Communication Needs of Japan and the United States: A Comparative Analysis of the Use of Mobile Information Services

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***Abstract*—Mobile marketers are anxious to gain knowledge about the use of mobile services in different cultures and countries. The aim of this research is to construct a method for comparing consumer demand for mobile information services in different countries. We attempted to gain a understanding of the cross-national needs structure through a comparison of use intentions between the United States (at the University of California at Los Angeles) and Japan. Toward this end, we extracted use intention factors from both the locations. The results confirmed the following four factors: the information-intensive factor, the entertainment factor, the low penetration service factor, and the communication tool factor. This study also found that the two countries have different needs characteristics for a certain mobile communication service, i. e., mobile e-mail, and roughly the same needs characteristics for mobile entertainment services and for mobile information services except "radio".**

Keywords- Cross-national study; Information intensive; Low penetration service; Entertainment; Communication.

I. INTRODUCTION

By the end of 2010, there were 5.3 billion mobile subscriptions worldwide. That equates to 77% of the world's population [1]. This represents a large increase from the 4.6 billion mobile subscriptions in existence at the end of 2009. The increase in mobile service usage around the world has been driven by both advanced technologies and the growing number of service options available to consumers. For the most part, these services include mobile searches, news and sports information, music and video downloads, e-mail, and instant messages [1]. The explosive growth in the use of mobile devices is frequently noted in research studies [2], [3].

Despite the growing importance of mobile devices, few studies have been conducted using a cross-national approach. The usages of mobile devices vary considerably among different countries [4]. The adoption of mobile services and technology does not appear to follow any single universal logic or pattern for different countries [2]. Harries *et al.* [5] investigated the role that culture plays in explaining differences in adoption, usage, and attitudes with regard to mobile services by comparing the United Kingdom and Hong Kong. Cho [6] explored how mobile phone users in the United States and Korea adopt both existing and potential mobile services. Lee *et al.* [7] investigated the different usage patterns among mobile users in Korea and Japan and interpreted these patterns within the framework of a value structure. Vrechopoulos *et al.* [8] conducted sociological research and found Finland to be the most mature mobile market when compared with Germany and Greece. They identified critical success factors and noted that these factors vary among the countries. Bohlin [9], on the other hand, identified new policy implications for the future European mobile market through an analysis of the success factors in the Japanese mobile Internet market.

As mobile carriers and content providers perform on a global scale [10], empirical cross-national research on mobile services has become increasingly relevant. A clear understanding of the mobile service needs of consumers can be achieved by investigating the structure of mobile services across different countries. In order to learn about consumer needs with respect to mobile information services, and whether consumers in different countries perceive these needs differently, we performed a comparison between the mobile information services needs structure of young people in Japan and the United States. These locations were selected for this international comparison because they are the two leading countries in the mobile market and because they use mobile services differently. Mobile users in Japan are the "most connected," with more than 75% using connected media (browsed the Internet, accessed applications, or downloaded content) compared to 43.7% in the United States and 38.5% in Europe [13]. At the end of June 2010, there were 111 million mobile subscribers in Japan [11], and there were 302.95 million subscribers in the United States at the end of December 2010 [12]. There is a need to identify a practical systematic framework of different structures in mobile information service needs in the United States and Japan by way of a cross-national comparison. If there are differences in service needs structures between two countries, mobile companies need to vary their international marketing strategies and tactics between the countries by adjusting for the differences. The following strategies can be used: introduce very high-spec devices, offer multiple technologies (picture messaging, mobile Flash, GPS, etc.), provide better network quality and coverage, etc. By understanding the differences in consumer needs with respect to mobile information services, mobile

 ISBN: 978-1-61208-164-9

companies will have a better chance of success. Therefore, the following hypotheses are presented:

H1. There is no change in the mobile phone service structure over a two-year period in Japan.

H2. The mobile service structure for information is same in both the United States and Japan.

H3. The mobile service structure for entertainment is same in both the United States and Japan.

H4. The mobile service structure for communication needs is same in both the United States and Japan.

This paper is composed as follows: In the following section, we cite relevant literature surveys to introduce various mobile services, and then in Section III, we identify the behaviors of mobile service users in the United States and Japan. In Section IV–VI, we describe how we measured information services in terms of the use intention data via an online survey. Section VII presents a factor analysis that is based on Japanese data and was carried out over a two-year period, and Section VIII presents a comparative factor analysis using data from Japan and the United States. The paper ends with a discussion of the results in terms of information, entertainment, and communication service factors, as well as the limitations of the study.

