered the level of behavioral change to be quite high while inno-

![Figure 2. A Trajectory of Service Importance and Education Emphasis.](image-url)
DIFFERENT SEGMENTS HAVE DIFFERENT NEEDS AND CONCERNS. HENCE, EDUCATIONAL CAMPAIGNS SHOULD SPECIFICALLY ADDRESS THE AREAS OF CONCERN TO EACH CUSTOMER SEGMENT.

vators perceived the change to be low. As prior research of adoption has shown, early adopters tend to be rational and judicious about their adoption. They tend to evaluate the innovation objectively and communicate their opinions to the remaining population. By contrast, innovators are more instinctive and passionate about their innovation decision. In order to drive adoption with early adopters and early majority, service providers must convince these groups that the behavioral change required to shift from landline access to acquire information and conduct transactions is not as extensive as they perceive. Marketing, demonstration, and case instances may be successful avenues to introduce new patterns of commerce.

Needs compatibility. Perceptions of needs compatibility among potential adopters reveal some very interesting results. As shown in the table, needs compatibility of the wireless Web is highest among early adopters, high among innovators, and lower among other groups. Coupled with the findings on behav-ioral compatibility, these results uncover a paradox of adoption among the groups. Specifically, early adopters and innovators perceive the wireless Web as highly compatible with their needs, while perceiving the behavioral change and trialability of the innovation to be an obstacle. This implies that an ideal form of wireless Web (mobile commerce) has not manifested itself to potential adopters. In other words, early opinion leaders embrace the concept of mobile commerce as useful. However, they seem to struggle with the usability of wireless Web (that is, a significant gap exists between its present form and its ideal form).

In terms of defining the ideal state of the wireless Web, subsequent interviews with innovators and early adopters revealed six key attributes: immediacy, personalization, timeliness, context, ubiquity, and constancy. These are viewed as necessary capabilities for creating a “killer app” of mobile commerce (see Figure 1). The direct implication for providers is to design technology around these key features in order to align technology closer to workflow patterns among adopters.

Trialability. Perhaps the most potent finding within the survey addresses trialability perceptions of potential adopters. Early adopters find the current state of the wireless Web services being provided by wireless service providers in the early phases as least trialable (accessing limited Web sites and not useful content). Interestingly, the early majority ranked trialability of services as the highest, while innovators found trialability to be high. Importantly, the latter group represents the most sophisticated users and the early opinion leaders of technology adoption. This current state of affairs may delay mass adoption, as word of mouth from early adopters is crucial to drive later adopters. Service providers would benefit greatly by creating or co-sourcing value-driven content and avenues for transaction that are geared for easy experimentation and early success among potential adopters. These services provide an avenue for early adopters to experiment with low cost (in terms of financial commitment, opportunity cost, and coordination cost) mobile commerce.

To explore aspects of utility a bit deeper, we asked potential adopters to assess the importance of services ranging from instant messaging to accessing email to downloading music to shopping. Among all groups, email, news, and instant messaging (SMS) were cited as the most important services in adoption. Shopping and videoconferencing ranked lowest. This finding necessitates a reconsideration of the potential return on new or upgraded networks. Perhaps a phased roll-out of services is a better market mechanism for align-
ing with the trajectory of consumer use. Many companies may be positioning themselves through services that are not likely to be quickly adopted by a critical mass of users. However, as noted before, customers may not be fully aware of the benefits of this technology, suggesting that targeted marketing strategies will be needed to raise customer awareness.

**Complexity.** Form factors of wireless Web devices were stratified across three attributes: voice recognition capabilities, voice read-back capability, and larger screen size. While early adopters and the early majority registered highest on each of these attributes, all groups considered form factors important in adoption. While voice recognition capability is cited as important, larger screen size is consistently cited as the most important form factor in adoption. This implies that significant resources must be committed to understanding how people use the visual aspect of the mobile interface. Perhaps service providers should collaborate more closely with device manufacturers to design an interface that is intuitive and simple in the input and output of information. Again, interviews with potential adopters revealed a significant gap in the ideal versus available interface in mobile devices. Voice and image inputs, intuitive information presentation, and graphical capability are key considerations in building technology around the user instead of attempting to mold a user around the technology.

