

The characteristics of wap-phones users - travel habits, Internet usage and demographics.

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Abstract

In the paper a study of mobile phones-owners with the Wireless Application Protocol (wap) is presented. Then some technical aspects regard a wap-based booking application is described and discussed. Key findings are; the wap-phone owners have many similarities with the frequent web-users, a relatively high percentage of them had e-commerce experience, and the wap-phones are most popular among managers. In Norway, the chosen country for this study, it is documented that the use of wap-services is still very small.

1. Introduction

A mobile phone used to have one main function, to make phone calls, talk or leave messages. This is changing. For instance, SMS-messaging has become very popular – particularly among the younger generations. In Japan DoCoMo's i-mode service is also very popular. According to Business Week (2000) DoCoMo has 15 million subscribers accessing 15.000 web-sites through their mobile portal, and about 70 percent uses fee-paying services. However, DoCoMo is the exception – not the rule. In Europe, more and more mobile phones with the Wireless Application Protocol (wap) are sold, but it seems the wap-services are only used by a small percentage of the owners of these new types of mobile phones. On the other hand the future expectation for mobile-commerce (m-commerce) is very high. A number of the consulting firms, for instance Durlacher (1999) are forecasting that m-commerce will soar in the next years - particularly from 2003 and on. And a study by Marcussen (2000) predicts that 20 percent of the population in Western Europe will be wap-users in 2003.

The travel industry seems to have the same expectations. A recent TTI-report (2000a) concludes that the way ahead for e-commerce in the travel industry “*is a fusion of three separate technologies – data via the Internet, digital television and WAP mobile phone technology.*” Some analysts describe it as a revolution; “*it is clear that business travellers will be leading the wireless phone, online booking revolution.*” (TTI, 2000b)

By the end of 2000 it seems that few are using wap-services on a regular basis. In Scandinavia the penetration of mobile phones is very high. This is also the case for Norway, the country chosen for the study presented in this paper. According to Wireless Week (2000) there are 2.92 million mobile subscribers in Norway. The total population is 4.5 million of which 3.7 million are 13 years and older. The number of mobile phones with wap is approx. 315.000 according to a national survey by the market research firm MMI in Oslo. This survey was carried out in November 2000 and included the following question, “Have you booked or ordered something by using your wap-phone?” Six percent of the owners of wap-phones answered “yes” which equals approx. 20.000 Norwegians. The number of daily wap-users as of October 2000 was seven to eight thousand according to Telenor, the largest telecom operator in

Norway. In their survey the most popular service was news and weather, and travel was number seven.

Compared to the use of Internet and the use of mobile phones in general, the use of wap-services is minuscule. However, it is still interesting to look at the owners of wap-phones and those planning to buy a wap-phone. The main argument for this is that members of these segments will be among the first to use mobile Internet-services (m-commerce) in the future. Hence, we have chosen to study the owner of wap-phones and those planning to buy wap-phones in Norway.

The paper is organised as follows: First, the demographic profile of the owners of wap-phones are compared to the profile of the Internet-users. Secondly, the same groups are compared with regard to holiday profile. Then the question whether the owners of a wap-phone frequently buy travel-services online or not compared to the Internet-users is addressed. Fourthly, some problems and challenges with regard to the development and technical aspects of a wap-based booking-service are discussed. The point of view is in this case an actual travel solution provider in Norway.

2. A study of the owners of mobile phones with wap.

The findings used in this paper are based on a national representative survey in the Norwegian population, a panel survey carried out from March to September 2000. Of the total sample of 8081, 423 of the respondents answered that they had a mobile phone with wap.

Table 1 – Age

	Did use the Internet 8 days ago or less frequently	Did use the Internet the last 7 days	Has a wap-phone	Is planning to buy a wap-phone the next 12 months
15 – 19 years (4%)	5%	7%	6%	6%
20 – 29 years (12%)	18%	16%	14%	15%
30 – 39 years (23%)	22%	30%	23%	27%
40 – 49 years (21%)	24%	23%	23%	21%
50 – 59 years (20%)	20%	17%	18%	15%
60 years or older (21%)	8%	7%	16%	15%
Sub-samples	1014	3420	423	551

The percentages in the first column show the age profile of the respondents in the survey. The owners of wap-phones are more similar to the “general population” with regard to their age-profile than the Internet-users. They are somewhat older than the Internet-users, particularly if the frequent users are the benchmark.

