Mobile Internet and Local Information: A Case in Japan

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Ⅰ　Introduction

There were 83 million subscribers to mobile phone services in Japan as of June 2004. This makes Japan the third largest mobile phone user in the world. Almost all the people walking the streets in Japanese cities carry mobile phones. Until several years ago, loud voices talking on mobile phones could ceaselessly be heard in railway or subway trains, causing much social disturbance. Such voices are now rarely heard. Although railway company campaigns have partially contributed to this change, the trend for many people to use their mobile phones without talking is the largest reason for this change. A scene in which more than half the passengers are looking at the screens of their mobile phones and hitting number buttons, and in which no one talks on a mobile phone in a less crowded train, is familiar now to many Japanese. Kellerman (2002) suggested a trend in which the mobile phone has become a tool not only for talking, but also for exchanging e-mails, browsing websites, and other online activities, as well as for digital photography. As a commentator pointed out, such new usage of mobile phone has already been popular in recent Japan (Rheingold, 2002).

The expansion of mobile phone usage has been driven by the deep penetration of mobile phone Internet connection (mobile Internet) services into societies. Short mail services (SMS), which connect users who subscribe to the same mobile phone company, have diffused to many countries around the world (Weilenmann and Larsson, 2001). In Japan, however, almost all e-mails from mobile phones are transmitted through Internet connecting services. A user of a mobile phone company can freely transmit and receive e-mails not only to, and receive them from, a user of the other companies, but can also send them to, and receive them from, the user of an ordinary PC. In addition, people can browse a number of
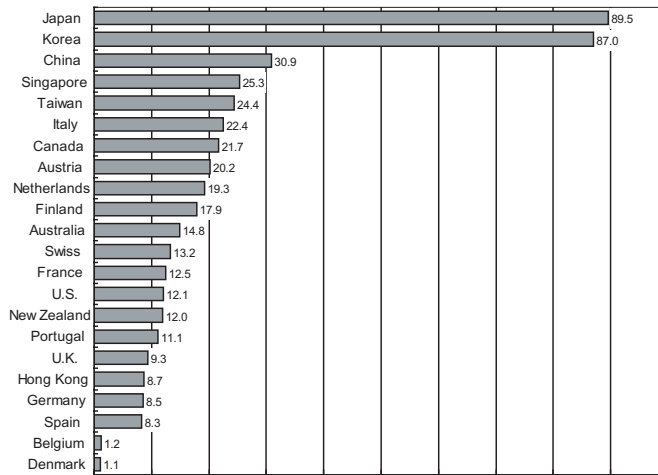
Figure 1   Penetration Rate of Mobile Internet by Country/Region
Source: *2004 "White Paper In Information and Communications in Japan"*

websites connected to the Internet (Frengle, 2002). Although the expanded usage of mobile phones is similar to the usage of personal digital assistants (PDA), a mobile phone is far easier to operate than a PDA. In Japan, nearly 90% of mobile phone users subscribe to these services. As Figure 1 shows, only Korea has a rate of subscription to mobile Internet services anywhere near as high as Japan's (Ministry of Public Management, Home Affairs, Posts and Telecommunications, Japan, 2004).

My colleagues and I have already reported on the penetration of mobile Internet services (Arai, Hashimoto and Yamada, 2002). There, we also discussed the characteristics and culture of mobile phone e-mail usage by young people. In this paper, I will discuss web browsing using mobile phones.

Here, I would like to consider websites that provide local information; for example, tourist guides, restaurant and lodgings searches and reservations, and so on. Let us call a website that provides local information a 'local site'. Mobile phones, which have overwhelmingly penetrated into societies, have a considerable advantage in providing local information compared to the other communication means, because a user can immediately access the necessary websites while away from his/her home or office.

We have difficulty finding research on mobile Internet services that discuss local sites because these services have only been in operation for such a short time, and are limited in their diffusion outside Japan. In this paper, first, the outline of mobile Internet services in Japan will be briefly viewed. Then, the definition and volume of local sites will be discussed. Finally, the geographical distributions of local sites will be analyzed.

