



GSMA

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Children's Use of
Mobile Phones —
An International
Comparison
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1 Executive Summary

Mobile phones are becoming ubiquitous and, in line with this trend, children's use of mobile phones has increased to the point where mobile phones are becoming commodities for them.

While some people welcome the penetration of mobile phones amongst children as a sign of the dawn of a new communication era, others recognize it as a phenomenon which calls for a certain amount of caution. How can we evaluate the ways in which children use mobile phones in their everyday lives? What are the driving forces behind the penetration of mobile phones amongst children?

This report aims to shed light on these questions. It is based on questionnaire surveys conducted in five countries; Japan, Korea, China, India, and Mexico in the summer of 2008. We interviewed approximately 6,000 pairs of respondents, each consisting of a child and his or her parent or guardian. In addition, we also conducted qualitative interview surveys in Japan and Mexico as case studies to give us deeper insight into children's use of mobile phones.

The key findings of the survey are as follows:

- 1 While age is the most important factor underlying the take-up rate of mobile phones among children, network externality also plays a key role. Network externality is an effect whereby, as the number of the people who use a certain product increases around its user, the benefit of owning the product for the user also increases. When network externality starts to take effect, the penetration of the product accelerates. We observed that 24% (on average) of the children surveyed bought their mobile phones when one of their three closest friends started to use a mobile phone. This effect is strongest in China, followed by Japan and Mexico, and weakest in India.
- 2 Ownership of mobile phones has a positive correlation with: age; being female; parents' income; expenditure on education, and ownership of video games and personal computers. On the other hand, ownership of mobile phones has no significant correlation with parents' education level, nor with the daily schedules of children (e.g. time spent on studying or playing).
- 3 Children who use mobile phones more frequently tend to show higher levels of trust in new media such as the Internet. Furthermore, although this is slight, we found a tendency for frequent use of mobile phones to reduce trust in traditional media including TV and newspapers.
- 4 Children who send or receive mobile messages (mobile e-mail or SMS) more frequently, tend to feel more strongly that their mobile phone is an essential tool in their life. Mobile e-mail/SMS is more familiar to children than voice calls and there is a high possibility that the network externality effect is particularly strong for mobile e-mail/SMS use. Children think of mobile phones as "information gadgets" for communicating, particularly by mobile e-mail/SMS.
- 5 There are some differences between countries. In Japan, mobile phone penetration clearly accelerates at the points of entry to junior high school and high school, showing a step-increase in penetration at specific ages. Ownership of mobile phones is more likely to be restricted for children with siblings, and children focus more on basic functions than design when selecting a mobile phone. In Korea, penetration of mobile phones among children is seen earlier than in any other country, and child users of mobile phones tend to trust new media more than traditional media. The more emphasis parents place on education, the more likely they are to let their children own a mobile phone.



How can we evaluate the ways in which children use mobile phones in their everyday lives? What are the driving forces behind the penetration of mobile phones amongst children?



In China, mobile phone ownership amongst children shows clear growth in line with age, with network externality having the strongest effect in all the countries surveyed. Chinese boys begin to own mobile phones at an earlier age than Chinese girls; a trend different from other countries. In India, many children share a mobile phone with their parents, with network externality playing almost no role. Parents who are focused on education tend not to let their children own a mobile phone. In Mexico, network externality is in play, and children place a strong emphasis on design when selecting a mobile phone.

6 The most interesting findings of this research are the importance of network externality and mobile messaging. The relative importance of network externality compared to other factors affecting penetration amongst children indicates that communication with friends is the principal motivation for children's ownership of a mobile phone. It is also obvious that the main method for their communication is not voice calling but mobile e-mail/SMS.

7 In total, over 60% of parents (on average) have concerns about their child's use of a mobile phone. Of the five countries, parents in Korea are less concerned than parents in other countries since Korean children have many more information sources than those in the other countries. There, the primary source of information about how to use a mobile phone correctly and safely is the family. The second source of information is teachers and friends in school; the third is mobile operators and handset vendors, and the fourth is the government. The wide range of information sources could explain both the low level of parental concern and the high mobile penetration at an early age in Korea.

2 Introduction

Mobile phones are becoming remarkably widespread and penetration rates in the countries where use is most widespread are reaching rates of one handset per adult.

This report looks at the following five countries: Japan, Korea, China, India and Mexico. Table 1 below shows the penetration rate of mobile phones (dividing the number of mobile phones in the country by the population), the Average Revenue Per User per month (ARPU) for mobile phone services and the *per capita* income of these countries.

As mobile phones become ubiquitous, they are also starting to be used widely by children. In Japan, statistics show that 30% of elementary schoolchildren and 60% of junior high school students own mobile phones¹, while it is thought that in Korea, the percentage of children owning mobile phones is even higher than in Japan. Mobile phones are becoming widespread among children in other countries too.

The penetration of mobile phones among children indicates a change in the perception of mobile phones as tools for work-based communications into commodities used for day-to-day communication. The phenomenon of mobile phone use on a day-to-day basis, not only for business, is not new, but their use by children is thought to be proof that this shift has come about.

The full picture of mobile phone ownership among children is as yet unclear, however. A number of research projects covering

individual countries or regions have been carried out to examine the penetration processes of mobile phones, not only among children. For example, Gruber and Verboven (2001) analysed the penetration processes of mobile phones in EU countries by applying the logistic curve, and concluded that market competition and the introduction of digital technology promoted the penetration of mobile phone use. Chakravarty (2005) analysed panel data from 29 Asian countries over 10 years, and reported that the existence of an independent regulatory body and market competition were the keys to penetration. Other similar analyses exist, such as the research of Maiorano and Stern (2007) into countries with medium to low incomes and other research into mobile phone penetration in individual countries (such as that of Iimi (2005) in Japan, and Bothlho and Pinto (2004) in Portugal). A certain amount of knowledge has been acquired from these research studies, but their programmes were focused on the behaviour of a nation in general and not focused on children. Since the data acquired relates to a national unit as opposed to individuals, it is also not possible to analyse the influence of individual attributes.

Bohler and Schuz (2004) are among the few researchers who have looked at the penetration of mobile phones among children. They surveyed the ownership rate of mobile phones among children in an elementary school in a German city and found positive correlations for mobile phone ownership with increased age, gender (more boys than girls owned mobile phones), children with no brothers and sisters and children whose parents drove them to and from school by car.

¹ Cabinet office, Government of Japan, 2007, 12, "Fifth survey of information society and the youth" (in Japanese)

Table 1 GDP, Penetration rate, and ARPU

	China	India	Korea	Japan	Mexico
GDP (Billion)	3,280	1,101	970	4,377	1,023
GDP per capita	2,483	941	20,015	34,296	9,716
Mobile Phone Penetration	44%	26%	94%	81%	67%
ARPU	11	5	27	58	19

US\$

Source: IMF and "Country Reports" GSMA and Mobile Society Research Institute, 2008

In Japan, the Mobile Society Research Institute (MSRI) conducted a survey, "Survey of parents and children about children's use of mobile phones," and estimated the ownership rate every year from 2005. These research projects, however, were not implemented with the purpose of systematically estimating the factors that decide mobile phone ownership, and do not make statistical estimates of these factors. What, for example, are the factors that affect the penetration of mobile phones among children? Children's reasons for using mobile phones are different from those of adults. The main reason children use mobile phones is to communicate with their parents and friends. The most frequently cited reasons for use among adults – communicating for work reasons and maintaining a range of relationships – are not seen in children's use. For this reason, it is thought that the motivation for having a mobile phone becomes stronger among children when their friends start to own mobile phones – creating a kind of networking effect that is stronger for children than for adults. Additionally, are there gender differences in children's mobile phone use? And what influence do the income and the academic level of parents have on children's use of mobile phones?



There are also many uncertainties about the influence of mobile phone use on children's cognition and behaviour. In some countries, it has been said that, along with the increase

in web-style communication, has come a rise in the degree of trust in new media, and that, in contrast to that, the degree of trust in traditional media (including television and newspapers) tends to fall; is that true? A mobile phone is now said to have become a 'must-have' tool for children, which they cannot be without even for a moment, but if that is the case, which types of children feel that mobile phones are essential? What are the criteria for children's selection of mobile phone models?

This report attempts to answer these questions, based on a questionnaire survey implemented in five countries: Japan, Korea, China, India and Mexico. Japan and Korea are thought to be in the front line, where high diffusion rates of mobile phones can be seen. China and India are countries with huge populations and, as such, large and growing markets for mobile phones. Mexico is chosen as a representative of Latin America whose scale is comparatively large and which already has a certain level of mobile phone penetration. An international comparison allows universal observation to be performed, without the prejudices of nationality, and allows the status in specific countries to be categorised at the same time. International comparisons also allow the individual attributes of each country to be demonstrated.



3 Summary of survey methodology

The survey was organised by the GSM Association (GSMA) and Mobile Society Research Institute (MSRI) in Japan.

The implementation of the questionnaire survey was commissioned to researchers in each of the five selected countries (Japan, Korea, China, India and Mexico). The survey consisted of two parts — questions to be answered by the parent or guardian, and questions to be answered by the child. Table 2 below presents details of the samples.

The sampling method was different from country to country (see Appendix 2 for details). Sampling controls were introduced to ensure that a certain proportion of mobile phone-owning children were surveyed. Since the sampling was not completely random, it would be incorrect to make an international comparison of the absolute level of mobile phone ownership rates among children. There would be no point in comparing the 30% of children in India and 80% of children in Korea who own mobile phones. **The meaningful aspect is not the comparison of statistical levels, but the strength of relationships to the other variables; in other words, a comparison between the strength of correlation.**

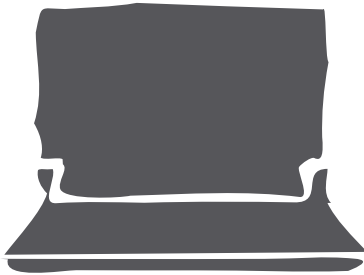


Table 2 Data sampling and mobile phone ownership of children

	Japan	Korea	China	India	Mexico
Date	June, 2008	Aug-Sep, 2008	July, 2008	Aug, 2008	Aug, 2008
Number of respondents (pair of parent and child)	2000	1000	1237	1008	1030
Male child	894	500	685	544	507
Female child	1106	500	533	464	523
No answer for gender of child	0	0	19	0	0
Children's age range	9 to 18	12 to 18	10 to 18	10 to 18	10 to 18
Mobile phone ownership of child					
Child has a mobile phone	1331	800	645	290	615
Child doesn't have a mobile phone	669	200	582	717	415
No answer for ownership	0	0	10	1	0
Research method	Internet	Interview	Interview	Interview	Interview

Unit=person

In the case of the Korean data, it should be noted that the lowest age of the sampled group was a comparatively high 12 years of age, and the rate of mobile phone ownership was also high (at over 70%). Table 3 below contains trends in mobile phone penetration for each country, by age. The major increases in mobile phone ownership amongst children in Korea take place in the years before they reach 12 years old. As these ages were not covered in this survey (because widespread use of mobile phones is seen earlier than in any other country), in chapters 3 and 4 where the analysis of reasons for ownership of mobile phones are presented, the results for Korea are treated as reference data and have been removed from the scope of analysis regarding factors behind penetration.

In terms of the survey methods, an Internet-based questionnaire survey was only utilised in Japan. In other countries, interviews were carried out face to face. In the Internet survey, it was confirmed that there was no significant bias in respondents' attributes in terms of employment, age, income, residence region etc.

In addition to the questionnaire survey, interview surveys were also conducted in Japan and Mexico to obtain an insight into those countries' cultural backgrounds. The interviews are reproduced in their entirety in Appendix 1 of this report.

Table 3 Mobile phone penetration amongst children by age

age	Japan		Korea		China		India		Mexico		percentage owning a mobile phone				
	not have	have	not have	have	not have	have	not have	have	not have	have	Japan	Korea	China	India	Mexico
9	100	67									40.1				
10	128	105			58	12	119	12	121	30	45.1		17.1	9.2	19.9
11	124	66			49	10	80	8	55	30	34.7		16.9	9.1	35.3
12	105	105	10	71	68	26	107	14	50	41	50.0	87.7	27.7	11.6	45.1
13	82	113	21	127	70	29	84	10	54	47	57.9	85.8	29.3	10.6	46.5
14	77	103	31	118	59	38	81	11	43	82	57.2	79.2	39.2	12.0	65.6
15	29	196	42	150	80	67	64	23	25	69	87.1	78.1	45.6	26.4	73.4
16	13	268	41	150	80	101	62	43	24	71	95.4	78.5	55.8	41.0	74.7
17	9	232	19	93	72	125	57	52	19	100	96.3	83.0	63.5	47.7	84.0
18	2	76	36	91	55	233	64	117	24	145	97.4	71.7	80.9	64.6	85.8

Unit= person

Unit= %

4

Factors in the decision to own a mobile phone

We conducted regression analysis to explain the mobile phone ownership of children. We used three 'explained' variables and twelve 'explanatory' variables.

Explained variables

The following three are target variables, or variables to be explained. Each of them goes some way towards explaining the penetration of mobile phones among children.