II. LITERATURE REVIEW

The use of mobile communication devices is increasing rapidly, and devices based on mobile technology are commonplace in everyday life [14]. A mobile information *service* is defined as use of the Internet via a handheld device [15]. The consumer pays for the desired mobile content or services [16]. Existing and potential services vary depending on the developments in mobile technology [9]. M-businesses offer more efficient markets and value system services, customized offering services, building community services, disrupting pricing services, and a radically extended reach in values services [17]. There are three main types of mobile services:

Information services: As a source of information, a mobile phone can have a significant impact on user behavior. Therefore, the quality of information provided by the device (e.g., maps or driving directions, restaurant guides, and promotional ads) often serves to expedite search efforts and stimulate the intention to use the mobile phone further. Users often log on to the Web to check e-mail, get news, obtain maps or driving directions, consult restaurant guides, etc. [9].

Entertainment services: Millions of people use their mobile devices for play [18]. Mobile phone usage in this context is an enjoyable activity that allows for an escape from reality. Users of these services may perceive mobile phone usage as more entertaining than informative [19].

Communication services: Short message service (SMS), multimedia message service (MMS), voice mail, and e-mail all fall under the category of communication services. These services may be classified as either utilitarian or hedonic, depending on the way they are used and the motivation behind their use [9].

III. MOBILE INFORMATION SERVICES IN THE UNITED STATES AND JAPAN

Most people today have a mobile phone, and many use them for mobile services beyond just calling and messaging. The mobile service market is growing rapidly. However, there are also many new service providers competing for customers, so it is very important to understand consumer usage behavior. This can be achieved easily by comparing user behavior on the basis of regions. The needs and uses of these services differ from country to country.

The United States is in its early stages of M-commerce development and adoption as compared to many European and Asian countries (e.g., Sweden, Japan, and Korea) [20]. This is true despite the fact that mobile application usage is slightly higher in the United States than that in Japan, as indicated in Table 1. In the United States, 19% fewer application users utilize their browser than in Japan, while 19% fewer browser users utilize applications. Messaging methods also vary. The United States displays the highest rate of text messaging, with 68.0% of users sending text messages compared with just 41.60% in Japan. Japanese users exhibit the highest reach in the e-mail category at

TABLE 1. MOBILE SERVICE USER BEHAVIOR IN JAPAN AND THE UNITED STATES IN OCTOBER–DECEMBER 2010: PERCENTAGE OF TOTAL MOBILE AUDIENCE (AGE: 13+ YEARS)

Countries	USA	Japan
Used connected media		
Browser, app or download	46.70%	76.80%
Used browser	36.40%	55.40%
Used application	34.40%	53.30%
Used messaging		
Sent text message	68.00%	41.60%
Instant messaging	17.20%	3.60%
Email	30.50%	57.10%
Accessed entertainment/social media		
Took photos	52.40%	62.90%
Social networking or blog	24.70%	19.30%
Played games	23.20%	16.30%
Recorded video	20.20%	15.80%
Listened to music	15.70%	12.90%
Watched TV and/or video	5.60%	22.80%
Accessed financial services		
Bank accounts	11.40%	7.00%
Financial news or stock	10.20%	16.50%
Accessed news, sports, weather, search, retail, travel, reference		
News and information	39.50%	57.60%
Weather reports	25.20%	34.70%
Search	21.40%	31.50%
Maps	17.80%	17.10%
Sports news	15.80%	18.20%
Restaurant info	10.00%	9.70%
Traffic reports	8.40%	14.00%
Classifieds	7.30%	3.60%
Retail site	6.50%	8.50%
Travel service	4.40%	2.90%

 ISBN: 978-1-61208-164-9

57.10%, while consumers in the United States are most likely to use text messaging services on their mobile devices (68.00%). Social networking/blogs reached the greatest percentage of mobile users in the United States at 24.70%, followed by Japan at 19.30%. Japanese users were most likely to capture photos (62.90%) and watch TV/video (22.80%) on their mobile devices, while users in the United States were most likely to listen to music (15.70%) and play games (23.20%) [10]. Table 1 displays mobile service user behavior in Japan and the United States [16].