Table 2 - Sex

	Did use the Internet 8 days ago or less frequently	Did use the Internet the last 7 days	Has a wap-phone	Is planning to buy a wap-phone the next 12 months
Male (44%)	33%	53%	57%	59%
Female (56%)	67%	47%	43%	41%
Sub-samples	1066	3420	423	551

In the total sample 56 percent were women. The owners of wap-phone and the frequent Internet-users have the same characteristics - they are predominately male.

Table 3 - Level of education

	Did use the Internet 8 days ago or less frequently	Did use the Internet the last 7 days	Has a wap-phone	Is planning to buy a wap-phone the next 12 months
Primary school	15%	14%	26%	16%
Senior high school & technical school	35%	29%	25%	31%
Under education	12%	13%	11%	12%
College or university level	37%	45%	38%	41%
Sub-samples	1014	3396	417	548

The frequent Internet-users have the highest percentage with a college or university degree. This result was expected. However, the differences between the groups are quite small. The relatively low percentage with a college or university degree among the owners of wap-phones can partly be explained by the age-profile presented in table 1. The last 20 to 30 years it has been much more common to study at a college or university than it used to be.

Table 4 - Yearly personal income

	Did use the Internet 8 days ago or less frequently	Did use the Internet the last 7 days	Has a wap-phone	Is planning to buy a wap-phone the next 12 months
Under 25.000 EUR	34%	21%	25%	25%
25.000 – 50.000 EUR	53%	56%	44%	49%
More than 50.000 EUR	5%	14%	18%	16%
Not answered	9%	9%	13%	10%
Sub-samples	1014	3420	423	551

The owners of wap-phones seem to have better income than the Internet-users, particularly the less frequent users. Hence, it is relevant to study more closely what kind of jobs they hold.

Table 5 - Position

	Did use the Internet 8 days ago or less frequently	Did use the Internet the last 7 days	Has a wap-phone	Is planning to buy a wap-phone the next 12 months
Managing director	4%	6%	9%	10%
Other manager	4%	9%	12%	14%
Head of department	23%	26%	27%	27%
Subordinate	57%	50%	42%	38%
Other	12%	9%	10%	10%
Sub-samples	778	2704	300	390

As expected the managers are more likely to have a wap-phone or plan to buy one compared to the two first groups. This is particularly true if the Internet-users are merged into one group. Secondly the skilled.

Table 6 – Type of job

	And did use the Internet 8 days ago or less frequently	And did use the Internet the last 7 days	And has a wap-phone	And is planning to buy a wap-phone the next 12 months
Unskilled workers (1028)	13%	32%	5%	5%
Skilled workers (1631)	17%	40%	6%	5%
Manager-employed (1173)	13%	65%	8%	11%
Employed (subordinates) (1250)	14%	62%	4%	7%
Self-employed (604)	12%	40%	9%	9%
Students & apprentices (757)	18%	69%	6%	9%
Sample: (6443)				

The wap-phones are most popular among the managers. Often the employer pays for the mobile phone for the managers. Hence, they tend to be less price-sensitive when buying a new mobile phone.

Table 7 - Type of holiday in 1999 (or 2000)

	Did use the Internet 8 days ago or less frequently	Did use the Internet the last 7 days	Has a wap-phone	Is planning to buy a wap-phone the next 12 months
1.Car – holiday	43%	44%	45%	40%
2.Holiday in a cottage	36%	37%	37%	36%
3.Holiday in the coastal region	30%	33%	26%	30%
4.Holiday in the mountain region	22%	21%	20%	20%
5. City - holiday	14%	16%	13%	17%
6. Charter holiday in the Mediterranean region	14%	14%	12%	15%
7. Camping-holiday	14%	12%	15%	9%
8. Charter – holiday	12%	13%	15%	13%
9. Holiday by travelling by plain	9%	10%	10%	12%
10. Adventure	6%	7%	8%	7%
Sub-samples	1014	3420	423	551

There are nearly no differences between the four groups. If the question of having a wap-phone has something to do with type of job, it would have been more interesting to compare the four groups with regard to business travel – the frequency of travelling by air etc.