- A Children's ownership of mobile phone: dummy variable takes the value of "1" if the child owns a mobile phone (question to child)
- B Desire for ownership by non-owners: dummy variable takes the value of "1" if the child does not have a mobile phone but responds that he/she would like to own one (question to child)
- C Starting age of using mobile phone: the age at which the child began to use a mobile phone (question to parent).

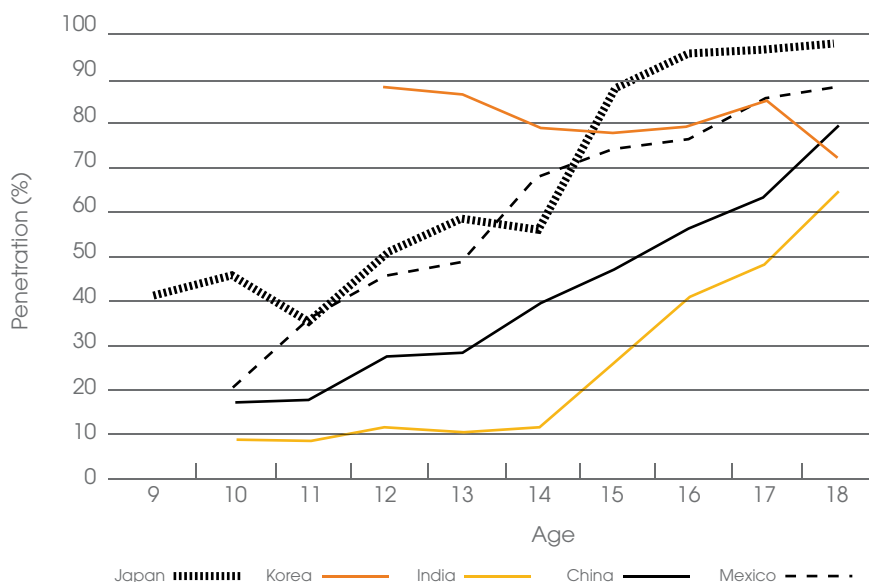
The difference between (A) and (B) above, informs the question of whether to focus on ownership as a result of children's desire to own a mobile phone. Some children are bought and given a mobile phone by their parents without ever wishing for one, whereas

other children want a mobile phone but their parents will not let them have one, so the results of (A) and (B) are different. Put another way, children's ownership of mobile phones is something decided jointly by children and their parents, and the result of this decision gives the response to (A), whether or not the child owns a mobile phone. The response to (A) is sufficient to see whether a child owns a mobile phone or not as a result, but to understand the feelings regarding whether or not a child wants to own a mobile phone, the response to (B) is more effective.

Since, however, the desire for a mobile phone shown in (B) applies only to children who do not currently own a mobile phone, a bias may occur in the sample towards children who are not attracted to mobile phones in the first place. As the age of the children rises and reaches the point where 70% of children have a mobile phone, there is the possibility that (other than children whose parents will not let them own a mobile phone) those children remaining do not in fact have such powerful desires to own a mobile phone.

The difference between variables (A) and (B) and variable (C) is the difference of placement of focus: now or in the past. (A) and (B) focus on whether or not the child

Figure1 Mobile phone penetration by age



A summary of the methodology and results of analysis conducted to establish the relative importance of different factors when making a decision on mobile phone ownership.



owns a mobile phone now and therefore deals with children aged 12 and 18 in the same way. Question (C), however, asks when the child first got a mobile phone and therefore reflects on the past. Let us assume here, for example, that five years ago it was almost unheard of for children to own mobile phones, but in the past five years, the penetration of mobile phones

among children has grown swiftly. In this case, questions (A) and (B) deal with the status after the penetration rate reached a certain level, and therefore show a strong tendency towards ownership, but (C) reflects the past, and therefore may demonstrate a lower tendency towards ownership.

The area that deserves the most attention is the rate of ownership, demonstrated by (A).

Table 4 Percentage of children who currently don't have a mobile phone but would like to have one

Age	Japan	Korea	China	India	Mexico
9	60.0				
10	71.9		75.0	15.1	46.3
11	58.9		72.9	16.3	45.5
12	68.6	90.0	67.5	18.7	68.0
13	72.0	81.0	68.8	16.7	72.2
14	66.2	83.9	49.2	28.4	62.8
15	69.0	95.2	48.5	39.1	60.0
16	53.8	85.4	47.8	33.9	70.8
17	22.2	89.5	51.0	33.3	73.7
18	50.0	86.1	48.2	19.0	50.0

Unit = %

This is due to the fact that it shows ownership as a result, and could be regarded as the variable that ultimately shows the level of penetration amongst children. Desire for ownership by non-owners (B), has a specific bias associated with the fact that its sample is limited to non-owners, while (C) has the tendency to reflect not the present but the past. (A) is therefore most appropriate to use to understand the current trend in mobile phone ownership, and from here on we will perform analysis based on (A).

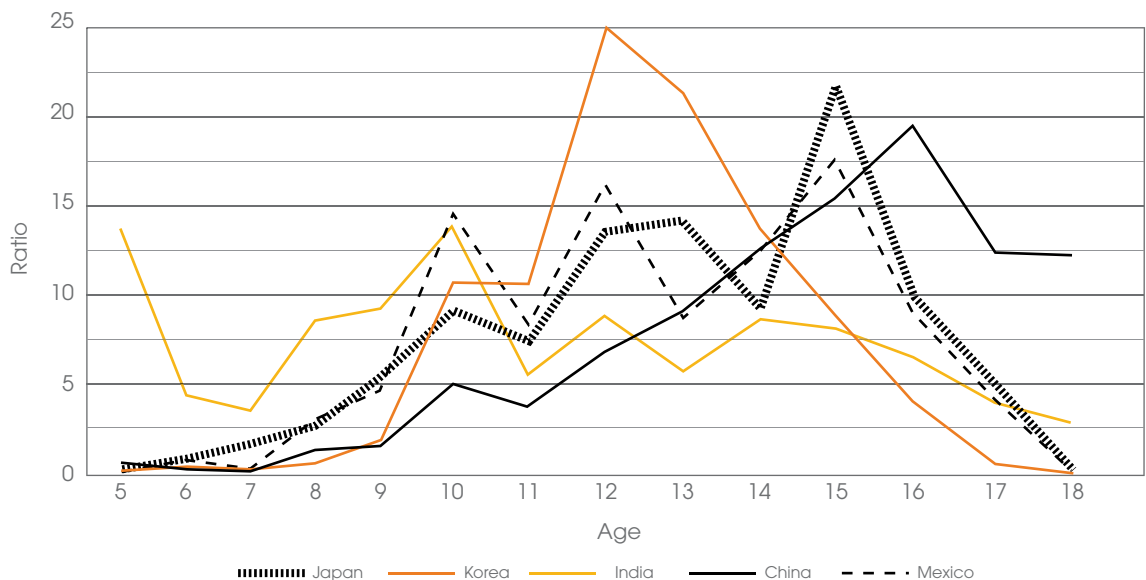
Let us take a brief look at the distribution of the variables. The age distribution of (A) mobile phone ownership is as shown in Table 3. Figure 1 is a graph representing mobile phone ownership rates, created in order to allow intuitive viewing of the trends. As mentioned earlier, Korea's status is unusual, with more than 80% of children already owning a mobile phone at the age of 12 and no further growth being seen beyond this point (i.e. market maturity). In all other countries, however, the rate of ownership grows with age. There are different attributes to this growth according to country. Japan shows swift growth in ownership between the ages of 14 and 15, thought to be associated with the increase in ownership of mobile phones as children enter high school. There is a less clear jump

in ownership between the ages of 11 and 12, which can be connected to the entry to junior high school. No similar sudden jump is seen in China where growth is steadier. In India, the ratio of ownership (excluding shared mobile phones) hardly grows until the age of 14, but then demonstrates a sudden increase from 15 onwards.

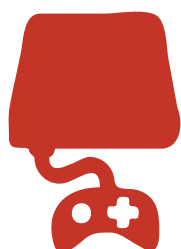
The conditions of (B), desire for ownership by non-owners, is shown in Table 4 by age. This ratio demonstrates the proportion of children in each age category who do not own a mobile phone but responded that they would like to own one. This proportion does not appear to rise or fall with an increase in age. In general, it could be assumed that the desire for a mobile phone strengthens as a child gets older. Contrary to this assumption, however, such an increase in desire by children not owning a mobile phone is not demonstrated by the figures. This is presumably because those children with a particularly strong desire for a mobile phone acquire one, and therefore leave the group of non-owners.

Figure 2 below shows the distribution of the starting age for using a mobile phone.

Figure 2 Starting age for using a mobile phone*



*Sharing phones with parents are excluded



The overall impression is that all countries have a wide distribution and no country stands out particularly. In Korea, as already seen, around 80% of children in all age groups have mobile phones, which gives it particular attributes, but the distribution of ages at which children begin to use mobile phones does not set it apart from any other country. It is not possible to perform regression analysis on ownership in Korea, but the results of such analysis on the starting age of using mobile phones would probably be comparable with those of other countries.

A detailed look at Figure 2 shows that children in Japan and China begin to use mobile phones relatively later than children in other countries, with the ages at which they begin to own mobile phones peaking at 15 and 16 respectively. Korean children begin to use mobile phones early, peaking at 12. In Mexico, the distribution falls between these two. India shows a slightly different trend with many children beginning to use a mobile phone at the age of 9 or before. In India's case, there were many parents who responded that their child shares a mobile phone with a member of the family.

When asked whether their child owned a mobile phone, the proportion of parents who responded that they did not have their own but shared their parents' mobile phone was 3.7% in Japan, 1.8% in Korea, 13.0% in China, 8.0% in Mexico and 54.1% in India, demonstrating a significantly high proportion in India. It appears that sharing a mobile phone with children is a common practice in India and that the age at which such

sharing begins is relatively young. If the shared cases are removed from Figure 2, the age distribution for Indian children beginning to use mobile phones comes into line with those of the other countries. Regression analysis of the age at which children start to use mobile phones was therefore performed, with the children sharing a mobile phone with their family removed from the samples.

Explanatory variables

Explanatory variables are as follows. As for the positive/negative expected coefficients, they are the coefficients expected for the explained variables (A) children's ownership of a mobile phone, or (B) their desire to own a mobile phone. Since increased penetration of mobile phone use among children lowers the starting age for using a mobile phone, the signs of the expected coefficients would be reversed with (C) as the explained variable.

1 Network externality by three friends (the number of people who own a mobile phone from among the three closest friends)

Children were asked to think of their three closest friends and to count how many of them have their own mobile phones. This provides the network externality variable. If network externality is in play, it is expected that a child whose friends have mobile phones will consider that having a mobile phone him or herself will assist with better communications with these friends, and so he or she will develop an increased desire to own a mobile phone. This means that the expected coefficient is positive.

Table 5 Number of mobile phone owners amongst closest three friends

		Japan	China	India	Mexico	Korea
Number of owners	0	334 (16.7)	293 (23.9)	320 (31.9)	179 (17.4)	9 (0.9)
	1	314 (15.7)	275 (22.4)	165 (16.5)	156 (15.1)	30 (3.0)
	2	211 (10.6)	270 (22.0)	217 (21.7)	122 (11.8)	97 (9.7)
	3	1,141 (57.1)	388 (31.6)	300 (29.9)	573 (55.6)	864 (86.4)

Unit = person, % in parenthesis

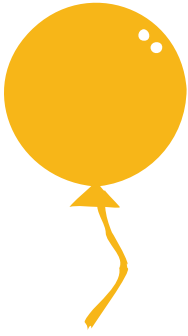


Table 5 on the previous page gives the distribution of these variables. China and India show a broadly even distribution between zero and three friends. In Japan and Mexico, around 50% of children responded that all three friends had a mobile phone, with an even distribution between the remaining categories of zero to two friends. An overwhelming majority of 85% of Korean children responded that all three of their friends had mobile phones demonstrating, again, that penetration is already maximised in the Korean sample.

2 Age of children

Age is considered to be one of the most significant explanatory variables. Since it is normal for mobile phone ownership to increase with age, the expected coefficient is positive.

3 Gender of children: male=1 (D)

This allows us to see whether there are differences in trends of ownership of mobile phones between the genders. The expected coefficient is uncertain prior to analysis.

4 Income of parents (index)

Since income standards differ from country to country, each country was given a range of categories to choose from, and these categories became the variables. We did not have the values translated according to exchange rates, but rather left them in the form of indices. Since mobile phone charges are often perceived as relatively expensive, it is assumed that parents with higher incomes are more capable of providing their children with mobile phones. The expected coefficient is positive.

5 Educational level of parents (index from 1 to 6)

The final level of parents' education is broken into six categories (elementary, junior high, high, vocational college, university, graduate school or above). Perhaps parents with a higher level of education are more likely to give their children a mobile phone; or perhaps, on

the contrary, they show more resistance. The expected coefficient is therefore indeterminate.

6 Expenditure on education per month (index)

This variable demonstrates parents' attitude to education. Expenditure on education also varies strongly from country to country depending on the regional standard of cost of living, so categories were specified for each country and these categories were used as indices. Some parents may let their children have mobile phones because they are keen on education; however, some may refuse to do so for similar reasons. The expected coefficient is therefore indeterminate.

7 Age of parents (20s, 30s, 40s, 50s)

The age of parents was surveyed in four categories – 20s, 30s, 40s and 50s. Younger parents are more used to mobile phones themselves and therefore expected to be more open to their children having a mobile phone at an earlier age. The expected coefficient is therefore negative.