Mobile phone users in certain countries, such as Japan, use integrated services, such as receiving messages regarding credit card usage, enjoying windows live messenger and other instant messenger systems, receiving messages from online community services, receiving promotional price discounts for family restaurants, and receiving coupons. Pioneers of location-based services—such as Korea and Japan—have created precise combinations of infrastructure and applications needed to ensure success [6].

IV. METHODOLOGY

We conducted two consecutive studies on Japanese customers in 2008 and 2009. In 2008, we conducted in-depth interviews with 30 mobile phone users who had adequate experience using mobile information services to explore their information needs and to identify the crucial factors that influence their mobile phone usage. On the basis of this qualitative study, we developed an instrument for survey research. We employed a professional market research firm in Japan to collect data under a random sampling framework from a panel of mobile information service users between the ages of 16 and 79. Data were collected online in the period between September 18 and September 24, 2008. A questionnaire focusing on the "use of information services via mobile phone" was distributed to a randomly selected Internet research panel with a sample size of 20000. From this sample, 5567 effective responses (27.8% of the total sample) were obtained. Out of these 5567 effective responses, the number of people who had mobile phones was 5222, which amounted to 93.8% of the effective responses. The following 21 services were examined: mobile e-mail, SMS, MMS, TV phone, radio, Internet, 1-seg TV (mobile terrestrial digital audio/video and data broadcasting service), music, ring tones, video streaming, games, learning (dictionary, translation services, and encyclopedia), health, infotainment content (movies, nightclubs, and celebrity gossip), mobile chat (push to talk), stock trading, shopping services, coupon and advertising information services, online storage services (Internet data storage services), reservation or booking (hotel rooms or airline seats), and location-based services (GPS or maps).

V. DATA COLLECTION

In 2009, an Internet research panel with a sample size of 3500 was randomly selected from the original 5222 respondents. Data were collected online during the period between July 10 and July 14. We obtained 1854 effective responses (53.0% of the sample).

For a two-year comparative study, a sample of 1854 effective responses from Japanese users was compiled. This sample consisted of the same people who responded in both 2008 and 2009; these respondents were designated as our analysis subjects.

In 2009, an Internet study was conducted with a sample size of 499 students at the University of California at Los Angeles (UCLA) in the United States. Out of the 499 respondents, 389 were in their 20's.

For a comparative study of young people in their 20's between Japan and the United States, we had an effective sample of 169 out of 1854 respondents from Japan and a sample of 389 students from UCLA. These respondents comprised our final set of sample data.

VI. FACTOR ANALYSIS BASED ON USE INTENTION DATA

A. Measurement

Aaker and Alvarez Del Blanco [21] have indicated that brand awareness indirectly affects purchase behavior. Likewise, an awareness of newly emerging services will affect purchase behavior and the intention to use these services. Therefore, this was a good place to begin extracting factors based on use intention. We conducted a factor analysis on 5222 respondents from the 2008 data and 1854 respondents from the 2009 data to extract common factors that exist among similar services in terms of the "use intention" of the 21 mobile information services. The following is a summary of the measurement:

The phrase, "Please rate your intention to use the following mobile information service" was used to operationalize use intention. A five-point Likert-type scale was anchored by low/high use intention for the 21 services.

VII. FACTOR ANALYSIS BASED ON JAPANESE USE INTENTION DATA OVER A TWO-YEAR PERIOD

In order to focus on the needs of the present and potential customers, we analyzed only "use intention." For this comparative two-year period, 1854 effective responses were designated as the analytical subjects. We conducted a factor analysis to extract common factors that existed among similar information services in terms of the "use intention" of the 21 mobile information services.

The factor analysis was conducted on the basis of the use intention by the principal factor method using varimax rotation. Kondo et al. [22] identified three dimensions of mobile services—information intensiveness, amusement, and service penetration rate—on the basis of the data of "awareness," "past use behavior," and "use intention." Here, we extracted four factors from the 21 information services, leading to the addition of one factor from the previous analysis. There was no change between 2008 and 2009 in the services affected by these factors except for "radio" (because of a missing value), which confirmed hypothesis H1.