II   Mobile Internet services in Japan

NTT DoCoMo started the 'i-mode' service, the first mobile Internet service in Japan, in February
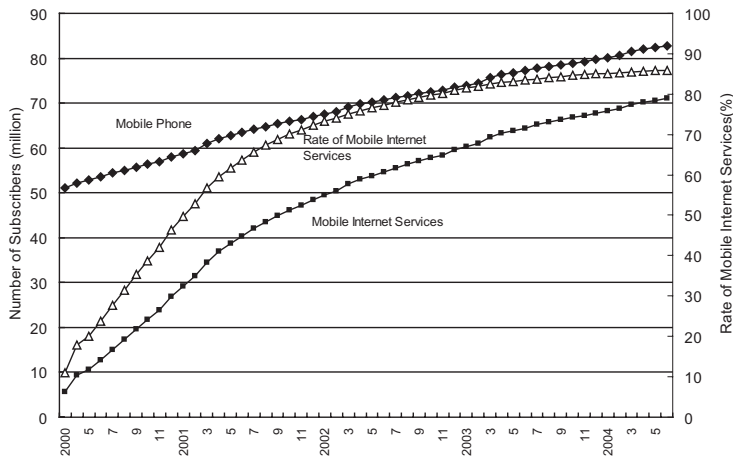
Figure 2　Subscribers to Mobile Phone and Mobile Internet Services
After Telecommunication Carriers Association

2002. The number of subscribers to the i-mode service exceeded one million half a year, and ten million one and a half years after the beginning of the service. The number of subscribers increased dramatically from 2000 to 2002, partially because other mobile phone companies in Japan soon imitated the i-mode service. There were 71 million subscribers to mobile Internet services as of June 2004, which is 56% of the Japanese population (Figure 2)[1].

A mobile Internet service is constructed on a dual network structure. Mobile phones are connected to the exchange center of a mobile phone company, which, in the case of i-mode, is called the 'i-Mode Center'. For connections between an exchange center and web/e-mail servers located outside the mobile phone company, either leased lines or the Internet are used. In the case of a leased line, the Internet is not used at all in the communication process of the service (Figure 3).

Websites connected by leased lines can be accessed from a menu, which is displayed on the top page of a mobile Internet service interface. These websites can easily be accessed using the menu, and are highly secure because they are not connected to the Internet at all (Miyanaga and Tanimoto, 2001). Mobile phone companies call these websites 'official sites'. From the beginning of mobile Internet services, many banks, which are sensitive regarding transaction security, have participated as official website providers (Matsunaga, 2000). Websites providing mobile banking services have accounted for a considerable percentage of all official sites to date.

Websites connected with exchange centers throughout the Internet are called 'nonofficial sites'. Nonofficial sites are operated by various companies, organizations, or private persons because they can be easily opened by anyone who can use Internet servers. The rapid increase in nonofficial sites in the early stage of penetration
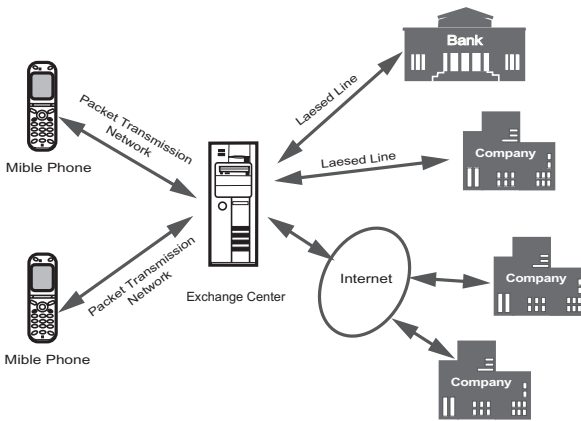
Figure 3　Network Structure of
　　　　　Mobile Internet Services