**Pricing factors.** Finally, with respect to pricing schemes, the five categories of adopters seem to exhibit a common view. All groups reported being most hesitant to adopt a scheme that bills voice and wireless Web separately based on consumption. The innovators, early adopters, early majority, and late adopter groups (77% of our sample) indicated they are highly likely to adopt if wireless Web services are bundled with voice services. These groups also preferred flat fee pricing to variable pricing. Interestingly, the laggards seem to prefer bundled services with variable pricing based on consumption. Therefore, it seems the key factor for initial adoption and subsequent contagion is the providers must price their services based on bundles of voice and data services. Many firms that have built process and system empires for individual products must integrate these lines of business to present a single face to the customer.

**Evolution vs. Revolution**

Most of the past innovation research has been focused on post-diction rather than prediction [5]. Our study focused on predicting how different factors (and the interplay between them) will influence wireless Web adoption. It seems highly likely that a “big bang” of rapid adoption within the U.S. market is unlikely. Instead, it is more likely that mobile commerce will follow a staged adoption pattern that may be accelerated or delayed based on the strategic choices made by service providers. Based on our survey results, we offer a predictive scenario of adoption behavior that is illustrated in Figure 2.

As illustrated in figures 1 and 2, the best means of visualizing the needs of adopters is in terms of “life workflow” (that is, both business and personal use). Importantly, it is the integration of services around these components that drives real economic value in mobile commerce. Too much emphasis on either component of life workflow diminishes the overall utility of the technology. Clearly, services such as messaging (SMS and email), along with banking and financial information, form the foundation of needs compatibility in the mobile commerce arena. The next layer of services that appear important to adopters are entertainment and information-based (involving news, music, and games, for example). For later adopters, maps and context-based services become an important aspect of service.

As also illustrated in Figure 2, providers must understand the adoption drivers that facilitate early adoption and then fan the fires of contagion for later adopting populations. Our research strongly suggests that a lack of trialability and a perception of a steep shift in life workflow (behavioral change required to adopt) now inhibit full adoption of mobile commerce by even the most innovative of the adopting population. Designing basic suites of services and devices that are closer to the actual workflow of personal and professional communication among users is critical for success in the U.S. market. Our results suggest these services should be basic and reliable, focusing on aspects of hyper connectivity. These services should also be accompanied by campaigns of customer education (see Figure 2). Based on our findings outlined in the table, such campaigns should be designed to educate each customer segment as to how mobile commerce services meet individual needs, require minimal behavioral change, hold a relative advantage over landline-based Web commerce, and are easy to use. Different segments have different needs and concerns. Hence, educational campaigns should specifically address the areas of concern to each customer segment.

Overall, our results imply that providers should carefully segment their offerings and selectively roll out new services on an evolutionary rather than revolutionary track. Following this pattern will guarantee success among innovators and early adopters by providing a service offering that is valued and that does
not “over promise.” This success is critical in moving the larger population of potential consumers toward full adoption.

Importantly, mobile commerce holds several new revenue opportunities for service providers as well as other businesses [2]. To unlock this potential, businesses must rethink the new medium and offer services for the consumer market that capitalize on the medium’s uniqueness, such as location awareness and ubiquity [3, 4]. In order to spur adoption, creative services and pricing strategies must be timed and executed to encourage experimentation and clearly distinguish the technology’s relative advantage over landline based Web commerce. This may require providers to view services and pricing as a game of mass customization rather than mass production. As illustrated by these results and by the sagging fortunes of some wireless providers, the era of “big bang” acceptance of new technologies and services may be forlorn hope. But if you build the technology with the specific needs of consumers in mind, they will (eventually) come.

**References**


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