8 Family size (number of people)

The larger the number of people in the family, the more it is expected that members of the family will experience face-to-face communication. As a result, children may demonstrate more mobile phone ownership, or they may demonstrate less. Since children in larger families have more people to communicate with, they may have a higher rate of mobile phone usage, but since they also have more face-to-face communication, they may want to preserve this, or even be satisfied with this, and therefore not want a mobile phone. For this reason, the expected coefficient is indeterminate.

9 Time spent in study (hours per day)

Time spent in play (hours per day)

Time spent in work (hours per day)

Respondents were asked about the time spent in each of these activities per day.

Time spent in study included time spent at school. These three responses gave a sense of the pattern of children's lives. The expected coefficient is indeterminate. For example, children who spend a lot of time studying tend to spend less time playing with one another, and therefore may feel less need for a mobile phone. As seen in some countries, however, children who attend extra tuition after school may need a mobile phone in order to communicate with their parents. Similarly, time spent in play and work in a child's life can affect both possibilities; therefore, the expected coefficient is indeterminate.

10 Ownership of fixed phone (D)
Ownership of PC with Internet access (D)
Ownership of video game console (D)

This variable relates to the availability of other communications or information equipment. Estimates can be made relating to their use as substitute or complementary equipment. The items' substitutability or complementarity cannot be assumed in advance, so the expected coefficient is indeterminate. If the family has a PC with Internet access, for example, it can be used for contacting others e.g. e-mailing, and parents (or children) may therefore feel no need for a mobile phone thereby lowering the mobile phone ownership rate of children. Alternatively, if a child experiences the convenience of using e-mail and Internet via a PC and wishes to own a mobile phone in order to have similar access while on the move, the ownership of mobile phones by children may increase.

11 Dummy variable for TV watching (dummy=1 if child watches TV) (D)
Dummy variable for newspaper reading (dummy=1 if child reads newspaper) (D)
Dummy variable for PC use (dummy=1 if child uses PC) (D)

This variable demonstrates the extent to which a child has media access. This too could be substitutionary or complementary, so the expected coefficient is uncertain prior to analysis.

12 Dummy variables for countries (only used for overall estimates)

Four dummy variables for each of the four countries other than Japan were created. The variables for Korea, China, India or Mexico take the value of "1" for each respective country. When making overall estimates, these dummy variables were used in order to adjust the penetration of mobile phones to the children of each country. As seen in Table 2, the ratio of children owning mobile phones was already taken based on certain controls, meaning that the ownership level standards on their own are meaningless, and so it was necessary to remove this influence when making estimates. The dummy variables for countries were used for this reason. Furthermore, some variables, which were expressed as indices, had differentials for different countries and the influence of these was able to be absorbed to an extent by the dummy variables.



5 Results of the analysis



Tables 6, 7, and 8 summarise the results of our estimates. Since the explained variables are 0 or 1, Tables 6 and 7 are in a form of Logit Analysis.

There are two types of estimates: an overall estimate including all countries, and country-specific estimates. Differences in level in the overall estimate were absorbed by inserting dummy variables for each country.

In addition to the estimated coefficient, the estimation results showed the value of gradient, indicating how much the ratio of mobile phone ownership or the ratio of children indicating an interest in ownership would rise, given a change in an explanatory variable by one unit.

The “dp/dx” column shows this gradient. If the value in this column is 0.05, it means that if an explanatory variable changes by one unit, then the proportion of mobile phone ownership or of children indicating an interest in ownership will increase by 5%. Table 8 is a normal multiple regression.

Table 6 Having a mobile phone

	total			Japan			China			India			Mexico			Korea		
	Coef	t-value	dp/dx	Coef	t-value	dp/dx	Coef	t-value	dp/dx	Coef	t-value	dp/dx	Coef	t-value	dp/dx	Coef	t-value	dp/dx
Network Externality by three friends	1.10	25.65	0.24	1.14	16.84	0.23	1.78	12.88	0.44	0.69	6.00	0.10	0.85	9.66	0.20	0.51	3.26	0.07
Age of children	0.18	9.42	0.04	0.18	5.43	0.04	0.24	3.99	0.06	0.39	7.18	0.06	0.32	7.93	0.08	-0.17	-3.12	-0.02
Sex of children: male=1 (D)	-0.20	-2.47	-0.04	-0.26	-1.83	-0.05	-0.06	-0.26	-0.01	-0.32	-1.32	-0.05	-0.48	-2.58	-0.11	0.02	0.09	0.00
Income of parents	0.05	2.13	0.01	0.09	3.08	0.02	-0.19	-1.48	-0.05	-0.13	-1.30	-0.02	0.38	3.04	0.09	-0.12	-1.27	-0.02
Education of parents(Index from 1 to 6)	0.04	1.05	0.01	-0.19	-2.34	-0.04	0.22	1.86	0.05	0.02	0.13	0.00	-0.14	-1.70	-0.03	0.00	-0.05	0.00
Expenditure for education a month(Index)	0.05	1.94	0.01	0.22	3.03	0.05	-0.02	-0.30	-0.01	-0.15	-2.80	-0.02	-0.11	-1.68	-0.02	0.08	1.78	0.01
Age of parents(20s,30s,40s,50s)	-0.05	-0.80	-0.01	-0.14	-1.04	-0.03	-0.07	-0.45	-0.02	0.01	0.04	0.00	-0.08	-0.59	-0.02	0.01	0.05	0.00
Family size	0.03	0.91	0.01	0.00	-0.07	0.00	-0.04	-0.40	-0.01	0.03	0.34	0.00	-0.04	-0.54	-0.01	0.22	1.78	0.03
Time of study (hours a day)	0.01	0.67	0.00	0.02	0.96	0.00	-0.15	-1.63	-0.04	-0.11	-2.72	-0.02	-0.02	-0.35	0.00	0.00	0.02	0.00
Time of play(hours a day)	0.03	1.23	0.01	0.02	0.45	0.00	0.06	0.39	0.01	0.16	2.00	0.02	-0.06	-1.53	-0.01	0.14	1.45	0.02
Time of work(hours a day)	0.06	1.61	0.01	0.08	1.30	0.02	-0.02	-0.13	0.00	-	-	-	-0.06	-0.64	-0.01	0.06	0.44	0.01
Possesion of fixed phone (D)	-0.17	-1.04	-0.04	-0.41	-0.52	-0.08	-0.33	-0.85	-0.08	0.10	0.30	0.01	0.10	0.34	0.02	-0.60	-1.73	-0.08
Possesion of PC internet (D)	0.62	4.43	0.14	0.78	0.97	0.18	0.77	2.74	0.19	0.26	0.46	0.04	0.29	1.24	0.07	0.75	1.87	0.13
Possesion of console videogame (D)	0.34	3.48	0.08	0.47	2.43	0.10	0.04	0.16	0.01	0.22	0.64	0.03	0.08	0.45	0.02	0.70	2.99	0.09
dummy of watching TV (D)	0.14	0.68	0.03	0.81	0.70	0.19	-0.79	-0.93	-0.18	0.54	0.36	0.07	0.14	0.50	0.03	0.33	0.72	0.05
dummy of reading newspaper (D)	-0.14	-1.55	-0.03	-0.14	-0.85	-0.03	0.09	0.35	0.02	-0.28	-0.96	-0.04	-0.31	-1.47	-0.07	-0.20	-1.02	-0.03
dummy of using PC (D)	0.38	2.84	0.09	-0.29	-0.94	-0.05	0.24	0.80	0.06	-0.36	-0.67	-0.05	0.71	3.11	0.16	-0.87	-1.31	-0.10
_cons	-5.53	-12.19		-4.81	-3.25		2.71	1.39		-6.15	-2.87		-5.12	-3.70		1.67	1.06	
Korea dummy	-0.26	-1.43	-0.06															
Mexico dummy	-0.41	-1.19	-0.09															
China dummy	1.51	7.97	0.26															
India dummy	-0.92	-2.97	-0.22															
Sample size	4478			1740			760			615			989			824		
Log of likelihood	-1937.9			-697.5			-259.2			-246.2			-403.8			-386.0		
Pseudo R2	0.3406			0.3787			0.5065			0.3208			0.3962			0.582		

Table 7 Want to have a mobile phone

	total			Japan			China			India			Mexico			Ref. Korea		
	Coef	t-value	dp/dx	Coef	t-value	dp/dx	Coef	t-value	dp/dx	Coef	t-value	dp/dx	Coef	t-value	dp/dx	Coef	t-value	dp/dx
Network Externality by three friends	0.55	8.48	0.13	0.78	6.76	0.17	0.57	3.16	0.13	0.25	2.12	0.04	0.54	4.66	0.13	0.30	0.67	0.01
Age of children	0.06	1.90	0.01	-0.10	-1.70	-0.02	0.24	3.56	0.05	0.07	1.24	0.01	0.12	2.21	0.03	-0.10	-0.54	0.00
Sex of children: male=1 (D)	-0.41	-3.53	-0.09	-0.70	-3.52	-0.15	-0.37	-1.50	-0.08	-0.39	-1.50	-0.06	-0.08	-0.35	-0.02	0.38	0.63	0.02
Income of parents	0.06	1.66	0.01	0.07	1.62	0.01	0.25	1.75	0.06	0.18	1.54	0.03	-0.13	-0.69	-0.03	-0.25	-0.96	-0.01
Education of parents(index from 1 to 6)	-0.15	-2.61	-0.04	-0.16	-1.45	-0.04	-0.08	-0.60	-0.02	-0.03	-0.17	0.00	-0.11	-0.90	-0.03	-0.75	-2.02	-0.04
Expenditure for education a month(index)	-0.06	-1.45	-0.01	-0.03	-0.26	-0.01	-0.03	-0.39	-0.01	-0.20	-3.09	-0.03	-0.33	-3.48	-0.08	0.06	0.48	0.00
Age of parents(20s,30s,40s,50s)	-0.28	-2.99	-0.06	-0.47	-2.53	-0.10	-0.61	-2.84	-0.14	0.24	1.35	0.04	-0.14	-0.81	-0.03	-0.91	-1.37	-0.04
Family size	-0.04	-0.78	-0.01	-0.17	-2.11	-0.04	0.11	0.92	0.02	0.02	0.20	0.00	-0.01	-0.12	0.00	0.34	0.80	0.02
Time of study (hours a day)	-0.03	-1.13	-0.01	-0.04	-1.05	-0.01	-0.09	-0.90	-0.02	-0.28	-5.96	-0.04	-0.11	-1.44	-0.03	0.03	0.47	0.00
Time of play(hours a day)	-0.07	-2.12	-0.02	-0.04	-0.67	-0.01	-0.16	-1.12	-0.04	0.09	0.98	0.01	-0.10	-1.97	-0.03	-0.43	-1.48	-0.02
Time of work(hours a day)	0.01	0.16	0.00	-0.04	-0.44	-0.01	-0.01	-0.05	0.00	-	-	-	-0.03	-0.22	-0.01	-	-	-
Possession of fixed phone (D)	-0.22	-0.97	-0.05	-	-	-	0.07	0.19	0.02	0.25	0.68	0.04	-0.66	-1.92	-0.15	-0.47	-0.37	-0.02
Possession of PC internet (D)	-0.30	-1.49	-0.07	-	-	-	0.05	0.16	0.01	0.55	0.80	0.10	-0.49	-1.40	-0.12	-17.74	-9.79	-0.14
Possession of console videogame (D)	0.18	1.30	0.04	0.40	1.67	0.09	0.18	0.56	0.04	-0.98	-2.14	-0.12	-0.05	-0.19	-0.01	0.12	0.13	0.01
dummy of watching TV (D)	-0.21	-0.68	-0.05	-	-	-	1.15	1.25	0.28	-	-	-	-0.79	-1.87	-0.17	-0.32	-0.22	-0.01
dummy of reading newspaper (D)	-0.27	-2.09	-0.06	-0.24	-1.11	-0.05	-0.62	-2.19	-0.14	0.34	1.15	0.05	-0.54	-2.00	-0.13	0.62	1.02	0.03
dummy of using PC (D)	0.47	2.50	0.11	0.41	1.07	0.09	0.58	1.80	0.13	0.01	0.02	0.00	0.52	1.29	0.12	-	-	-
_cons	2.07	3.22	0.13	4.07	3.96	0.13	4.10	1.94	0.13	-2.11	-1.22	0.13	3.80	1.81	0.13	8.35	1.77	0.13
Korea dummy	0.67	1.89	0.14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mexico dummy	-0.29	-0.51	-0.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
China dummy	0.07	0.25	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
India dummy	-3.03	-6.59	-0.59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sample size	1631			593			352			443			404			146		
Log of likelihood	-917.2			-338.7			-201.3			-206.4			-233.6			-48.5		
Pseudo R2	0.1547			0.1212			0.1335			0.1451			0.1503			0.141		