contributed to the large expansion of mobile Internet services in Japan (Natsuno, 2001). A user can access nonofficial sites by entering the URL of a nonofficial site into his/her mobile phone. Although the access method for mobile phones is the same as for PCs, exclusive websites for mobile phones are usually constructed because of the smallness of handset screens. At present, all mobile phone companies use the HTML family of languages for their websites: C-HTML for i-mode, XHTML for EZweb and Vodafone. HTML is commonly used for websites for PCs[2]. Therefore, almost all nonofficial sites can be browsed, regardless of the mobile phone company to which one subscribes.

　The number of official sites reported by the three mobile phone companies in Japan is around 8,500. Because nonofficial sites can be opened without any permission, their exact number is unknown. The number is, however, roughly estimated at 90,000, based on a report by NTT DoCoMo.

III　　Local sites

1.　The concept of local sites

　Following the diffusion of mobile Internet services through societies and the rapid increase of websites for mobile phones, the geographical characteristics of the information provided by these websites, particularly by local sites, is worthy of the attention of geographers. Before the analysis of these characteristics, I should discuss the operational definition of local sites.

　Conceptually, a local site is defined as:

　A: a website that provides various information
　　　about a specific area/place.

　However, a more limited definition can be considered:

　B: a website that people who wish to gain some
　　　information about a specific area/place
　　　can immediately find.

　Definition B can be objectively translated as:

　B: a website with an index word that is
　　　identified regionally, such as a place name, in
　　　the menus of official sites or in site-search
　　　services.

　In the menus of official sites, or in site-search services, websites are usually classified into categories by region and subject. Therefore, group B should be divided into the following two subgroups:

　B1: websites classified into categories by region
　　　only;

　B2: websites classified into categories by both
　　　region and subject.

　The local sites described by definition A are not limited to those described by definition B. There can be a website that provides information
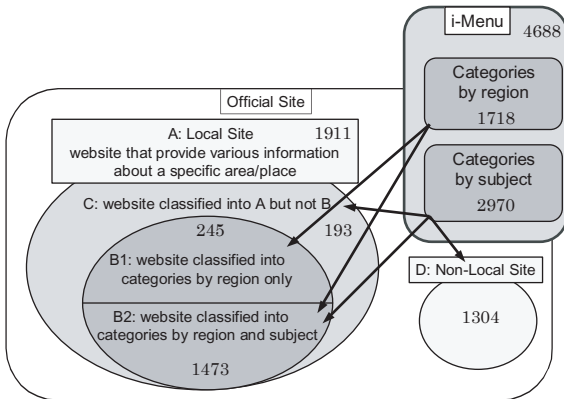
Figure 4　Operational Definition of Local Site
Number: number of websites classified
into each group in i-Menu

about items located in a specific place that has no regional index-word. Let this be website C, that is:

C: a website classified into A but not B.

A website included in neither B nor C can be referred to as nonlocal:

D: a nonlocal site.

Figure 4 summarizes the relations among these groups of websites.

2.　Characteristics of local official sites

We have little knowledge concerning local sites, because of a lack of empirical studies focusing on websites for mobile Internet services. I chose the official sites of i-mode service as the first target of the study because it is not only the most typical mobile Internet service in Japan, but also the most suitable for systematic research of websites for some technical reasons.

When a user wishes to browse the official sites of i-mode, he/she should access i-Menu, which is the official site menu of i-mode. In i-Menu, all websites are classified into over thirty categories. A user can access any website by selecting the categories

step by step. All the categories can be divided into two groups: regional categories and subject categories. The number of the websites included in i-Menu is 4688; this excludes administrative sites operated by the mobile phone company (May 2004). The numbers of the websites classified based on the framework discussed above are shown in Figure 4. The net total of the local sites, excluding the overlap (or A), is 59% of the net total of websites of all kinds. The apparent total of the local sites including the overlap exceeds 70% of the apparent total of all websites. Therefore, there is a high probability that local sites will be hit when a user accesses the official sites from the menu.

