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Madeleine Besson

Olivier Epinette

Olivier Segard

Pierre Vialle

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Madeleine Besson, Olivier Epinette, Olivier Segard, Pierre Vialle

Institut National des Télécommunications, Evry, 91011, France
{Madeleine Besson, Olivier Epinette, Olivier Segard, Pierre Vialle}@int-evry.fr

ABSTRACT

According to most industry experts and researchers, wireless Internet access is seen as a promising market for mobile users in locations such as airports and other public venues [1]. According to the Gartner Group, 6,000 wireless Internet hotspots were installed in the world in 2002, 57% in Northern America and 14% in Europe. 15,000 hotspots should have been implemented in Europe by 2000, used by 11 million regular users and 12 million occasional users. Airports, because of the high density of travellers and the relatively long waiting times involved, are considered as key hotspot locations. Yet, consumption of such services is still lagging behind suppliers' expectations. Why, and whether, consumers will use wireless Internet still remains unclear. This paper aims to contribute to answer both questions by defining a framework explaining the intent of use by consumers. To this end, we carried out market research, focused on executives attending public venues where wireless Internet services can be proposed. In this paper we first define the specific features of the wireless Internet access for airports. We then propose a framework explaining the intent to use wireless Internet services.

***Keywords*:** e-business, m-business, product adoption, telecommunications, mobile Internet, wireless Internet

INTRODUCTION

Understanding and anticipating potential consumer behaviour is critical for suppliers of new high technology services. However, this is a particularly difficult exercise because of factors such as the complexity of the products involved, the presence of interdependencies, the low or non-existing consumer experience, or the high incertitude of the impact of innovations.

More specifically, consumer behaviour concerning wireless Internet services in public venues is hard to understand for the following reasons. First, these services can be used by a large variety of travelling professionals, even if senior executives currently constitute the main target of hotspots. Second, adoption and usage are dependent both on the decision of the individual users, and of the company employing them. Third, from the individual user's perspective, there is no clear border between professional and more personal expectations. Family, entertainment and business topics must be equally considered. Fourth, a multitude of companies can coexist on a hotspot, as in the case of an airport. So, the spectrum of localised mobile Internet services, which can be proposed, is broad. Fifth, the adoption and consumption of such services are subject to network externalities: consumption in one hotspot is dependent on consumption in other geographical areas. Finally, beyond the services to be provided, the physical characteristics of the hotspot could have an influence on the consumption experience.

To explore this complex consumption situation, we conducted a survey in co-operation with the state-owned organisation which manages the main airports near Paris. From this survey, we present, in the second part of this paper, a framework aiming at explaining the intent to use wireless Internet services. We begin with the context of the survey.

1. THE CONTEXT: WIRELESS INTERNET HOTSPOTS IN AIRPORTS

The research[1] was conducted in the main airports near Paris, in order to analyse the intent to use Wireless Fidelity (Wi-Fi) services in these hotspots, the provision of which began in the year 2003.

An airport covers different activities and geographic zones. Several activities can be carried out on an airport platform, such as transport, control, cleaning, maintenance, or passenger care. Geographically, these activities broadly relate to three zones on the airport area: tarmac (services concerning aeroplanes), air terminals (services for passengers on site) and airport periphery (activities benefiting from close location to the airport, such as hotels or offices). Finally, three categories of people can be found on an airport site: employees of businesses and administrations located on the airport platform, passengers, and employees from outside firms on short duty at the airport (for example for repair activities). In this study, we focus on business travellers that have been identified as the main market target by ADP, the organisation managing the various airports around Paris.

[1] This research is drawn from a broader research project called ERACE, including also an inter-organisational component [3].

The study relates to a hotspot service in the main airports of Paris, using a Wireless Local Area Network (WLAN) technology. WLAN is a short-range, broadband data communication system using radio waves [2]. Various standards coexist, but the 802.11b standard, defined by the Institute of Electrical and Electronics Engineers (IEEE) tends to be dominant. It allows a theoretical flow of 11 Mb/s in the frequency band of the 2.4 GHz, on a distance of up to several hundred meters. The IEEE 802.11b standard is more popular under the name of Wi-Fi. The deployment of a Wi-Fi network is relatively easy and it offers a much higher level of flexibility than fixed networks. The number of accesses can be increased without needing to re-dimension the network, as would be the case with fixed networks. This system allows some limited mobility inside one cell, but contrary to cellular networks such as GSM networks, does not allow roaming between cells without service interruption. Such networks can be accessed by different types of terminals equipped with Wi-Fi chips, such as mobile phones, Personal Digital Assistant (PDA), or laptop computers.

There are three possible uses of Wi-Fi. The first is private use, either for a home network, or for a company Local Area Network (LAN). The second is community networks, usually in rural areas. The third is hotspots in public venues such as coffee shops, hotels, railway stations or airports.

A Wi-Fi network can give access to the following services:

- Internet access: including surfing, messaging and Virtual Private network services allowing access to Intranet,
- Localised information services: reception of “push” information, such as infrastructure usage information and schedules (transport hotspots), or commercial information (for example from nearby shops),
- Multimedia services, such as movies or music. As the available bandwidth is shared between current users, a large number of users can result in unacceptable download time.