Table 8 Starting age of having a mobile phone

	total		Japan		China		India		Mexico		ref Korea	
	Coef	t-value	Coef	t-value	Coef	t-value	Coef	t-value	Coef	t-value	Coef	t-value
Network Externality by three friends	-0.01	-0.28	0.03	0.39	0.04	0.46	0.46	1.23	-0.19	-2.03	0.03	0.20
Age of children	0.72	46.62	0.77	29.30	0.77	20.63	0.93	5.13	0.73	24.42	0.44	12.41
Sex of children: male=1 (D)	0.19	3.05	0.34	3.23	-0.39	-2.95	-0.36	-0.50	0.40	3.00	0.15	1.23
Income of parents	-0.01	-0.41	-0.03	-1.35	0.11	1.64	0.01	0.05	-0.20	-2.40	0.13	2.00
Education of parents(index from 1 to 6)	-0.12	-3.93	0.00	-0.03	-0.07	-1.11	0.43	1.10	-0.06	-1.07	-0.09	-1.29
Expenditure for education a month(index)	-0.06	-3.22	-0.14	-2.62	-0.23	-5.66	0.18	1.24	0.10	2.21	-0.07	-2.43
Age of parents(20s,30s,40s,50s)	0.34	6.38	0.32	2.90	0.33	4.01	-0.05	-0.11	0.20	2.05	0.73	6.00
Family size	0.03	1.27	0.00	-0.04	0.16	2.64	0.19	0.65	0.05	0.98	0.08	1.04
Time of study (hours a day)	0.00	-0.33	-0.01	-0.73	-0.05	-0.98	0.12	1.04	0.02	0.81	0.01	0.91
Time of play(hours a day)	0.03	1.63	-0.03	-0.99	0.05	0.55	0.12	0.59	0.08	2.97	-0.08	-1.38
Time of work(hours a day)	0.00	0.15	-0.02	-0.38	-0.04	-0.58	-	-	0.01	0.11	0.12	1.30
Possession of fixed phone (D)	0.09	0.64	0.07	0.11	0.15	0.59	0.86	1.02	0.31	1.27	-0.09	-0.44
Possession of PC internet (D)	-0.48	-4.23	0.48	0.64	-0.21	-1.23	-3.25	-2.77	-0.26	-1.58	-0.49	-1.58
Possession of console videogame (D)	-0.18	-2.40	0.06	0.38	-0.01	-0.10	-0.12	-0.13	-0.66	-4.91	0.06	0.43
dummy of watching TV (D)	-0.23	-1.53	0.18	0.21	-0.07	-0.16	-1.81	-0.53	-0.53	-2.69	0.32	1.03
dummy of reading newspaper (D)	0.09	1.21	0.20	1.45	0.14	0.96	-1.14	-1.34	-0.03	-0.23	-0.01	-0.10
dummy of using PC (D)	-0.18	-1.60	0.19	0.64	-0.02	-0.12	0.74	0.70	-0.13	-0.81	-0.04	-0.10
_cons	2.58	6.96	-0.14	-0.11	23.28	21.63	-4.37	-0.77	1.95	2.00	3.29	3.10
Korea dummy	-0.73	-5.53	-	-	-	-	-	-	-	-	-	-
Mexico dummy	-0.97	-4.16	-	-	-	-	-	-	-	-	-	-
China dummy	7.22	45.38	-	-	-	-	-	-	-	-	-	-
India dummy	-0.91	-2.99	-	-	-	-	-	-	-	-	-	-
Sample size	2606		1010		361		126		585		612	
F-value	186.1		88.3		43.0		3.3		60.0		17.6	
R2	0.6019		0.602		0.6808		0.3229		0.6427		0.3348	

Examining first the overall estimate, we see that it fits within the range that is reasonable for a cross-section regression. For a regression on mobile phone ownership, the pseudo-coefficient of determination in (A) is 0.3; for a regression on desire for ownership by non-owners, the pseudo-coefficient of determination in (B) is about 0.15. We conjecture that the coefficient of determination for the regression of desire for ownership of a mobile phone by non-owners is low because, as described above, the consistency of the population cannot be maintained when owners are removed from the sample. The coefficient of determination for the regression of the starting age of using a mobile phone is 0.3 to 0.6, which is a reasonable value as a cross section. Below is a summary of the conclusions that can be drawn for each explanatory variable.

1 Network externality

Network externality is measured by having the child name three close friends and determining the number of those owning mobile phones. If having a larger number of friends who own mobile phones can be shown to increase the likelihood of owning or wanting to own a mobile phone, then this is verification of network externality.

In the overall estimate, the network externality factor was extremely clear and significant for both (A) ownership of mobile phones, and (B) desire for ownership by non-owners. Although this is not observed for (C) starting age for some countries, this does not pose a problem because it is obvious that the ownership of mobile phones by friends at the present time has no relationship with the starting age in the past.

According to the overall estimate, if the number of friends out of three who own a mobile phone increases by one, then 24% of the individuals also own a mobile phone. Of those who do not own mobile phones, 13% wish to. The size of the increase in ownership is greater than that of the increase in desire for ownership. The first reason for this is that there may be factors promoting ownership other than the child's own desire. For example, the

argument that "all my friends have bought one, so I want one too" may be effective at convincing parents. Secondly, only non-owners are asked about their desire for ownership; it is possible that many non-owners are children who tend not to feel much network externality in the first place, and thus do not have a strong desire for ownership.

See below for a comparison of the strength of network externality by country.²

Ownership

China (0.45) > Japan (0.23) = Mexico (0.20) > India (0.10)

Desire for ownership by non-owner

Japan (0.17) > Mexico (0.13) = China (0.12) > India (0.04)

The tendency for ownership is strongest in China: if one of the three friends has purchased a mobile phone, then 45% of the children also own one. China is followed by Japan and Mexico, where about 20% will purchase a phone if a friend does; it is even lower in India: about 10%. Desire for ownership by non-owners is highest in Japan, where if one friend buys a mobile phone, then 17% of non-owners will also want one. Mexico and China have a slightly lower percentage than Japan, where 12 to 13% of children will want to purchase a mobile phone if a friend does. The value is low in India, at less than 5%.

Overall, the countries can be classified into two groups. One is the group of countries where network externality is high: China, Japan, and Mexico. The other is India, where network externality is low. One possible reason why network externality is low in India may be that there are fewer friends to call or e-mail using mobile phones, but our investigations did not reveal this to be true. In India, most mobile e-mails/SMS are sent to friends and this level is no different from other countries. The low network effect in India may be due to factors outside the scope of this study.

2 Child age and gender

For the overall estimate, age was a positive factor for (A) mobile phone ownership, as expected. For each additional year in age, an additional 4% of children own a mobile

² Korea's network externality value is low because it is not possible to observe the process of increased ownership as children grow older; this is because, as shown in Figure 1, the ownership ratio in Korea is already near the maximum of 80% or more at every age group. This can be confirmed in Table 5, where the pseudo-coefficient of determination of the estimation formula for Korea is by far the lowest, at 0.058. For this reason, the comparison excludes Korea.

phone. This rate is also significant and stable for each country individually. In Japan, the increase in mobile phone ownership per year in age is 4%, while in China, India and Mexico it is 6%.

In the overall estimate, age was not very significant for (B) desire for ownership by non-owners. The results are also not constant across countries. This may be because as they grow older, children who want a mobile phone end up owning one, and the remaining children do not want a mobile phone. Since the non-owner sample excludes children who actually own a mobile phone, two effects intersect as children grow older. The first is the effect of increased desire to purchase as age increases; and the second is the effect of removing children with a high desire to purchase from the sample. If the first effect is greater than the second, then the figure will be positive (China and Mexico); if the second is stronger, then the figure will be negative (Japan). If the two effects are equally matched, then the result will be indeterminate (India and overall estimate).



By gender, girls had a greater inclination to own a mobile phone than boys in almost all countries. In the overall estimate, (A) 4% more girls owned a mobile phone than boys, and (B) 9% more girls who did not own a mobile phone wanted to. For (C) the starting age of using mobile phone, girls start owning mobile phones 0.19 years (approximately 2 months) earlier.

In China, however, boys begin owning mobile phones at a younger age than girls. This trend is the opposite of the overall trend and may be because parents in China give preference to boys when giving children mobile phones, although this cannot be determined from the study itself.

3 Income of parents

Parental income had a significant positive influence on (A) mobile phone ownership in the overall estimate. In other words, the higher the parents' income, the more likely it is that children will own a mobile phone. By country, this effect was significant in Japan and Mexico. Parental income did

not, however, have a significant impact on desire for ownership by non-owners. It could be inferred that children's desire for a mobile phone bears no relationship to their parents' income, but parental income does have an impact on whether they actually buy a mobile phone. This is a reasonable result, considering that a mobile phone may represent a relatively large expenditure.

4 Educational level of parents

In Japan and Mexico, the increased educational level of parents had a negative correlation with mobile phone ownership; in China, it had a positive correlation. In other words, in Japan and Mexico, highly educated parents tend not to let their children own mobile phones, while the opposite holds in China. These effects cancel each other out in the overall estimate and no trend is shown. There was a negative correlation with desire for ownership by non-owners in all countries, and a significant negative correlation in the overall estimate. As the educational level of the parents increases, the desire for ownership amongst the children tends to fall. In other words, the children of highly educated parents tend to be negative about mobile phone ownership. Although the reason for this is unknown, one possible explanation is that highly educated parents think carefully about the positive and negative aspects of their children owning mobile phones, and children, influenced by their parents, have less desire to own a mobile phone as a result.

It was found, however, that the starting age of using a mobile phone tends to decrease as the parents' educational level increases. Since the starting age of using mobile phones is a reflection of a situation in the past, it can be inferred that highly educated parents purchased mobile phones for their children at an early age in the past, but that they do not necessarily take the same action today. For example, highly educated households may have actively evaluated mobile phones as new information devices, but as mobile phones became more popular they may have begun to note associated issues, and become more cautious about mobile phone ownership.



5 Expenditure on education

In Japan, mobile phone ownership increases as educational expenditure increases, while conversely, in India, mobile phone ownership decreases with higher educational expenditure. This may be a reflection of a difference between countries where mobile phones are considered to be necessary for education and countries where this is not the case. In Japan, educational expenditures have no correlation with the desire for ownership by non-owners, so in Japan it is safe to consider the relationship between educational expenditure and an increase in mobile phone ownership to be a reflection of parental policies. For example, this would be the case if parents who were passionate about education sent their children to extra tuition after school, and gave them mobile phones because the children needed to contact them while away from home. In Japan, tutorial schools are quite numerous and so this is a realistic explanation (the description of Japan, above, also applies to Korea). In India and Mexico, the higher the educational expenditure, the lower the mobile phone ownership and the children themselves do not have a much higher desire to own mobile phones.

In terms of the starting age for using mobile phones, in Japan and China (as well as Korea), the age decreases as educational expenditure increases, with children tending to receive mobile phones at an earlier age. In Mexico, however, the age increases which shows a marked difference between Japan, China and Korea on the one hand, and Mexico and India on the other.

6 Age of parents

Parental ages were divided into five groups: under 20, 20s, 30s, 40s and 50s. We found that parental age does not have an impact on mobile phone ownership. In other words, no matter what the age of the parents, the percentage of mobile phone ownership of their children does not differ. Age did, however, have a negative impact on children's desire for ownership; the older the parents, the less their children wanted to own a mobile phone. Since older parents

are less accustomed to the mobile phone culture, it may be that parents cannot, or do not enjoy, exchanging mobile e-mail/SMS and the like with their children, and are more cautious about new technology such as mobile phones the older they become. Note, however, that parental age has no impact on ownership ratios, so this does not mean that older parents are opposed to their children owning mobile phones and delay their ownership.

There is an extremely strong negative correlation between parental age and the age at which children start to use a mobile phone. In other words, the older the parents, the older the children are when they start to own mobile phones. This shows that in the past, older parents had a tendency to delay ownership of mobile phones by their children. The size of the effect is as follows: an increase in parental age of 10 years correlates with a 0.44 year delay (approximately 5 month delay) in the start of mobile phone ownership by children.

7 Family size

Family size was not found to be significant in the overall estimate. There are some countries in which it is significant; in Japan, a larger family size reduces the desire for ownership by non-owners. With each increased family member, the proportion of children stating that they wanted a mobile phone decreased by 4%. Since income is controlled, this may signify that an increase in family members means a larger number of dependents, which could create economic hardships that in turn lower desire for ownership. On the other hand, it is possible that when non-owners have many family members around them, they have more opportunities for face-to-face communication at home and therefore less desire to communicate using mobile phones.

The questionnaire only asked about siblings in Japan and India. When a dummy for the presence of younger siblings was created and added as an explanatory variable, a significant impact was found for Japan. Table 9 shows the coefficient of the sibling dummy variable only. In Japan, children who have



a younger brother or sister have a 6% lower mobile phone ownership ratio. Additionally, children with a younger brother or sister are 0.41 years (5 months) older when they start owning a mobile phone. In Japan, the same reason as the family effect can be given for this outcome. One reason is that the more siblings there are, the higher the educational and other expenses, which could result in less money being available for mobile phones. Another possibility is that when children have siblings to play and otherwise communicate with, they have less need for communication via mobile phone. Additionally, in Japan many children use mobile phones for safety, as a means of contact in situations such as returning home late at night from after school tuition. In this case, if the child has siblings then he or she can return home with them instead of returning home alone, which could reduce the need for a mobile phone. In any case, mobile phone ownership tends to decrease in Japan as the family size or number of siblings increases, and this result is unique to Japan. Note that in India, no correlation was detected with having siblings.