It should be noted that the percentage of C, which contains websites classified into the local but not into regional categories, in all kinds of websites is small (13%). The characteristics of the local sites can be roughly understood from the analysis of the websites classified into the regional categories.

3.　Characteristics of the local nonofficial sites

Next, I will discuss the local sites among the nonofficial sites. Owing to the difficulty of obtaining an overview of all nonofficial sites, as mentioned above, I attempted to analyze the local sites registered on a site-search service for mobile Internet. For this analysis, I chose 'Yahoo! Mobile', which is one of the leading site-search services in Japan. In Yahoo! Mobile, nearly 17,000 websites, including official sites, are registered. The official sites account for about one fifth of all registered sites.

Nearly 7,100 websites are classified into regional categories on the index page of Yahoo! Mobile. These amount to 43% of the gross total of all
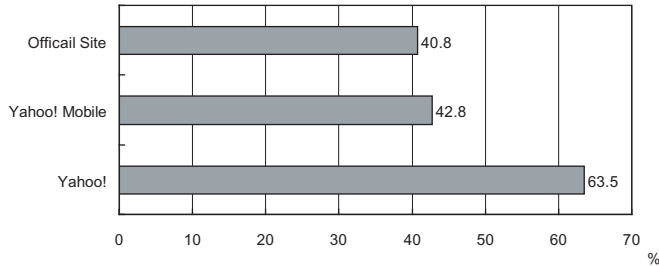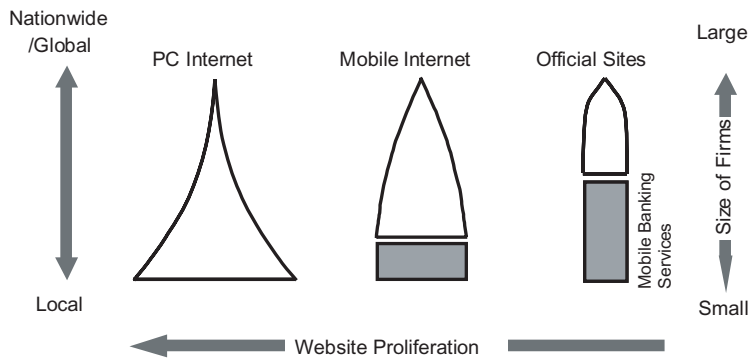
Figure 5　Percentage of Local Sites

Figure 6　Hypothesis on the Relation between Website Proliferation and Local Sites

websites in all categories. This percentage is slightly higher than that of the official sites, and considerably lower than that of Yahoo!, which is the corresponding service for PC Internet (Figure 5). These differences among the official sites, Mobile Internet, and PC Internet can be explained by the following hypothesis (Figure 6).

In the early stage of the proliferation of websites in societies, content providers were limited to large firms/organizations, because much knowledge, skill, and investment were needed to open a website. The activities of these large firms/organizations usually covered the whole country. They would open sites not for local customers, but for the whole country. The official sites of mobile Internet services are like this. However, many sites for mobile banking services provided by small local banking institutions are opened as official sites for security reasons. These sites are identified as local sites, and they raise the percentage of local sites amongst the official sites.

The site-search services for mobile Internet reflect the situation of the next stage of website proliferation. The nonofficial sites became popular in mobile Internet services. Owing to the lower cost of opening nonofficial sites, compared to that for official sites, small local firms/organizations begin to participate in mobile Internet. Their participation raises the percentage of local sites. On the other hand, the declining percentage of sites for mobile banking services, because of the increase in the total number of all websites, lowers the percentage of local sites. As a result, the percentage of local sites at this stage of website

proliferation decreases a little.

In the case of the site-search services for PC Internet in the more advanced stage of website proliferation, more and more sites by small local firms/organizations, and even private persons, come into the picture. The percentage of local sites increases greatly in this stage.