As users of a particular hotspot may be customers of another hotspot, or of a mobile operator, the establishment of roaming agreements is necessary. Basically, a roaming agreement ensures that a customer of network A is able to use the service provided by network B, while being billed by network A, with some mechanism of revenue sharing between the two networks. Therefore, users can pay for service usage in three different ways. They can be billed by the hotspot manager, either directly through payment by credit card, or indirectly with prepaid cards that can be bought in the airport’s newspaper shops. They can also be billed on their mobile phone account, as most mobile operators offer subscription schemes bundling General Packet Radio Service (GPRS) cellular services with Wi-Fi services.

2. THE FRAMEWORK: FACTORS EXPLAINING INTENT TO USE

To explore this complex subject, we made a qualitative study, and not a quantitative research, which would be limited to quantifying traditional uses, and might not take into account all the richness of the consumption experience in a hotspot, and of the psychosocial context. The qualitative study is based on twenty-four interviews with medium and senior executives. From our preliminary results, we were able to conceive a simple framework aiming at explaining the intent of adoption and use of wireless Internet services. This framework specifically concerns an airport environment, but can easily be adapted to other types of public hotspots.

The sampling frame was made up of several lists of business schools’ alumni. People were selected in order to ensure the strongest variety of the points of view on our study subject. The selection was operated starting from two variables that could discriminate the answers: the function in the company and the degree of mobility. After having contacted further these two hundred people, we were able to carry out twenty-seven interviews. Three could not be used because of bad audio recording quality.

To collect information, individual in-depth interviews were carried out. They are appropriate for collecting information concerning perception and behaviour. The interviewed person expressed himself freely, but within the framework of the topics suggested by the guideline. The former is composed of three parts. The first part makes it possible for the person interviewed to evacuate the stereotypes concerning the Internet and to centre on the current uses. The second part centres the discussion on travel and the situations of waiting able to occur on this occasion. The last part proposes to imagine the mobile Internet services able to be offered.

Four categories of factors emerge from our qualitative analysis, namely individual characteristics and experience of business travellers, the policy of their organisation concerning Information and Communications Technology (I&CT), situational factors relative to the hotspot, and service availability inside and outside the hotspot (table 1).

Table 1. Factors explaining intent to use Wireless Internet in an airport

Factors	***Explanations***
Individual characteristics and experience	
Position	Managers with higher positions are more likely to be equipped, but less likely to use
Function	Mobile communications are more crucial for some functions (e.g. sales, technical support)
Age	Older people are less likely to use
Sex	Men more likely to use than women
Personality	Desire to keep in touch, need for anticipation and reassurance
Experience	Experience in using the Internet and mobile devices (learning effect, familiarity), related to personal interest, technical functions, sector of industry
User status	Effect of positive/negative experience on general attitude towards computing and Wi-Fi Wi-Fi user in other contexts
Organisation policy	
Attitude towards I&CT	Strategic resource or cost to minimise
Equipment and access policy	Influence equipment
Service policy	Policy to spur or restrict usage
Security policy	May lead to restrict availability of remote access to IS
Situational factors	
Perceived available time	The more perceived available time, the more usage
Travel characteristics	The type of travel, in terms of duration, destination, transit, determines the available time. A low level of organisation induces need for information and transaction
Physical environment	Privacy, comfort, noise level, availability of sockets
Service availability	
At hotspot	Attractiveness and width of services available influence usage
At other hotspots	The more hotspots, the more adoption and incentive to use (network externalities)
At company premises	Availability of company WLAN induces adoption and propensity to use
Roaming availability	Reduce transaction costs, induce spontaneity of usage

2.1 Individual characteristics and experience

Various factors seem to have an influence on the propensity to use wireless Internet in a hotspot: hierarchical position, function, age, sex, personality, experience and user status.

The hierarchical position plays an ambiguous role. On the one hand people with a higher position are more likely to be equipped with terminals by their organisation, and particularly with PDAs. On the other hand, their comments suggest that travel time is often perceives as an opportunity to read, think and relax, rather than dealing with a computing device.

The function in the organisation also has an influence on intended usage. First, for some functions, such as sales or technical support, communicating in situations of mobility can be critical. People carrying on such functions are therefore more likely to be equipped, to be experienced in communicating while being mobile, and to have urgent needs in a hotspot. In general, executives working in technical functions or in the I&CT sector are more experienced in using computing devices and therefore more likely to use Wi-Fi services.

Age can have a low influence on usage, as propensity to use seems to decrease with age.

Men exhibit a higher propensity to use wireless Internet than women. One explanation could be that laptop computers and their connection do not appear practical. PDAs are considered as an interesting alternative, but are still not perceived as user friendly enough by women.

Some personality features seem to influence usage, and particularly one characteristic that we call “need for reassurance”. Even when the trip is organised in advance, some respondents expressed the need to connect to the Internet in order to check information or to be able to deal with unexpected events, concerning, for example, a hotel or car reservation. The role of “orientation towards communicating with others” can be ambiguous. On the one hand, such people can be expected to communicate electronically, on the one hand they may prefer to communicate directly, for example, with their neighbour. The latter case seems to be more likely.