8 Children's daily schedules

Children's daily schedules had a limited overall impact on mobile phone ownership. The only correlation found was in India, where more time spent studying correlated with lower mobile phone ownership, and more time spent playing correlated with higher ownership.

Meanwhile, in Mexico more time spent playing reduced the desire for ownership

by non-owners and delayed the start of ownership. In the overall estimate as well, there was a weak but negative correlation between more play time and desire for ownership by non-owners. It could be inferred that in the case of non-owners, if children have enough play time, they do not want a mobile phone.

There are perceptions among the general public about relationships between mobile phones and lifestyle patterns. For example, there are theories that children who frequently use mobile phones do not study much and spend more time alone. The current estimations in this study, however, found only a weak and limited correlation with time spent on various activities.

9 Ownership of information and communication equipment

We considered three types of information and communication equipment: fixed phones, personal computers, and video game consoles. The only category for which the effect was consistent was video game consoles: children owning video game consoles had higher rates of mobile phone ownership and began using mobile phones at an earlier age. There was no impact, however, on desire for ownership by non-owners. It appears that for children, video games and mobile phones are complementary and good matchups.

Personal computers also had a positive impact on mobile phone ownership; children owning personal computers were more

Table 9 Effect of having brothers and sisters: Japan and India

	Having mobile phone = 1			Starting year of using mobile phone	
	Coef	t-value	dp/dx	Coef	t-value dp/dx
Japan					
Having brother or sister (D)	-0.3	-1.82	-0.06 *	0.41	3.48 ***
India					
Having brother or sister (D)	-0.27	-1.00	-0.04	-0.27	-0.37

Other variables are omitted

likely to own mobile phones and started using them at an earlier age. It is possible that personal computer and mobile phone ownership is complementary rather than substitutive. Personal computers did, however, have a negative impact on non-owners with a weak but negative correlation with desire for mobile phone ownership. A substitutive effect was found with non-owners, where a mobile phone was not needed if the child had a personal computer. This substitutive effect was limited, however, and overall the complementary effect was greater. Both children owning personal computers and children owning video game consoles were more likely to own mobile phones. One possible interpretation is that the ownership of personal computers and video game consoles are a reflection of how positive the parents are regarding the use of IT devices and then when the parents are positive about IT devices, their children are more likely to own mobile phones.

Summary

Here we will attempt to summarise the results above. Needless to say, the factor most strongly influencing the rate of mobile phone ownership by children was age; the older the child, the more likely he or she was to own a mobile phone. Parental income also positively influenced ownership. In addition to these, network externality also had a clear positive impact on ownership. When children's friends get mobile phones and start using them to communicate, the children want mobile phones for themselves as well. Video game consoles and personal computers were also found to have a complementary relationship with the ownership of mobile phones and could stimulate mobile phone ownership. Educational expenditures, parental education and children's daily schedules did not always have a consistent correlation.



Ways in which mobile phones may influence children

Owning a mobile phone affects the owner in a variety of ways; here we focus on three areas.

3 "trust in media" describes whether children think the media provides them with accurate facts or not.

First, we look at change in children's trust in media³. It has been said in some countries that there are tendencies for children's trust in existing media to decline as communications via mobile phones become popular, and that their trust in new media such as the Internet and mobile phones increases. We examined whether we can actually see such trends among children and whether there are any differences in these trends between the countries surveyed.

Secondly, we examined to what extent mobile phones are considered essential to children's lives. Network externality has been identified as one of the drivers for increasing penetration of mobile phones among children. That implies that mobile phones are now becoming seen as indispensable tools for communication among children. We tried to measure how the perception of necessity is reflected in children's feelings.

Thirdly, we studied how the factors affecting the selection of mobile phone models have changed as mobile phones have become more popular and the mobile phone market has matured. If we assume the maturity of mobile phones follows a typical maturity pattern, we can also expect that the priorities

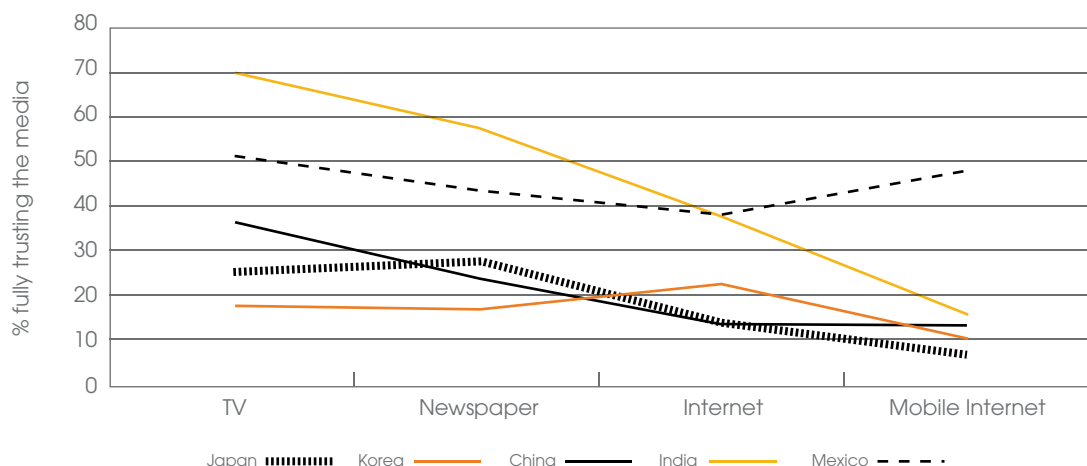
of users when selecting mobile phone models will shift from basic functions to advanced functions and then to non-functional factors such as model design as mobile phones become widespread. We examined the extent to which such trends could be observed.

1 Trust in Media

We selected TV and newspapers as representative of traditional media and the Internet and mobile Internet as representative of 'new media'. In our questionnaire survey, we asked children to rate the extent to which they trust or distrust these media on a five-level scale. The five levels are: 1 "don't trust it at all" 2 "don't trust it so much" 3 "neither trust nor distrust it" 4 "trust it to a certain extent" 5 "fully trust it".

Figure 3 shows the ratio of the number of respondents saying "fully trust it" to the number of total respondents by country. All of the countries surveyed exhibited a similar trend in which the curves in the graph fall primarily to the right. The degree of trust is highest for TV, followed by newspapers, then by the Internet and mobile Internet being the lowest. By country, trust in media is generally high in India and Mexico, whereas it is comparatively low in Japan, Korea and China. The percentage of children who responded that they trust TV was 70% in India, 50% in Mexico, 40% in China, more than 20%

Figure 3 Trust in media



Owning a mobile phone affects the owner in a variety of ways; here we focus on three areas. First, we look at change in children's trust in media.



in Japan and below 20% in Korea. The same trend can be seen for trust in newspapers. We can see the same trend, high trust in India and Mexico and low trust in Japan, China and Korea, for the information obtained from the Internet and mobile Internet. The trend was the same amongst only those children who own mobile phones.



Why is trust in media as a whole so low in Japan, China and Korea? Given the high penetration of mobile phones and the Internet in Japan and Korea, it may be possible to assume that trust in media as a whole tends to decline as mobile phone and Internet usage become widespread. However, it remains to be seen whether trust in new media such as the Internet and mobile Internet is increasing or not in proportion to the decline of trust in traditional media. To verify such an assumption, we performed regression analysis.

We should note that in our survey on the Internet and mobile Internet, the number of respondents varies by country since there are differences in penetration of these media between countries. Table 10 shows the ratio of the number of respondents who answered our questions on trust in media to the number of all respondents. More than 80% of children responded to our question about trust in TV in all of the countries. However, for the question regarding trust in the Internet, the percentage is only 10% in India, and the percentage is below 10% in both India and Mexico for the question regarding trust in the mobile Internet.

Table 10 Trust in media

Percentage of interviewees who responded to questions on trust in media

	TV	Newspaper	Internet	Mobile Internet
Japan	100.0	100.0	100.0	100.0
Korea	99.9	99.9	99.9	99.9
China	92.5	65.2	74.1	75.9
India	89.2	64.1	10.9	5.6
Mexico	84.9	26.5	44.7	7.5

Unit=%

We used two explained variables. One is the degree of trust (trust index) in traditional media, which is the sum of the trust indices for TV and newspapers. Another is the degree of trust in new media, which is the sum of the trust indices for the Internet and mobile Internet. The maximum value is 10 and the minimum value is 2 for the two indices.

$$\begin{aligned} \text{Trust index to traditional media} &= \\ &\text{trust index to TV} + \text{trust index to newspaper} \\ \text{Trust index to new media} &= \\ &\text{trust index to Internet} + \text{trust index to} \\ &\text{mobile internet} \end{aligned}$$

It is assumed that if the degree of trust is high, the frequency of use will also be high. Therefore, the expected coefficient is positive for the same media. In other words, children who often use traditional media are expected to be trusting of such media while those who often use new media are expected to show trust in them. We do not know what the cross-effect will be, however. It is often argued that as people start to use new media, their trust in traditional media declines. If this is true, then the coefficient will be negative for the cross-effect. The third variable is the daily frequency of use of mobile e-mail/SMS, used to examine the effect of mobile phones.

$$\begin{aligned} \text{Daily frequency of use of mobile email} \\ \text{or SMS} &= \end{aligned}$$

$$\begin{aligned} &(\text{"number of mobile e-mail/SMS received} \\ &\text{per day"} + \text{"number of mobile e-mail/SMS} \\ &\text{sent per day})/10 \end{aligned}$$

The unit for this variable is 10 times per day. We are aware of the fact that if we assume that the use of mobile phones affects trust in media, it would be more appropriate to use the frequency of use of mobile Internet for the purpose of analysis.



We produced three new explanatory variables. The first one is the frequency of use of traditional media and the second one is the frequency of use of new media. The sum of TV and newspapers' use frequency is labelled as "frequency of use of traditional media" while the sum of the Internet and mobile Internet's use frequency is labelled as "frequency of use of new media". We asked the respondents to answer their frequency of use rating on a three-level scale (3 "often use it"; 2 "sometimes use it"; 1 "seldom use it"); so the sum will be 6 at maximum and 2 at minimum.

Table 11 Determinants of trust in media

	(1)		(2)		(3)	
	old media trust		new media trust		new media-old media	
	Coef	t-value	Coef	t-value	Coef	t-value
Old media usage index	0.13	3.09 ***	0.03	0.67	-0.12	-2.50 **
New media usage index	-0.07	-1.80 *	0.13	3.27 ***	0.21	5.34 ***
Frequency of mail (receive+sending) unit=10	0.006	0.43	0.023	2.54 **	0.017	2.23 **
Age of children	-0.02	-1.24	0.00	0.14	0.02	1.37
Sex of children: male=1 (D)	-0.04	-0.48	0.12	1.51	0.17	2.27 **
Education of parents (index from 1 to 6)	-0.03	-0.63	-0.07	-1.54	-0.02	-0.45
Expenditure for education a month (index)	0.06	2.23 **	0.02	0.83	-0.06	-1.90 *
Korea dummy	-0.22	-1.44	0.33	2.07 **	0.59	3.83 ***
China dummy	0.04	0.23	-0.11	-0.58	-0.14	-0.71
India dummy	0.73	1.49	1.38	1.94 *	0.59	1.08
Mexico dummy	-0.42	-1.08	1.71	-5.39 ***	2.18	7.93 ***
Constant	7.87	22.67 ***	6.58	18.45 ***	-1.38	-4.08 ***
sample size	1485		1493		1457	
F-value	2.13		9.48		16.7	
R2	0.019		0.066		0.111	

However, the mobile Internet is not widely used in countries other than Japan and Korea, so we chose to use frequency of use of mobile e-mail/SMS here as the indicator of frequency of communications via mobile phones. We aimed to examine and identify as independent factors whether the respondents' trust in new media increases, or trust in traditional media decreases, as they communicate more often via mobile phones.

We also used age and gender of children, educational level of parents, expenditure on education and dummy variables for countries as control variables that may affect the trust index in media. Table 11 summarises the result of our calculations. The very low level of determinants suggests a low level of matching. It implies that there may be many other factors including personal experience, that affect their trust in media. We are assuming here that such other factors do not have a strong correlation with the explanatory variables we are dealing with, as we examine our findings in terms of significance of the coefficients.

Looking at the effect of frequency of use of media, we observe a clear tendency that the more frequently children use a specific media, the higher trust they show in such media. In regression equation (1) with trust in traditional media, the coefficient value 0.13 of old media usage index is significant while in regression equation (2) with trust in new media, coefficient value 0.13 of new media usage index is also significant. Interestingly, the values of the coefficients are almost equal for old and new media, which implies that there are the same kinds of strong relationship in which the trust index increases as frequency of use rises, for both traditional and new media.

However, we found a difference between media in the cross-effect. In equation (1), the coefficient of cross term, -0.07, is significant. This shows that trust in traditional media becomes a little lower as children use new media more frequently. It seems that children who are familiar with the Internet tend to show lower trust in traditional media although

such a tendency is relatively vague. On the other hand, we cannot see the reverse. Namely, coefficient value 0.03 in equation (2) is not significant. It means we cannot find a tendency that children show lower trust in new media if they use traditional media more frequently.