Under this hypothesis, we can expect that the local sites will increase at a growing rate with the diffusion of mobile Internet.

IV Geographies of the local sites

1. Geographical distributions of local sites registered in a site-search service

How are local sites distributed geographically? Although several studies have focused on the geographical distributions of PC Internet activities based on the registered addresses of domains or IP addresses (Dodge and Shiode, 2000; Zook, 2000), no attempt to analyze the websites for mobile Internet services has been carried out. Here, I analyzed the location of the local sites registered in a site-search service for mobile Internet, Yahoo! Mobile.

Figure 7 shows the numbers of local sites by regional category. The largest concentration of local sites is found around Tokyo, and the second largest is found around Osaka. Other concentrations are found around Nagoya and around Fukuoka, although they are significantly smaller than the concentrations of Tokyo or of Osaka. The distribution pattern of the concentrations of the local sites corresponds to the hierarchy of Japanese cities. This fact provides positive evidence that the number of local sites in
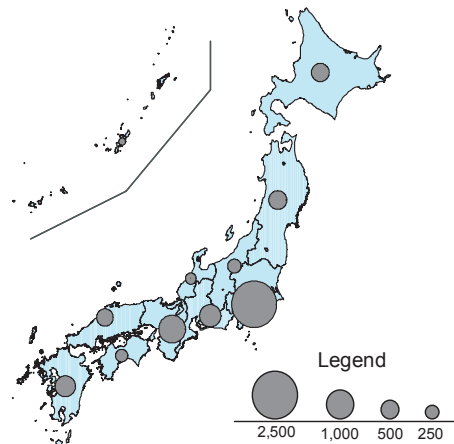

Figure 7   Geographical Distribution of Local Sites Registered in a Site-search Service
Source: Yahoo! Mobile

a particular area is strongly affected by the size of the population that is the potential target of the local sites, and by the number of the firms/organizations that are the potential providers of websites.

However, the number of local sites is not directly proportional to the size of the population and to the number of firms/organizations in the locale. Figure 8 shows the number of local sites per 100,000 people by area, in descending order[3]. The density of local sites relative to population varies between regions. High densities of local sites are found in Kanto, Shin'etsu, Hokkaido, and Okinawa. Every area except Kanto has a number of tourist resorts. This fact suggests that the localization patterns of the websites providing local information about tourism strongly affect the distribution of all of the local sites.

2. Geographical distributions of restaurants and lodgings registered on online database services

As indicated above, mobile Internet services have yet some way to go in achieving full market
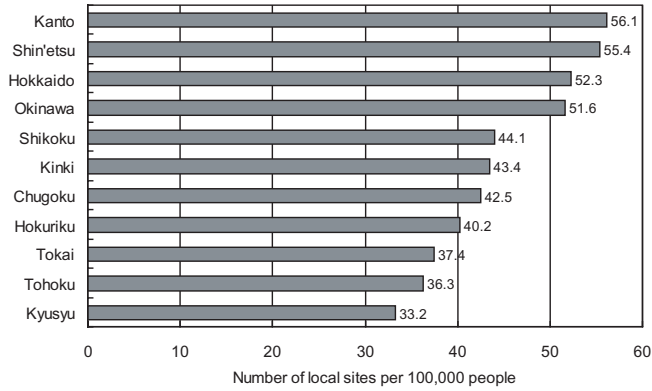
Figure 8 Number of Local Sites Relative to Population by Area