Table 2 summarizes the factor loadings for each service

 ISBN: 978-1-61208-164-9

TABLE 2. FACTOR LOADINGS AND USER RATIO FOR EACH SERVICE IN 2008 AND 2009

Service Items	2008				2009				User
	1	2	3	4	1	2	3	4	Ratio
Reservation or booking	**.793**	.160	.136	.170	**.775**	.189	.211	.162	45.00%
Shopping services	**.739**	.291	.163	.098	**.712**	.302	.241	.076	47.90%
Coupon 'advertisement	**.620**	.312	.090	.243	**.602**	.350	.099	.228	59.80%
On-line storage services	**.617**	.272	.419	.088	**.551**	.258	.500	.084	24.40%
Health	**.613**	.398	.317	.054	**.534**	.394	.437	.072	39.50%
Learning	**.594**	.416	.179	.134	**.532**	.442	.243	.167	53.80%
Location based services	**.590**	.255	.154	.206	**.634**	.284	.205	.175	48.70%
internet	**.587**	.428	-.035	.229	**.574**	.408	.038	.205	84.50%
Infotainment content	**.560**	.498	.275	.108	**.539**	.472	.374	.150	50.90%
Stock trading	**.501**	.122	.343	-.024	**.542**	.099	.388	-.045	29.70%
Radio	**.417**	.330	.255	.130	.266	.350	**.397**	.140	37.50%
Ring tones	.198	**.743**	.136	.257	.210	**.724**	.170	.233	67.00%
Music	.375	**.714**	.117	.157	.297	**.748**	.205	.164	58.30%
Video streaming	.379	**.678**	.260	.179	.360	**.682**	.314	.190	50.80%
Games	.308	**.568**	.225	.119	.371	**.514**	.248	.125	57.20%
1 seg TV	.284	**.495**	.187	.197	.269	**.498**	.174	.174	46.50%
Mobile chat	.338	.296	**.754**	.070	.308	.267	**.774**	.039	17.70%
TV phone	.254	.356	**.479**	.297	.217	.311	**.506**	.279	35.40%
MMS	.092	.261	.158	**.719**	.095	.258	.159	**.700**	84.70%
Mobile email	.130	.144	-.147	**.615**	.143	.118	-.149	**.643**	97.10%
SMS	.085	.049	.139	**.449**	.062	.077	.193	**.451**	80.30%

(A) Year 2008: 1707 respondents; age group: 16~79
(B) Year 2009: 1686 respondents; age group: 16~79

in the case of each factor. The differences between the two years were due to a number of missing values. The results showed that in both 2008 and 2009, four factors were confirmed to be the primary factors affecting the mobile information service needs in Japan. These four factors were as follows:

Factor 1: information intensiveness;
Factor 2: entertainment;
Factor 3: low penetration service; and
Factor 4: communication service.

Factor 1 refers to services that require a high degree of information, such as making a reservation or stock trading. Factor 2 represents services with *entertainment* characteristics, such as ring tones. Factor 3 represents services with *low penetration* characteristics where the use ratio is low, such as a TV phone. Factor 4 represents services having *communication tool* characteristics, such as SMS, e-mail, and MMS, i.e., e-mail with pictures. Services within the factor are listed as follows:

Factor 1: radio, the Internet, learning, health, infotainment content, stock trading, shopping services, coupon and advertising information services, online storage services, reservation or booking, and location-based services;
Factor 2: 1-seg TV, music, ring tones, video streaming, and games;
Factor 3: TV phone and mobile chat;
Factor 4: mobile e-mail, SMS, and MMS.

VIII. COMPARATIVE FACTOR ANALYSIS BASED ON USE INTENTION DATA FROM JAPAN AND THE UNITED STATES

In order to focus on the needs of both present and potential customers, we analyzed only the "use intention." For this comparative research of young people in Japan (169) and the United States (389), effective responses were designated as the analytical subjects. We conducted a factor analysis to extract common factors that exist among similar information services in terms of the "use intention" of the 20 mobile information services, excluding 1-seg TV, which does not exist in the United States.