Experience plays a role through two distinct but related aspects. The first concerns the accumulated experience, and hence familiarity and skills with the use of computing and telecommunications products and services. The more experienced the user, the higher the propensity to use other products and services such as wireless Internet. This is apparent, as explained before, through the type of function (e.g. technical), or the sector of industry. The second concerns the positive or negative attitude generated by former experience. Interestingly enough, some respondents having tested Wi-Fi in another context (WLAN) had a negative attitude due to the problems they encountered.

User status: being already a Wi-Fi user in other hotspots naturally leads to an increase in the propensity to use it in an airport.

2.2 Organisation policy concerning Information & Communications Technology

For business travellers the policy of their company or organisation concerning I&CT can have a decisive impact on the availability of equipment and of usage. In [5] and [6], we identified that the adoption behaviour for new I&CT products and services was strongly dependent on the way these investments and expenses were considered, and that Information Technology (IT) managers found it difficult to assess the return on investment for this type of project. The attitude towards I&CT investment and expenses broadly oscillates between two extreme positions. One possible attitude is to consider I&CT as a strategic investment (at least for a given number of projects), whose benefits are localised outside the IT function, such as improving internal and external co-ordination, reducing time to market, or increasing customer satisfaction. Another attitude is to treat these resources as a cost to be minimised, according to the available budget. In this case, investments will be considered if benefits are localised inside the IT function, such as a lower cost per bit, or lower maintenance cost.
The attitude towards I&CT will impact on the equipment and access policy (deciding who will be equipped with a terminal equipment and allowed to access a service), as well as the service policy, such as the range of services available.
Another critical point is the security policy of the IT department. A tight security policy may lead IT departments to restrict remote access to their Information System, in order to avoid malevolent intrusions (for example by hackers). IT departments may be even more cautious in the case of Wi-Fi access, as intrusion is easier to achieve for radio links than for fixed lines. An intruder could pretend to be another user for the server, or alternatively appear as the server to a user.

2.3 Situational factors

The main influencing factors are the perceived available time, the travel characteristics, and the characteristics of the physical environment. The perceived available time is relative in two aspects: the user personality (e.g. tolerance of inactivity), and the competing entertainment or other activities at hand.

Travel characteristics, in terms of duration, destination and transit time, have an influence on both time available and need for communication and information. For example, a passenger transiting between two intercontinental flights would have a high need to keep informed about his family or his business, and would also have enough time available for it. A low level of pre-organisation of travel should also induce stronger needs for communicating, for example in order to confirm a reservation, or to get additional tourist information.

Consumption of Wi-Fi services should also depend on the physical environment. This refers to ambience factors such as benefiting from a comfortable enough environment, in terms of furniture, silence, and isolation from other people. It also refers to more critical issues such as the availability of sockets for terminal equipment to be plugged in to. These factors appear to be critical and also difficult to provide, as the organisation of space in an airport is strongly determined by considerations of security, passenger management, and scarcity of available space.

2.4 Service availability

The expected consumption will be dependent on the availability of attractive services both inside and outside the hotspot considered. Service expectations are rather standard and mainly concern e-mail and Internet access. For PDA users, the provision of information in a suitable format is required. In terms of content, respondents seem to focus more on travel related information. “Push” information, for example to keep informed about accurate boarding and departure time, also raised interest. We did not identify much attraction towards multimedia services, such as downloading movies[2].

Expected consumption is also related to service availability outside the hotspot considered, through the number of other hotspots, and/or the existence of WLANs in the organisation employing travellers. This is a typical example of network externalities where the utility of a service is dependent on the availability of complementary products and services [4]. In fact it is unlikely that potential users would adopt Wi-Fi specifically in the case of the Paris airports. We would expect a two-stage decision process: first a decision to adopt Wireless Internet at a general level, or in a company WLAN, and then to use it in the airport under a given number of conditions. Multi-usage means the existence of roaming agreements between the various hotspot owners and mobile operators, including the possibility to be billed by one’s usual provider.

CONCLUSION

We proposed a framework explaining the use of wireless Internet services by individual characteristics, company policy, usage situation, service availability and travel characteristics.

[2] However, this may result from a possible bias in the interviews, as we felt that respondents were rather reluctant to mention entertainment while talking about professional travel.

A first key result of our research is the importance of the consumption situation, such as the availability of electrical connectors, a comfortable environment, or the perception of the serviceable time. The provision of localised services and of a related physical environment seems to be able to trigger the consumption of wireless Internet services on hotspots.

A second key result is that focusing only on the individual's needs and expectations, a traditional characteristic of consumer marketing, is not sufficient in order to understand the product's potential for adoption. The individual adoption behaviour will be obviously influenced by the company's computer policy, such as the terminal equipment policy, the security policy or the services provided by the organisation.

A third key result consists of the confirmation of the importance of network effects. The consumption of services in a specific hotspot is dependent on the consumption in other places, related to geographical range of availability of similar services, as well as the provision of adequate billing solutions.

The next step of our work is to use the framework to develop a set of hypotheses to be tested with a quantitative study.

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