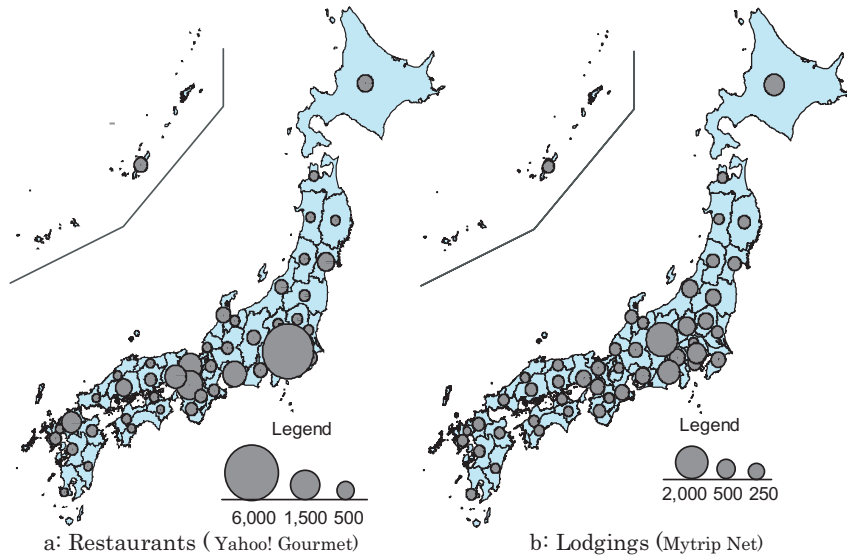a: Restaurants (Yahoo! Gourmet)

b: Lodgings (Mytrip Net)

Figure 9 Geographical Distributions of Restaurants and Lodgings
Registered on Online Database Services

penetration. We cannot analyze the characteristics of various types of website in detail because of the relatively small number of websites for mobile Internet. To overcome this difficulty, I attempted to analyze the local information provided by online database services. In the case of mobile Internet, an online database service has far more registrants than a site-search service, because even small firms, who cannot open their own websites, can easily register with online database services.

Restaurants and lodgings database services were chosen for the analysis.

Figure 9a shows the geographical distribution of restaurants registered with the mobile version of 'Yahoo! Gourmet', which is a typical restaurant database service. Significant concentrations of registered restaurants are found in large metropolitan areas. This pattern reflects the fact that the number of restaurants in an area depends decisively on the population of the area. On the

a. Restaurants (Yahoo! Gourmet)

r=0.544

(chart y-axis: Registration Rate (0/00), x-axis: Number of Registrants)

b. Lodgings (Mytrip Net)

r=0.385

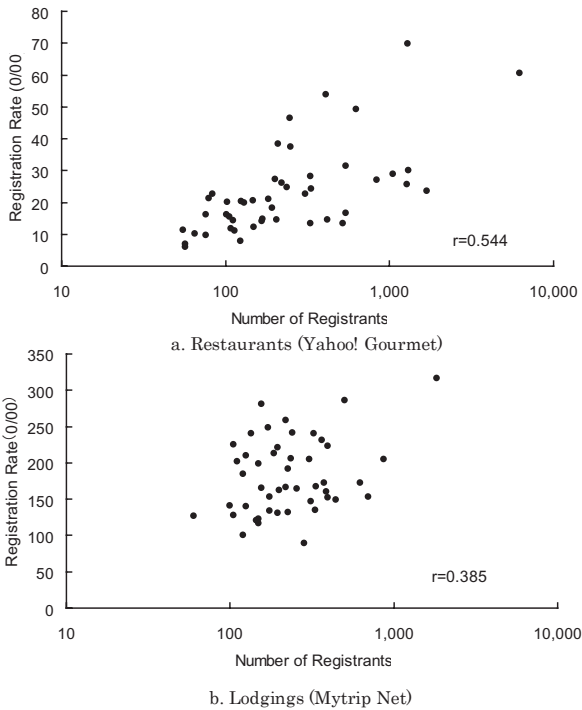(chart y-axis: Registration Rate (0/00), x-axis: Number of Registrants)

Figure 10　Correlation of the Number of
Registrations and Registration Rate

other hand, the location of lodgings registered with the mobile version of 'Mytrip Net (*Tabi no Madoguchi*)', a typical lodgings database service, are heavily concentrated outside large metropolitan areas (Figure 9b). A number of typical tourist resorts are located in these areas. They can expect a massive inflow of tourists from large metropolitan areas. Both the concentrations of restaurants and of lodgings relate to the huge markets of large metropolitan areas.