We used factor analysis as the statistical technique to analyze the data. We examined the data to check for inconsistencies due to random error by running a reliability test, ensuring that the integrity of the data was at a manageable level. Table 3 shows that the overall factor analysis was significant for Japan as the Kaiser-Meyer-Olkin statistics were greater than 0.50 and the chi square statistics were significant with a probability of less than 0.05 [23]. In the case of UCLA (Table 6), the overall factor analysis was not significant because there was a considerable amount of missing data from the Internet questionnaire, and hence, we ran the factor analysis without including the Internet data. Without the Internet data, the chi square statistics became significant, as shown in Table 8. We conducted a factor analysis on the 20 mobile information services by further excluding Internet data and extracted four factors that explained the 68.23% cumulative variance for Japan and three factors that explained the 57.6% cumulative variance for UCLA (eigenvalues greater than 1 are shown in Tables 4 and 9). The Cronbach α coefficient, the reliability coefficient of the measured value of questionnaire items for each construct from the point of view of internal consistency, is used for verifying whether each item had common parts for the same factor. If the

value of this coefficient was 0.7 or more, the internal consistency of the measurement scale was considered to be high and the reliabilities were adequate. The coefficients for each factor are shown in Tables 5 and 10. Since all values exceeded 0.7, it was concluded that the items of each information service of these factors had common parts.

We extracted four factors from 20 information services. There was no change in the first two factors between UCLA and Japan, except for some services belonging to the *communication* factor. In Table 10, the factor structure is presented on the basis of the identification of items that have loadings on the same factor, with a factor loading greater than 0.4. The service item Internet (for the United States) did not satisfy the abovementioned requirement and hence was omitted. For UCLA and Japan, the same items that significantly loaded on the first factor were reservations and booking, coupon advertisements, Internet storage services, shopping services, stock trading, learning, and location-based services. These six items represented the information services that customers could access by using a mobile device. Therefore, this factor was referred to as a mobile *information-intensive* service. Reservations and booking and coupon advertisements were very significant in the *information-intensive service* for both countries. The most information-intensive service items were loaded on the same factor; this implied that the service structure for an information-intensive service was same between the United States and Japan. This supported hypothesis H2.

The common items for the United States and Japan that were loaded as the second factor were music, games, ring tones, and video streaming. All of these items had an entertainment factor. These items indicated that customers prefer to be entertained by their mobile devices. Therefore, this factor could be named "*entertainment.*" Users in both countries were always satisfied by mobile entertainment services that enabled them to listen to music and download ring tones on their mobile phones. There existed an entertainment factor for both counties, and the entertainment service items were loaded on the same factor except for some items. This resulted in the rejection of hypothesis H3. We could interpret this as the existence of a same structure of the entertainment factor with slight differences in its members.

In Table 11, the order of the third and fourth factors was different for the United States and Japan. The identified items (for the United States and Japan) of the last two factors were fewer than those of the first two factors. Therefore, they were relatively old services and did not explain data variability well as compared to the first two factors. For the United States, the third factor consisted of two items, SMS and MMS, which facilitate basic communication; hence, this factor was named "*communication services.*" For Japan, factor 3 represented services with *low penetration* characteristics where the loading value was low. The third factor consisted of mobile chat and TV phones. These were classified as the "*low penetration factor,"* which specified advanced communication tools. The fourth factor was composed of MMS, mobile e-mail, and SMS, all of which facilitated basic communication. We found that the service structure for communication was different between the United States and Japan, which resulted in the rejection of hypothesis H4.

TABLE 3. KMO AND BARTLETT'S TEST FOR JAPAN

Kaiser-Meyer-Olkin measure of sampling adequacy		0.912
Bartlett's test of sphericity	Approx. Chi-square	2085.6
	Df	190
	Sig.	0.00

TABLE 4. KMO AND BARTLETT'S TEST FOR JAPAN

	Rotation sum of squared loadings		
factor	Total	% variance	Cumulative %
1	9.379	46.896	46.896
2	1.936	9.682	56.578
3	1.255	6.276	62.854
4	1.076	5.380	68.234

TABLE 5. RELIABILITY STATISTICS FOR INFORMATION SERVICE IN JAPAN

For Japan	Cronbach's α	No. of items
Information-intensive service	0.898	8
Entertainment	0.913	7
Low penetration service	0.774	2
Communication tools	0.654	3

TABLE 6. KMO AND BARTLETT'S TEST FOR UCLA (WITH INTERNET)

Kaiser-Meyer-Olkin measure of sampling adequacy		0.905
Bartlett's test of sphericity	Approx. Chi-square	60.443
	Df	190
	Sig.	**1.0**

TABLE 7. TOTAL VARIANCE EXPLAINED FOR UCLA (WITH INTERNET)

	Rotation sum of squared loadings		
Factor	Total	% variance	Cumulative %
1	7.123	35.616	35.616
2	2.529	12.645	48.261
3	1.330	6.650	54.911
4	1.034	5.168	60.079