Table 8 - E-commerce experience

	Did use the Internet 8 days ago or less frequently	Did use the Internet the last 7 days	Has a wap-phone	Is planning to buy a wap-phone the next 12 months
Has booked travel-services online	7%	21%	17%	22%
Is planning to book travel-services online the next 12 months	10%	31%	28%	38%
Has searched for holiday-packages online, but booked offline	14%	25%	17%	22%
Sub-samples	1014	3420	423	551

So far very few has booked something by using their wap-phone. Table eight shows that e-commerce in the travel industry is quite common particularly among the frequent web-users. The owners of wap-phones are more similar to the frequent web-users than the less frequent users. However, the most interesting group is those

planning to buy a wap-phone the next 12 months. A relatively high percentage is willing to book online, and our hypothesis is that it is a relatively small step to take for them to start booking via a wap-phone in the future.

Table 9 – booking of travel-services online

	Did use the Internet 8 days ago or less frequently	Did use the Internet the last 7 days	Has a wap-phone	Is planning to buy a wap-phone the next 12 months
Has booked accommodation online	3%	11%	9%	11%
Has booked holiday-package online	5%	10%	8%	12%
Has booked air-tickets online	3%	12%	13%	15%
Sub-samples	1014	3420	423	551

This table shows the three sub-groups that constitute “travel-service” (table 8). As expected air-tickets have the highest percentage. It is documented in other studies that more and more business travellers are booking air-tickets online. With reference to m-commerce this of particular interest as this quote shows; “*Recent technological advances mean that the Internet is no longer the only online booking channel available for business travellers. The arrival of mobile phones with wap..... makes online booking even more flexible – and should boost its popularity even further.*” TTI (2000b)

3. A wap application for accommodation booking

The company DBC-Munin, a Norwegian travel solution provider is currently implementing a booking system to serve the Norwegian tourism market. The Norwegian Computing Center is implementing the wap channel, the wap-application for the booking system. The vision of the travel solution provider is to become one of the leading web/wap-portals for accommodation services among the small travel suppliers in Norway. Hence, they offer these companies a distribution channel for their products and services. They will also offer a payment-solution for this market. This is important for the small companies since it means less “hazel” for them.

3.1 The challenge

In a competitive marketplace a travel technology company must offer solutions that are innovative, smart and cheap to implement. Innovation should give the user a new and modern experience. Smartness should reduce the administration of the system. And the small travel supplier should benefit from a low-cost service.

The new possibilities given by handheld machines like web enabled mobile phones, wap-phones, were by the travel solution provider looked upon as interesting. It was anticipated that tourists could be especially interested in using the wap-channel for information and re-booking. At the same time implementation costs was looked upon

as a risk because of the uncertainty regarding the popularity (or lack of popularity) of wap-services among the travellers – see table 10. This implied that the implementation costs of the wap-channel should be held at a minimum.

Table 10 - Importance of booking from a mobile-phone (wap) or PDA

	The Internet-population	Sub-population “Is planning to book a holiday-package or accommodation online”
Very important	5%	5%
Somewhat important	15%	16%
Of low importance	19%	17%
Not important	53%	59%
Not answered	8%	3%
A national telephone survey, May 2000, Sub-samples:	587	165

3.2 The technical solution

The vision of the travel service provider for the web is met by developing different presentations of the same information. A dynamic graphical Flash presentation is developed in order to get a modern user-interface. A html version is developed to speed up the time of the downloading. Users on a slow link will probably not accept the long latencies for the Flash version. And a wap-version that is targeting the mobile phone users.

Technologically a XML-based solution was chosen because of the natural separation of content and presentation. As the mark-up language for wap, Wireless Markup Language (WML), is XML-based, it was well suited for the purpose. All three versions (Flash, html and WML) are reading the same XML-data dynamically generated by servlets from an Oracle 8i database. The Flash version required special development, and that solution was also the most expensive. Both the html and WML solutions did benefit greatly from using XML. The transformation of XML to html and to WML was done by writing stylesheets (XSLT). For the WML-version this was done in a remarkably short time. All transformations are made on the server side and html or WML is delivered back to the client.