Looking at the frequency of mobile e-mail/SMS (receiving and sending), the coefficient value 0.023 in equation (2), with new media as an explained variable, is significant. It indicates that children who send mobile e-mail/SMS more frequently show a higher level of trust in new media. On the other hand, the coefficient is not significant in equation (1) with traditional media as an explained variable, which indicates there is no effect on the trust index of traditional media. It is often said that heavy users of mobile phones tend to show lower trust in traditional media such as TV and newspapers. In our findings, however, we cannot see such a tendency. It might be interpreted that people who eagerly send and receive mobile e-mail/SMS messages do not become distrustful of traditional media but rather develop higher trust in new media, and this results in their giving a relatively higher evaluation to new media.

We have just referred to the relative comparison between new and traditional media and it could be true that this relative comparison is more meaningful than the absolute levels of trust. There is a difference between people in the level of trust in media as a whole. The explanatory variables we use here are not indicators for absolute levels of trust, but factors explaining a difference between traditional and new media. Thus, if we carry out regression process, using the difference in trust index, we might be able to produce a regression equation that supports our assumption. We defined a new explained variable by deducting traditional media's trust index (explained variable of equation (1)) from new media's trust index (explained variable of equation (2)). (3) is the regression equation produced using this variable. As we expected, the coefficient of determination rose to approximately 0.1, which indicates

an improved match. Both coefficients of usage index and frequency of mobile e-mail/SMS show signs that we expected and are significant. These results are consistent with our findings so far.

To recapitulate the above, an increase in frequency of use of a specific media and the level of the user's trust in such media are positively correlated. As for the cross-effect, the use of new media moderately reduces trust in traditional media. However, the use of old media does not have a negative impact on trust in new media. We also observed a tendency toward rising trust in new media with children using mobile e-mail/SMS more frequently.

We will also observe here the effects of control variables. Older age was found to have no significant effect. Effect of gender is not strong; however, gender is significant in equation (3). We found a tendency for boys to show a lower trust in traditional media and a higher trust in new media than girls. The effect of the educational level of parents is not clear. Children associated with greater expenditure for education tend to show higher trust in all types of media; in particular, their trust in traditional media such as TV and newspapers is higher.

Comparing dummy variables for countries, there is not a great difference between countries in trust in traditional media, while trust in new media varies by country. Trust in new media is lowest in Japan and China while relatively high in Korea, India and Mexico. One of the reasons that trust in new media is high in India and Mexico might be that the Internet and mobile Internet are still not used so widely in these countries and various problems related to the Internet have not yet surfaced there. In the early stages of the Internet, almost all senders of information were 'elites' with a high educational background and consequently information provided via the Internet was relatively reliable. However, low-quality and sometimes false information has increased in line with the expansion of the user base. History may be repeating itself in India and Mexico. However,

this argument cannot explain why in Korea where the Internet is as popular as (or more popular than) in Japan, trust in new media is so high. Further examination of the reason for the high level of trust in new media in Korea would be beneficial but is outside the scope of this study.

2 Necessity

We focused on the following seven items in order to examine the extent to which mobile phones have become psychologically essential products to children.

- 1 It is fun to use a mobile phone.
- 2 Not having a mobile phone is inconvenient.
- 3 I feel lonely when I don't receive any voice calls.
- 4 I feel lonely when I don't receive any messages (SMS, e-mail, IM).
- 5 I fiddle around with my mobile phone if I feel bored.
- 6 I feel insecure without my mobile phone/ PHS.
- 7 Communication by mobile phone is sometimes troublesome.

We asked children to select from the following four options: "fully agree", "agree", "don't agree", "don't agree at all". All of the questions underpin the issue of whether a mobile phone is a psychologically essential tool to a child. The seventh question asks about a negative aspect i.e. whether children sometimes found mobile phones to be troublesome; we have included this question assuming that children would not consider communication by mobile phone to be sometimes troublesome unless they regard a mobile phone as a necessary tool. (In other words, we thought that children who do have negative feelings may be feeling this way because they believe that they can't just abandon their mobile phones. They are, of course, free to stop using mobile phones if they are really causing that much trouble; but in reality no one wants to give them up.) First, we look at the distribution and correlation of these variables shown in Table 12. As for distribution, the numbers of respondents who answered that they agree

with item 1 ("It is fun to use a mobile phone") and item 2 ("Not having a mobile phone is inconvenient") are quite high. For these items, the sum of answers "agree" and "fully agree" reached almost 90%. For item 3 ("I feel lonely when I don't receive any voice calls") and 4 ("I feel lonely when I don't receive any messages"), the respondents who agreed or fully agreed were about 40% of the total. For item 5 ("I fiddle around with my mobile phone if I feel bored") and item 6 ("I feel insecure without my mobile phone"), the respondents who agreed or fully agreed were approximately 60%.



Regarding correlation among these items, correlation among items 3, 4, 5, 6 is strong and exceeds 0.4. Among the necessity factors, these four items are strongly related to children's psychological desires; this is thought to be the reason for strong correlation. The correlation of item 7 with other items is weak, and the reason may be the negative aspect

of item 7. Nevertheless, we should note that all of the correlation coefficients of item 7 with items 3, 4, 5 and 6 are positive not negative. It is possible to interpret this result as follows; when a child has a strong feeling that his/her mobile phone is a psychologically essential tool, an equally strong feeling of being bothered by his/her mobile phone might be provoked.

Next, we look at the determinants of necessity. Whether a respondent agrees or not to a specific item are used as explained variables. The value is 1 if a respondent agrees or fully agrees, and 0 in all other cases. However, since the ratio of respondents who agree or fully agree to items 1 ("It is fun to use a mobile phone") and 2 ("Not having a mobile phone is inconvenient"), are too high, for these two items the value is 1 only if a respondent fully agrees. Furthermore, to review the overall tendency, we calculate the sum of the answers to all items and define it as item X.

Table 12 Necessity of mobile phones to children: distribution and correlation

	Don't Agree At all	Don't Agree	Agree	Fully Agree
(1) It is fun to use a mobile phone	93 (2.4)	388 (10.0)	2,177 (56.0)	1,229 (31.6)
(2) Not having a mobile phone is inconvenient	139 (3.5)	482 (12.1)	1,962 (49.4)	1,390 (35.0)
(3) I feel lonely when I don't receive any voice calls	583 (15.7)	1,663 (44.7)	1,078 (29.0)	393 (10.6)
(4) I feel lonely when I don't receive any messages (SMS, email, IM)	536 (14.4)	1,415 (37.9)	1,292 (34.6)	486 (13.0)
(5) I fiddle around with my mobile phone if I feel bored	312 (8.1)	902 (23.4)	1,820 (47.2)	821 (21.3)
(6) I feel insecure without my mobile phone/PHS	415 (11.0)	1,250 (33.2)	1,477 (39.3)	621 (16.5)
(7) Communication by mobile phone is sometimes troublesome	423 (11.6)	1,616 (44.4)	1,295 (35.6)	307 (8.4)

Unit = person, % in parenthesis

Correlation Coefficients	1	2	3	4	5	6	7
(1) It is fun to use a mobile phone	1						
(2) Not having a mobile phone is inconvenient	0.35	1					
(3) I feel lonely when I don't receive any voice calls	0.32	0.31	1				
(4) I feel lonely when I don't receive any messages (SMS, email, IM)	0.37	0.35	0.69	1			
(5) I fiddle around with my mobile phone if I feel board	0.38	0.37	0.40	0.44	1		
(6) I feel insecure without my mobile phone/PHS	0.37	0.45	0.48	0.52	0.54	1	
(7) Communication by mobile phone is sometimes troublesome	0.03	0.03	0.25	0.17	0.15	0.15	1

For explanatory variables, we use the logarithm of number of mobile e-mail/SMS sent/received per day and logarithm of number of calls made/received via mobile phone per day. We can assume that the more frequently a respondent sends/makes or receives mobile e-mail/SMS or calls, the stronger is the respondent's recognition of a mobile phone as an essential tool; therefore, the expected coefficient is positive. We use logarithm because the effect has nonlinear property and by using logarithm, the level of fit of the equation is expected to improve. We also use age of children, gender of children and dummy variable for countries as explanatory variables. Dummy variables for countries indicate differences in the level of necessity by country. Table 13 shows the results of our estimate.

For the number of mobile e-mail/SMS sent/received per day, the sign is positive for almost all items, reinforcing the necessity of mobile phones. We should note that children who use mobile email/SMS more frequently tend not to feel that mobile phones are troublesome (item 7 "Communication by mobile phone is sometimes troublesome"). From all the variables, only this one (number of mobile e-mail/SMS sent/received) is negatively significant against item 7. In other words, the more frequently a respondent sends or receives mobile e-mail/SMS, the less troubled he/she is by mobile phones. From this finding, we can assume that use of mobile e-mail/SMS is a factor that facilitates the use of mobile phones and makes them essential tools in children's lives.

fact that, since phone calls may intrude into people's private lives, receiving many calls does not necessarily make people happy. Another reason might be that people have a tendency to make calls from a mobile phone at times of emergency, and most emergencies are negative events.

Comparing the value of coefficients in the overall estimation shown in the rightmost column X, the coefficient for number of mobile e-mail/SMS is greater than that for number of calls. It indicates that an increase in the frequency of sending/receiving mobile e-mail/SMS has more impact on mobile phones being a necessity than an increase in the frequency of calls does. In other words, mobile phones are more essential tools to people who send/receive mobile e-mail/SMS than to people who make/receive calls via mobile phones. Children think of mobile phones as, so to speak, "information gadgets" for using mobile e-mail/SMS and the Internet. They consider voice calling functionality as a supplementary function.

As children get older, their feeling that a mobile phone is a necessity becomes generally stronger, as is demonstrated by the signs for Items 2, 3, 4 and 6 being positive with the age variable. Only the sign for item 1 ("It is fun to use a mobile phone") is negative, but this is probably because children's excitement at having and using a mobile phone is greatest when they first get a phone, and then gradually fades. We also find that as children get older, the percentage of those who feel it can be troublesome to own a mobile phone increases.

For the gender variable, the signs are negative in almost all cases. Boys' feelings about mobile phones being a necessity are not as strong as those of girls. The differences by gender are significant in items 3, 4 and 6, which are items particularly related to psychological desires. This finding indicates that girls have a greater feeling of loneliness when they don't receive any mobile phone calls or mobile e-mail/SMS, and a greater feeling of insecurity without their mobile phones, than boys do.



Regarding the number of calls made/received via mobile phone per day, most of the signs are positive. This indicates that high frequency of calls is a factor that makes mobile phones essential tools. However, the sign is negative for item 1 ("It is fun to use a mobile phone") indicating that the high frequency of calls is not always considered fun by users. This finding is in contrast to what we have previously found; the more a respondent sends or receives mobile e-mail/SMS, the happier he/she feels to use a mobile phone. The finding might be explained by the

Table 13 Determinants of necessity

	1			2			3			4		
	It is fun to use a mobile phone			Not having a mobile phone is inconvenient			I feel lonely when I dont receive any voice calls			I feel lonely when I dont receive any messages (SMS, email, IM)		
	Coef	t-value		Coef	t-value		Coef	t-value		Coef	t-value	
Log of number of mails/ SMS a day (unit=10)	1.39	6.89	***	0.51	3.86	***	0.09	1.14		0.62	6.90	***
Log of number of calls a day (unit=10)	-0.80	-3.01	***	0.58	2.33	**	1.27	7.66	***	0.47	2.86	***
Age of children	-0.06	-2.29	**	0.11	4.02	***	0.04	1.94	*	0.05	2.42	**
Sex of children: male=1 (D)	-0.19	-1.49		0.12	0.99		-0.34	-3.96	***	-0.24	-2.88	***
Korea dummy	1.74	5.30	***	-0.81	-4.75	***	0.49	3.65	***	-0.17	-1.26	
China dummy	-0.14	-0.52		0.72	2.66	**	0.41	2.02	**	-0.27	-1.41	
India dummy	0.76	3.77	***	0.06	0.29		1.12	7.97	***	0.51	3.66	***
Mexico dummy	1.25	5.38	***	0.64	2.90	***	-0.18	-1.19		-0.86	-5.76	***
_cons	1.92	4.66	***	-0.23	-0.61		-1.68	-5.87	***	-1.09	-3.98	***
Sample size	2701			2792			2621			2654		
log of likelihood	-864			-1017			-1622			-1685		
Pseudo R2	0.089			0.039			0.087			0.083		
	5			6			7			8		
	I fiddle around with my mobile phone if I feel bored			I feel insecure without my mobile phone /PHS			Communication by mobile phone is sometimes troublesome			1+2+3+4+5+6+7: Necessity index (least square regression)		
	Coef	t-value		Coef	t-value		Coef	t-value		Coef	t-value	
Log of number of mails/ SMS a day (unit=10)	0.89	7.46	***	0.39	4.51	***	-0.13	-1.78	*	1.92	10.93	***
Log of number of calls a day (unit=10)	0.16	0.83		0.82	4.47	***	0.14	0.93		0.91	2.79	**
Age of children	0.01	0.57		0.07	3.91	***	0.09	4.52	***	0.15	4.40	***
Sex of children: male=1 (D)	0.01	0.08		-0.17	-2.10	**	-0.08	-0.92		-0.31	-2.03	**
Korea dummy	0.95	5.95	***	-0.10	-0.77		0.77	5.58	***	0.76	1.97	**
China dummy	0.29	1.50		0.05	0.25		1.66	8.15	***	1.66	4.56	***
India dummy	1.27	7.78	***	0.44	3.00	***	1.52	10.76	***	2.57	9.87	***
Mexico dummy	0.83	5.69	***	-0.61	-4.37	***	0.97	6.76	***	0.83	3.34	***
_cons	-0.58	-2.07	**	-1.23	-4.49	***	-2.22	-7.33	***	14.51	28.27	***
Sample size	2710			2666			2551			2021		
log of likelihood	-1524			-1697			-1626			45.05 (F-value)		
Pseudo R2	0.063			0.063			0.068			0.187 (R2)		

We believe these results reflect gender-specific psychological differences. To examine whether there are any cultural reasons for such differences by gender, we carried out an analysis by country on the regression of items 3, 4 and 6. We can produce 15 (3x5) sets of regression equations. Table 14 shows the estimated coefficients for the “gender” term we have collected out of the equations. The table shows that there are differences by country. The difference is the greatest for Mexico, then Japan and Korea, who follow with a similar level of difference. There is virtually no significant difference for India and China. In other words, gender differences in children’s feelings of loneliness without mobile e-mail/SMS or calls via mobile phone vary by country. Such differences exist in Mexico, Japan and Korea while there are no such differences in China and India.