 ISBN: 978-1-61208-164-9

TABLE 8. KMO AND BARTLETT'S TEST FOR UCLA (WITHOUT INTERNET)

Kaiser-Meyer-Olkin measure of sampling adequacy		0.906
Bartlett's test of sphericity	Approx. Chi-square	1246.164
	Df	171
	Sig.	0.00

TABLE 9. TOTAL VARIANCE EXPLAINED FOR UCLA (WITHOUT INTERNET)

	Rotation sum of squared loadings		
Factor	Total	% variance	Cumulative %
1	7.108	37.409	37.409
2	2.505	13.183	50.592
3	1.330	6.998	57.590

TABLE 10. RELIABILITY STATISTICS FOR UCLA INFORMATION SERVICE (WITHOUT INTERNET)

For UCLA	Cronbach's α	No. of items
Information-intensive service	0.930	10
Entertainment	0.883	7
Communication tools	0.642	2

TABLE 11. FACTOR LOADINGS OF EACH MOBILE SERVICE: COMPARISON BETWEEN THE UNITED STATES AND JAPAN

Rotated Factor Analysis							
Mobile service items	Japan(169): factor				UCLA(389): factor		
	1	2	3	4	1	2	3
Reservation and booking	**.813**	.169	.294	.083	**.823**	.133	.021
Location based services	**.704**	.290	.148	.122	**.391**	.366	.290
Shopping services	**.657**	.302	.276	.018	**.737**	.236	.044
Stock trading	**.620**	.168	.520	-.060	**.667**	.195	-.156
data storage services on Internet	**.586**	.316	.557	.068	**.761**	.126	-.036
Coupon· advertisement	**.556**	.312	.087	.113	**.796**	.041	.037
Internet	**.504**	.387	-.079	.288	N/A	N/A	N/A
Radio	**.440**	.252	.396	.126	.286	**.585**	-.041
Ring tones	.144	**.735**	.167	.217	.074	**.574**	.103
Video streaming	.318	**.694**	.284	.225	.353	**.659**	.076
Music	.423	**.661**	.164	.218	.134	**.723**	.185
Infotainment content	.508	**.596**	.373	.059	**.690**	.213	.022
Games	.366	**.536**	.207	.082	.139	**.699**	.137
Learning	.519	**.522**	.184	.067	**.566**	.329	.114
Health	.472	**.516**	.365	.021	**.710**	.273	-.034
Mobile chat	.324	.276	**.842**	.040	**.495**	.332	.063
TV phone	.209	.389	**.490**	.128	.345	**.512**	-.058
MMS (Text messaging)	.075	.219	.106	**.762**	-.020	.226	**.481**
Mobile email	.184	.041	-.317	**.605**	.159	**.543**	.330
SMS (Text messaging)	-.016	.093	.173	**.505**	-.057	.045	**.821**

A) USA (UCLA): 19 items; 389 respondents
B) Japan (National): 20 items; 169 respondents

For the large sample size of 1854 for 2008 and 2009 in Japan and the medium sample size of 389 for UCLA, health and learning were loaded in the first factor, which was an information-intensive factor. Because of the small sample size of 169 for Japan, the first factor and the second factor for the services of learning and health could not be easily differentiated. They were very close and had little influence on the entertainment factor. In Table 11, we concluded that a factor in TV phones was less assertive in Japan. Infotainment content was loaded in the entertainment factor for Japan and in the information-intensive factor for the United States.

IX. CULTURAL AND TECHNOLOGICAL DIFFERENCES IN MOBILE INFORMATION SERVICES BETWEEN JAPAN AND THE UNITED STATES

Differences in service needs between Japan and the United States were found in our research. From the previous section, we concluded that the intention to use mobile services for chat, mobile e-mail, and Internet access was considerably higher in Japan than in the United States. The reasons may be summarized as follows:

In the United States, a mobile phone is often viewed as a necessary tool rather than a luxury [24]. People in the United States are just as enthusiastic about mobilizing technology, but they often think in terms of shrinking and mobilizing the PC and the Internet, rather than expanding the mobile phone. Young people in the United States are much more likely to use SMS than e-mail. Sending an SMS was often considerably cheaper than sending an e-mail. The U.S. market has traditionally favored smart devices, such as the BlackBerry, which target business users as a path for potential growth.