Virtually no changes were made to the server logic while implementing the wap-channel. The web server servlet must decide what kind of output device it is delivering content to – just to decide what kind of stylesheet to use. That decision could be based on the parameters given to the servlets in the accessed URL or it could be based on “inherent” information in the HTTP protocol that is following every request from any browser to a web server. When receiving a request from a wap-phone there are several fields that could be used, but HTTP-USER-AGENT seems to be the most obvious. The later approach will benefit from using exactly the same URLs for all three versions (Flash, html and WML).

There are differences in screen characteristics (such as no of lines, no of character per line, screen size in pixels and pixel x/y ratio) and in implementation of WML capabilities among different wap-phones. It is a problem that web servers have no way

of knowing these characteristics because this important information is not included in the wap-protocol. There are also different implementations of the same version of WML. The use of tables is e.g. included in the WML 1.1 spec., but tables are not implemented by all wap enabled devices. Again the web server has no standardised way of knowing the WML capabilities of the wap browser (this might be a transient problem as new phones are expected to have more WML functionality). Moreover, if wap device-specific information is important the web server has to investigate the HTTP-USER-AGENT string closely. For the Siemens C-35i wap-phone e.g. the identification string for HTTP-USER-AGENT might be something like "SIE-C3I/1.0 UP/4.1.8c". The browser implementation in this case would be version 1.0 of the UP browser, and the screen-characteristics would probably be defined by the "SIE-C3I" sub-string. Then the actual characteristics of the device must be looked up in a database. The web administrators are left with the burden of updating the database when new devices or new versions hit the market.

The obvious way to implement a wap-service is to circumvent these problems by making the service as general as possible. This means one have to accept that the visual experience might not be optimal on all devices and that there even might be some visual defects on some devices. But as a first approach this strategy should work. Later, when the user-needs are better understood, device-specific stylesheets versions could be made. Our current implementation takes this general approach. It would however be very simple to write separate stylesheets for different wap-phones to be included in the system at a later stage.

Because of the general approach to wap-devices it was also decided choose an URL based identification of user devices (again this could easily be changed). As the web pages are dynamically generated the URLs are used for session handling as well. A wap-service is typically accessed by the following example URL: <http://www.norbooking.no/search?service=wml&sesionid=...> where the "service" parameter to the "search" servlet is indicating that the WML stylesheet should be used for the output. Based on the information given to the servlet in the URLs, the servlet calls an EJB component that generates the XML data from the booking and information database. The servlet then looks up the right stylesheet to transform XML into the device specific format (html or WML currently). The output is then sent back to the client.

The process of writing stylesheets for WML is not overwhelming. As most wap-phones have a very limited display, the output should be mostly text-based. At the moment a wap service is really about delivering just the basic content. The often misunderstood graphical "wrapping" of today's web has no place in a wap-context. The lack of popularity of wap-services can partly be attributed to technical problems or issues, some of them described above. As a consequence, some of the wap-services will be regarded as difficult to use, slow and not bug-free.

However, with higher bandwidth, better screens, other technical improvements, services that are regarded as useful, the comparison with web ("Internet on your mobile phone") will eventually be justified. (Tsalgatidou & Veijalainen, 2000)

4. Concluding remarks

Regarding the implementation of a wap-application, the time to develop a service can be short if the data is already in a structured XML format. Presentation should be mostly text based and presently only the most generic WML functionality should be used.

“Consumers in the Telecommunications Age want information now: They want it fast; they want it simple, they want it cheaply; and more importantly, they want it often while doing something else” (Kaufman & Lane, 1997). Some mobile phone services are popular among some segments of the mobile phone users. SMS-messaging is one example. On the other hand mobile-commerce services are still used by very few in Western-Europe. There are a number of challenges in this area and this quote might describe a situation that is not very far. In the paper we have shown some of the characteristics of the current owners of wap-phone and those planning to buy wap-phones. The study did not reveal any surprising results. Those planning to buy a wap-phone seem to be the most interesting group with regard to mobile-commerce since a relatively high percentage of them have e-commerce experience.

Regarding directions for future research there are a number of possibilities since the technology and m-commerce is still in an embryonic stage, but useful frameworks for research can for example be found in articles by Meuter et. al. (2000) and Bitner et. al. (2000).

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