However, the distribution of restaurants/ lodgings registered with online database services is affected by more than just the demand-side factor of huge markets in large metropolitan areas. A positive correlation is found between the number of registrants and the rate of registrations in the case of both restaurants and lodgings (Figure 10). The positive correlation suggests that firms that have larger locational advantages tend to the more eager to utilize the Internet for their sales promotions. Restaurants located in large metropolitan areas tend to try to attract more local customers by submitting their information through the Internet. Also, lodgings located in tourist resorts slightly apart from large metropolitan areas tend to be eager to attract potential customers living in large metropolitan areas utilizing the Internet. The eagerness of their ICT marketing activities pushes up the number of registrations in these areas. Thus, the attitude of firms toward the circulation of information about themselves affects the geographical distribution of local information.

V　Characteristics of mobile Internet as a means of local information provision

The characteristics of mobile Internet as a means of local information provision are summarized as follows.

In the early stages of mobile Internet services, mobile phone companies stressed the security of official sites. The sites for mobile banking services had rapidly diffused among small local banking institutions, utilizing this advantage.

Nonofficial sites have not fully appeared on the horizons for the potential providers of websites yet. The percentage of local sites for mobile Internet, most of which are provided by small local firms, is relatively small compared with that for PC Internet. However, a characteristic distribution pattern of local sites corresponding to the hierarchy of Japanese cities can be found.

The number of local sites in a particular area is strongly affected by the size of the population and by the number of the firms/organizations.

Online database services, in which even small local firms can easily participate, can be powerful tools for providing local information through mobile Internet. The amount of local information registered with database services for mobile Internet is near that available on PC Internet. The geographical distributions of the participants in both database services are considered to be similar. The geographical distribution of the firms registered with online database services, e.g. restaurants and lodgings, is considered to be more strongly affected by the size of the large metropolitan markets than that of the independent local sites. In addition, the positive attitude of firms with locational advantages in respect of the large metropolitan markets to Internet marketing activities promotes the concentric location patterns of firms registered with online database services.

Based on these analyses, we can expect that the characteristics of mobile Internet as a means of local information provision will become similar to that of PC Internet, as mobile Internet penetrates into societies. The local information provided by mobile Internet may have little distinctiveness from the quantitative perspective, e.g. the geographical distributions, compared to that of PC Internet. However, we can also say that mobile Internet can provide useful services to more people than can PC Internet because of its enormously high penetration rate. The fact that almost all people can use mobile Internet services suggests the great potentialities of mobile Internet as a means of information provision. Needless to say, however, new usages of mobile Internet are required to utilize the full potential of mobile Internet. Some ideas have already been put into practice. A method for information provision linking PC Internet and mobile Internet and, 'i-Area', which is a local site-search system using the location data transferred from mobile phones, are good examples of these new ideas. I would like to discuss these in further studies.

Acknowledgment

Notes

1) After the Telecommunications Carriers Association (TCA).
   http://www.tca.or.jp/japan/database/daisu/index.html
2) The fact that NTT DoCoMo employed the HTLM family of languages for the i-mode service is considered one of the major reasons for the great success of mobile Internet services in Japan. Some commentators pointed out that the poor usability for both service providers and users of WAP (wireless application protocol), which was employed for mobile Internet services in many countries other than Japan, hampered the diffusion of these services (Helyar, 2001). In the early stage of diffusion of mobile Internet services, mobile phone companies employed WAP for their service. However, they later changed to HTML to establish compatibility with the other companies' services.
3) A number of mobile banking services are identified as local sites. A large part of these mobile banking services are operated by agricultural cooperatives. The sites of mobile banking services are excluded from this analysis to avoid any distortion due to a distinctive distribution logic particular to the nature of agricultural cooperative sites.

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