On the other hand, mobile service sales in Japan have been consumer driven: people use their phones for e-mail, music downloads, games, and mobile-wallet services, in which financial transactions are carried out via the mobile phone [25]. Thus, Japan has developed a sophisticated mobile phone market earlier than the United States. Many Japanese people look to their mobile device as a central source of information gathering. This leads to a "Keitai (mobile phone) Culture" that is more obvious in Japan than in other countries, partially because of the Japanese people's affection for technology in general. The citizens of Japan are very technologically savvy, with considerable technological research, development, and manufacturing occurring in their country. Similarly, Japanese adults and teenagers rely on their mobile phones for communication and for the types of functions that a laptop or desktop computer would normally provide. With so many types of services and phones available, they may have one phone solely for the purpose of talking and another phone just for e-mail and accessing the Internet, or for other capabilities. The increase in texting via e-mail is the natural extension of the mobile phone culture and etiquette, which dictates the correct and appropriate usage of phones because Japanese people do not want to listen to other passengers chatting incessantly on their phones while they are riding a train home from work. As technology grows and develops, the mobile phone appears to

 ISBN: 978-1-61208-164-9

be at the forefront of both exponential growth and the evolution of culture. In this sense, the Japanese mobile market is years ahead of the U.S. market and is leading the way with respect to the mobile phone culture. The smart phone market in Japan expanded in 2010 with innovative and diverse formats such as personal/governmental/corporate communications. Our data dealt with mobile information service needs in 2009 instead of the actual usage. When we look at the rapid growth of smart phones in 2010, our analysis based on the 2009 needs data successfully predicted the potentiality of the mobile information service needs.

X. CONCLUSION

We identified four dimensions of need determinants for Japan and the United States: the *information-intensive* dimension, the *entertainment* dimension, the *communication* dimension, and *the service penetration rate (advanced communication)* dimension. Each factor was very closely related to the device generation, 1G or 2G (*communication*), 3G (*entertainment*), and 3G or 4G (*information intensive*). Therefore, we could conclude that our measurements were generally appropriate for extracting factors with respect to the need for mobile information services in technologically advanced countries. These results might be considered reliable largely because of the consistency of the sample questions.

The dimension of the *service penetration rate* was related to services with advanced technology, and there would not be many people who experienced using certain services. The dimension of *information-intensive* services had the largest variability. This might be due to the fact that this dimension was specific to customers who were interested in the specific services and would require appropriate segmentation identifying the relationship between the interests in the service and the characteristics of the customers.

From the comparative study, we found that the service structure for the information service was same and the service structure for the entertainment service was roughly same in the case of both the United States and Japan.

However, the scenario for service with communication factors appeared to be due to the cultural differences between the United States and Japan. Japan is more advanced than the United States in the use of communication tools. Daily life in Japan is not conceivable without an Internet connection. Mobile users in Japan were the "most connected," with more than 75% using connected media (browsed the Internet, accessed applications, or downloaded content) in June 2010 as compared to 43.7% in the United States. Japanese mobile users also displayed the highest usage of both applications and browsers, with 59.3% of the entire mobile population accessing their browsers in June 2010, and 42.3% accessing applications. Comparatively, 34.0% of the mobile users in the United States used their mobile browsers, and 31.1% accessed applications. The use of messaging methods also varied. The United States had the highest use of text messaging, with 66.8% sending a text message in June 2010 compared with just 40.1% in Japan. Japanese users exhibited the highest reach in the e-mail category at 54%, while consumers in the United States were most likely to use instant messaging services on their mobile phones (17.2%). Mobile operators in developed countries could begin to lose money in the next two to four years if they do not change their business models [26]. In this competitive mobile market, companies need to come up with innovative ideas and implement them around the world.

This study confirmed that mobile information services could be categorized into three types: information, entertainment, and communication. In our comparison of these services in Japan and the United States, communication displayed the largest difference.

XI. LIMITATION

Our research has some limitations with respect to the generalized ability of its findings. In 2009, an Internet study with a sample size of 499 was administrated to UCLA students, while the sample for Japan was randomly drawn. We could not exclude the impact of country-specific factors such as governmental legislation and other regulations. Controls on these effects could lead to cross-cultural studies. However, this might prove difficult because regulations were not enforced simultaneously in the considered countries, and the rate of development was not equal.

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