Lastly, we examine differences by country in Table 13. Looking at each item from 1 to 7, there are both positive and negative signs with no consistent trend. For instance, Korea has the highest ratio of respondents who feel it is fun to use mobile phones, while its percentage of respondents who feel inconvenienced without mobile phones is the lowest of all countries. In Mexico, the percentages are high in both those two categories, those who feel it is fun to use mobile phones and those who feel inconvenienced without mobile phones.

The results contain many inconsistencies, which may be representative of the uniqueness of each country. If we regard these differences as cultural ones, we can conclude that there is no simple consistency in cultural differences.

If we aggregate all of the items and perform regression analysis with the aggregated values, it will have another implication. The rightmost column X shows the results of such testing. All of the coefficients of dummy variables for countries are significant, which means there is a significant difference between Japan and other countries. There is no significant difference between Korea and Mexico, but there are significant differences among other countries. If we ranked countries in the order of the level of necessity of mobile phones, the ranking in descending order would be as follows: India>China>Korea/Mexico>Japan. We should note the fact that the level of necessity of mobile phones is relatively low in Korea and Japan, where mobile phones are most widely used. Whether this is attributed to any cultural factor or other unknown universal factor must be further examined.

Table 14 Coefficients of “Gender of children” in the by-country regression 3,4,6 of Table 13

	3			4			6			
	I feel lonely when I don't receive any voice calls			I feel lonely when I dont receive any messages (SMS, email, IM)			I feel insecure without my mobile phone/PHS			
	Coef	t-value		Coef	t-value		Coef	t-value	n	
Regression for Japan only	-0.33	-2.18	**	-0.25	-1.74	*	-0.15	-1.02	958	
Regression for Korea only	-0.34	-2.15	**	-0.39	-2.58	**	0.08	0.52	748	
Regression for China only	0.00	-0.01		0.36	1.90	*	0.07	0.38	496	
Regression for India only	-0.06	-0.18		0.00	-0.01		0.15	0.44	198	
Regression for Mexico only	-0.79	-3.02	***	-0.89	-3.51	***	-0.38	-1.78	*	413

3 Criteria for Selecting Mobile Phone Models: Market Maturity

According to market maturity models, user demand characteristics change according to levels of penetration. Take the automobile market: in the early stages of the automobile industry users selecting a car model placed high priority on basic functions such as engine power, speed and robustness. However, as the industry developed and usage became more widespread, priority in selecting models shifted to advanced functions such as spaciousness, air-bags and anti-lock brake systems, then to design and brand. In the case of clothing, the key selling points for products underwent a similar shift, from durability and heat-retaining properties through to design and brand. Is it reasonable to expect a similar change in user priorities in the case of mobile phones? If so, such shifts are likely to be particularly obvious in the selection of models by children who are typically highly fashion and brand-conscious. With such an assumption in mind, we asked the child respondents to select the factors that they prioritised when selecting a mobile phone model.



We asked respondents to select three from the following nine options.

- 1 Quality of voice/data
- 2 Quality of service area
- 3 Speed of data transmission
- 4 Battery life
- 5 Lightweight and small handset
- 6 Support for rich functionality (Internet, IM etc)

- 7 Has a wide variety of functions
- 8 Handset's shape and design
- 9 The brand name of a manufacturer or a mobile network operator. Items 1-5 are basic functions such as quality of voice, service area, speed and battery life. Items 6-7 are advanced functions including light weight and small size, and a wide variety of functions and services. Items 8-9 are design and brand. We expect the priority to shift from items with small numbers to items with big numbers as the market matures. Note that the nature of the sample is different for India where we asked this question only of children who do not own mobile phones.

The results are shown in Table 15; the percentages of respondents who selected a specific item are shown by country. Since the respondents were allowed to select three items, the sum of Items 1-9 exceeds 100%. To illustrate the tendency, we produced a graph (Figure 4 on p.32). The values in the graph show the ratio of respondents in each country who selected the factor as their priority. In other words, the graph shows the level of priority children put on each factor in each country. The factors are placed from the left (basic functions) to the right (advanced functions and design). We would expect that the mobile phone market is mature in the country if the values in the graph are gradually increasing from left to right.

Table 15 Most important three points when selecting a mobile phone (multiple answers)

	Japan	Korea	China	India	Mexico
(1) Quality of voice / data	34.9	32.9	74.1	23.3	8.7
(2) Quality of service area	33.5	12.1	22.0	27.9	23.9
(3) Speed of data transmission	14.4	9.2	11.3	13.8	13.3
(4) Battery Life	30.4	19.7	43.5	53.3	28.2
(5) Lightweight and small handset	26.0	27.0	18.5	26.7	29.1
(6) Support for rich functionality (Internet, IM etc.)	11.0	27.9	14.1	13.3	10.3
(7) Has a wide variety of functions	29.2	68.7	47.9	25.8	54.3
(8) Handset's shape and design	43.9	70.1	42.7	30.8	63.8
(9) The brand name of a manufacturer or a network operator	6.2	27.3	21.2	36.7	52.6

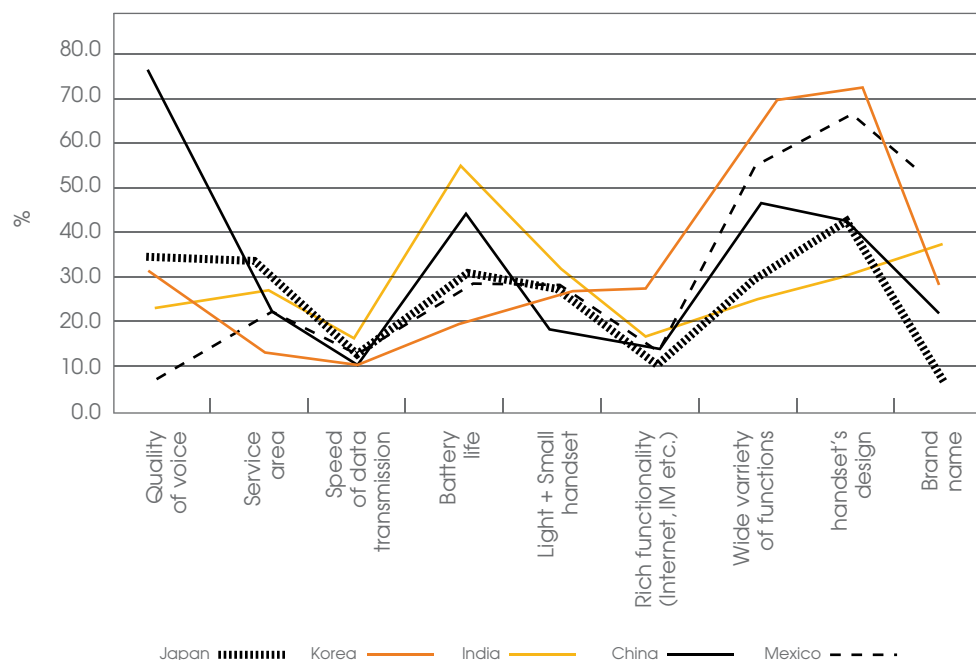
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The findings are that such an upward trend is clearly observed only in a limited number of countries and is clearest in Mexico. We could also see a relatively upward trend in Korea. However, in Japan, China and India, the trend lines fluctuate widely. The penetration rate of mobile phones is high in Korea but low in Mexico. The result shows that the Mexican market, with its low penetration rate, is more mature than the markets of Japan and other countries with a higher penetration rate. Since we cannot find a clear general upward trend, we should refrain from making any conclusion at this point.

A variety of other factors could be affecting users in selecting their mobile phone models. For instance, quality of voice may be important to children who mainly use voice calls while such a function may not be important to children who mainly use mobile e-mail/SMS. Girls may put higher priority on light weight and small size than boys do. Using estimate equations, we have tried to exclude the factors that reflect such user attributes as much as possible.

As user attributes, we use frequency of mobile e-mail/SMS (natural logarithm of (number of mobile e-mail/SMS sent) + (number of mobile e-mail/SMS received)), frequency of calls via mobile phone (natural logarithm of (number of calls made) + (number of calls received)), age of children, gender of children and income of parents. We add dummy variables for countries to them. The coefficients of dummy variables for countries indicate the level of market maturity of the country, excluding users' attributes. Since Japan is the basis for defining dummy variables for countries, market maturity actually means "market maturity relative to Japan". It should be noted that India is not included in this regression analysis, since all of the respondents to this question in India are non-owners of mobile phones, and consequently we do not have data on variables of frequency of mobile e-mail/SMS and calls via mobile phone. The explained variable is a dummy variable that has the value of 1 when a respondent selects a specific factor. We carry out logit regression to the variable, with nine sets of regression equations (as we have nine factors) and in Table 16 we show only coefficients in order to avoid complexity.

Figure 4 Importance of factors when selecting mobile phone operators and manufacturer



Positive coefficients mean that as the value of the variable increases, more respondents select the factor. Conversely, negative coefficients mean that as the value of the variable increases, fewer respondents select the factor. While there are both significant and insignificant coefficients, we show the coefficients in the graph in order to discover a trend. Figure 5 is the graph of the coefficients of the first five factors, namely variables of user's attributes: frequency of mobile e-mail/SMS, frequency of calls, age of children, gender of children and income of parents.

The first point we found from this graph is that there was a stark contrast between voice calls and mobile e-mail/SMS. Frequency of calls produces a downward curve, which indicates that children who mainly use mobile phones for calls tend to put a higher priority on the basic functions, such as quality of voice, service area and speed of data transmission while they are almost unconcerned about design of the model. In contrast, frequency of mobile e-mail/SMS produces a curve sloping upwards to the right which indicates children who mainly use mobile phones for mobile e-mail/SMS tend to put higher priority on advanced functions and design. We can conclude that there is a clear difference in priority in selecting mobile phone models between voice call users and mobile e-mail/SMS users.

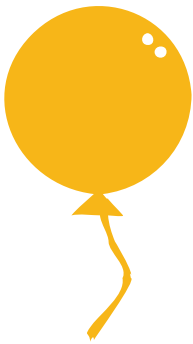


Regarding gender, if the respondent is a boy, the variable takes the value of 1. Thus the positive value indicates that boys put high priority on the factor while the negative value indicates that girls put high priority on the factor. The findings show that boys put high priority on speed of data transmission while girls put high priority on light weight and model design. The finding is consistent with our intuitive assumption on the effects of gender. The effect of the age is not clear in the graph, however, in Table 16, the factors such as speed of data transmission, battery life and advanced functions are significant. It indicates that as children become older, they tend to place a higher priority on these factors. The effect of parent's income level on his/her child's selection criteria is negligible.

There is a striking contrast between voice call users and mobile e-mail/SMS users. We often use the expression "heavy users of mobile phones" without defining this, but there are differences in character between users who use mobile phones mainly for voice calls and those who use them mainly for mobile e-mail/SMS. It is therefore probably prudent to take a different approach to each category of user when developing mobile phones.

Table 16 Determinants of selection criteria

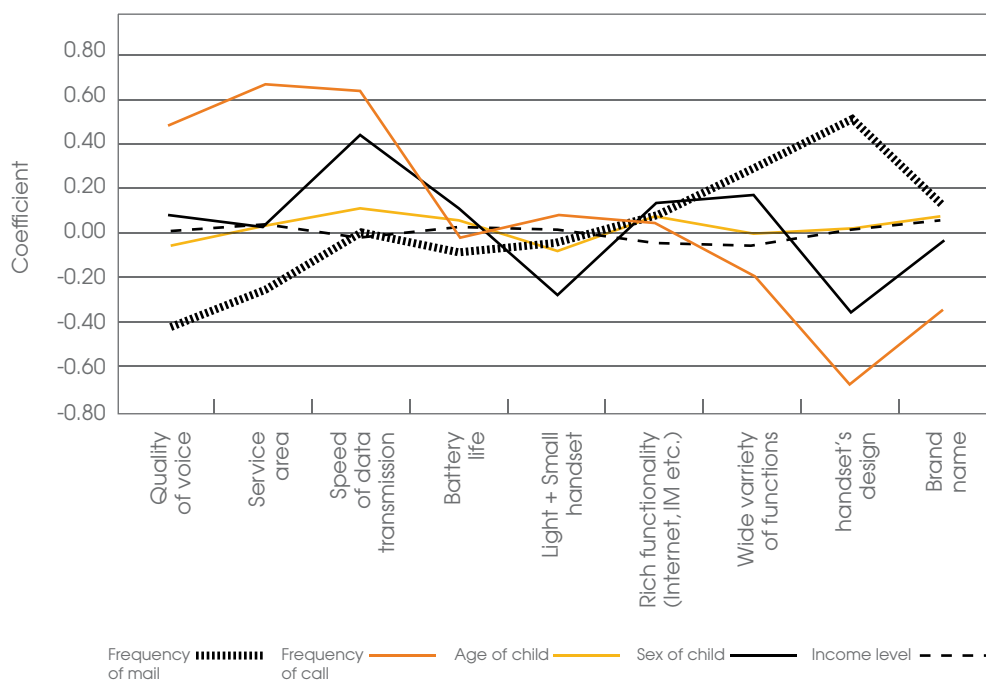
	Quality of voice	Service area	Speed of data transmission	Battery life	Light & small handset	Rich functionality (Internet)	Wide variety of functions	Hand-set's design	Brand name
	t-value	t-value	t-value	t-value	t-value	t-value	t-value	t-value	t-value
frequency of mail	-0.40***	-0.24**	0.00	-0.08	-0.04	0.05	0.27***	0.50***	0.09
frequency of call	0.49***	0.64***	0.62***	-0.02	0.06	0.03	-0.19	-0.69***	-0.38**
age of child	-0.03	0.02	0.11***	0.05**	-0.02	0.10***	0.00	0.00	0.02
sex of child	0.07	0.03	0.42***	0.14	-0.26**	0.16	0.18*	-0.38***	-0.04
income level	0.01	0.03	-0.01	0.02	0.00	-0.03	-0.04	0.02	0.00
Korea	0.05	-1.23***	-1.00***	-0.63***	0.09	0.76***	1.34***	0.91***	1.85***
China	1.53***	-0.47**	0.30	0.81***	-0.56**	0.71**	0.75***	0.06	1.82***
Mexico	-1.68***	-0.05	-0.44*	-0.45**	-0.07	-0.75***	1.18***	0.85***	2.88***
_cons	-0.18	-1.31***	-3.61***	-1.52***	-0.68	-3.23***	-0.75**	-0.26	-3.00***
sample size	2276	2276	2276	2276	2276	2276	2276	2276	2276
log of likelihood	-1267	-1198	-832	-1326	-1268	-974	-1450	-1473	-1060
Pseudo R2	0.153	0.046	0.029	0.032	0.007	0.051	0.08	0.055	0.143



In order to compare the tendency of each country, we produced a graph of coefficients of dummy variables for countries (Figure 6). We dotted the values relative to Japan for Korea, China and Mexico. At first glance, all of the countries produce curves sloping upwards to the right. In comparing these countries with Japan, the graph implies that these mobile phone markets are now more mature than the Japanese market. For instance, in Mexico and Korea, they put higher priority on having a wide variety of functions, design and brand than in Japan. In China, they put greater priority on rich functionality, variety of functions and brand. Conversely, in Japan they put higher priority on the basic functions than users in the three countries. They put higher priority on quality of service area than users in Korea and China and put greater priority on battery life than users in Korea and Mexico.

Given the high penetration of mobile phones in Japan and Korea, we originally assumed that the Japanese and Korean mobile phone markets are more mature than the other markets. However, the finding is contrary to this assumption and would indicate that the Japanese market is the least mature market. The Korean market is more mature than the Japanese, while the maturity of the Mexican market is at the same level as the Korean market. These findings are also inconsistent with our assumption.

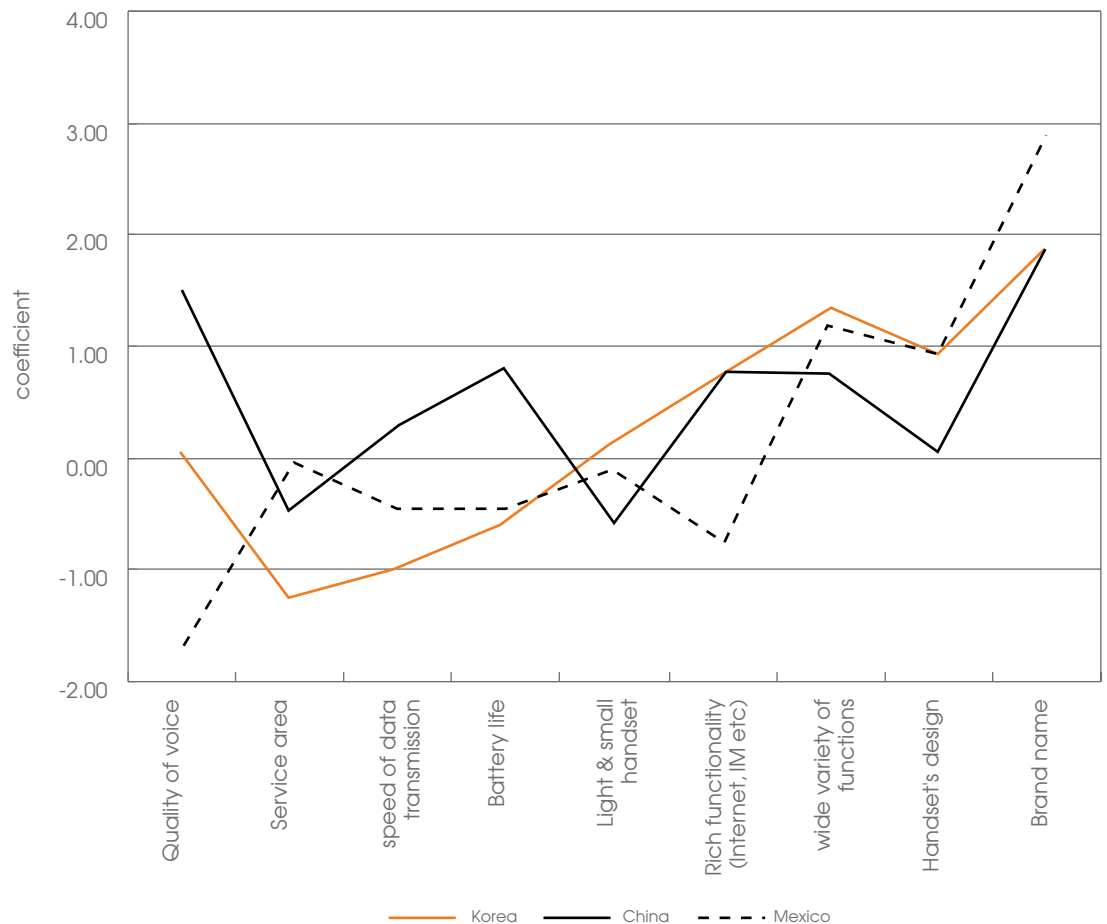
Figure 5 Importance of factors when selecting a mobile phone, from children's point of view



There may be several reasons for these findings. One is the view that children apply unique criteria when selecting their mobile phones and consequently our market maturity model cannot apply to them. For instance, since children move around only within a limited area, they may not pay attention to the quality of the service area. Another possible reason is that in Mexico and China, only children of rich families currently own mobile phones, and the maturation of the market for such affluent users is progressing more quickly than in other markets. Another reason related to the Japanese market may be that in Japan, mobile phone models are linked to each operator and consequently the choice of model design is limited, although a wide variety of functions are available.

Such a situation may affect the selection criteria for users. Finally, there may be cultural factors e.g. the cultural background of the country may affect the degree of priority users place on design. A further survey would be required in order to determine which hypothesis is correct in explaining these findings.

Figure 6 Importance of factors when selecting mobile phone: effect of countries



7 Mobile phone literacy

How to use mobile phones safely is something which children need to learn. Many parents have concerns about mobile phone use by children, including the risk of them accessing inappropriate information such as pornography or crime-related sites. This chapter describes the ways in which children learn how to use a mobile phone.

Table 17 shows the concerns of parents about their child’s use of a mobile phone. Parents were asked whether they have concerns about four issues: using a mobile phone for long time; excessive bills; accessing inappropriate information, and communicating with strangers. The table shows the ratio of parents who answered “yes, often” in column (a) and “yes often” + “yes sometimes” in column (b). Over 60% of parents demonstrated some level of concern about the four issues shown in column (b) and “Using the phone for a long time” and “Accessing inappropriate information” were the two issues which generated the most concern.



Figure 7 shows parental concerns (column (a) in Table 17) by country. The most striking fact is that the level of concern in Korea is the lowest of all five countries for all four issues. Approximately 10% of Korean parents answered “yes, often” to all problems compared with 20~50% of parents in other countries. The low level of concern amongst Korean parents is one reason for the exceptionally early mobile phone penetration among children in Korea;

because Korean parents are not concerned about mobile phone use by children, they allow their children to have a mobile phone at a younger age than in other countries. One of the reasons why Korean parents show little concern about mobile phone usage by children is likely to be because services for the safe use of mobile phones, such as filtering services, are widely adopted in Korea.

When comparing the four issues generating the most concern, we found that differences between countries were largest for “Accessing inappropriate information.” While almost 50% of parents in China are concerned about the risk of children accessing inappropriate information through mobile phones, only 5% of parents in Korea are concerned about it. Is this because the amount of inappropriate information is different among countries? Or is it because the literacy to avoid such inappropriate information is different among countries? Further analysis would be required to obtain answers to those questions.

Parents naturally expect their children to learn how to use mobile phones safely and so we asked parents who they thought was the most appropriate person/organisation to teach children how to use a mobile phone when they first start to own one. The choices were: family, a teacher at school, friends at school, mobile phone operators, handset vendors, government, and others (free form answer). Figure 8 shows that 65%-85% of parents think that someone in the family, such as a parent or a sibling, is the most appropriate person. Around 5% thought that another person/organisation was most appropriate.

Table 17 Parental concerns about mobile phone usage by their children

	(a)	(b)
Talk / use the phone for a long time	30.2	69.7
Paying too much for bills	24.3	62.5
Accessing inappropriate information (such as pornography)	30.0	60.5
I don't know who my child communicates with	21.8	61.0

(a) = Ratio of (Yes, often)/(Yes, often+ Yes, sometimes+ never)

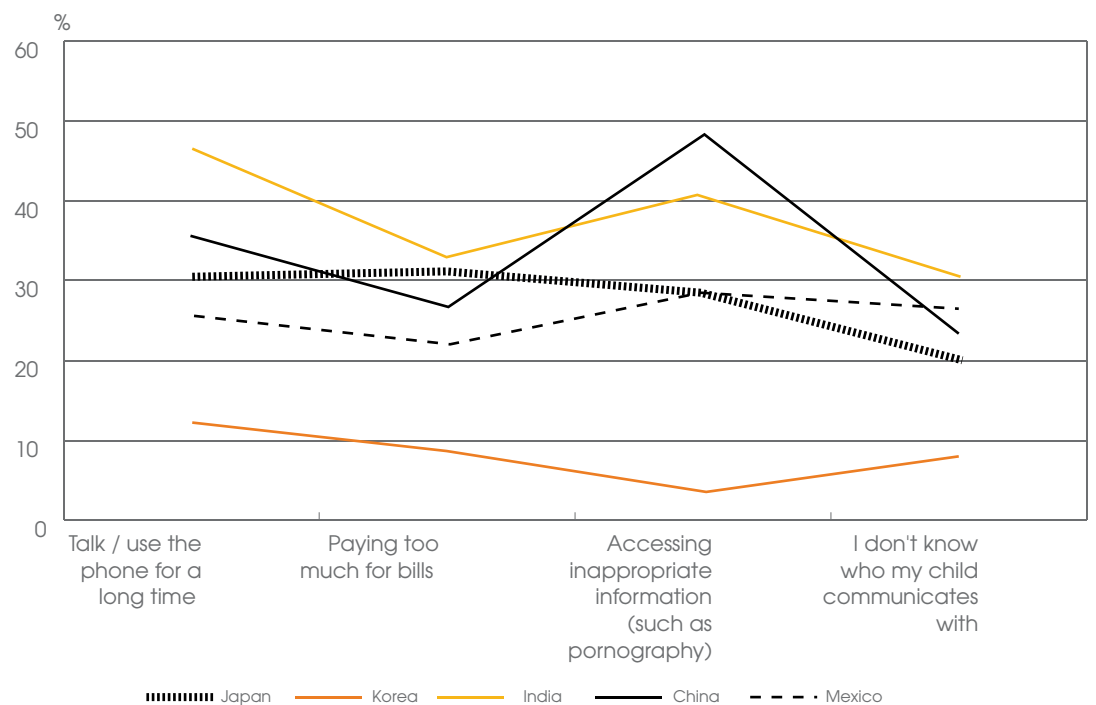
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(b) = Ratio of (Yes, often +Yes, sometimes)/(Yes, often+ Yes, sometimes+ never)

This chapter describes the ways in which children learn how to use a mobile phone.



Figure 7 Parental concerns about mobile phone usage by their children
Ratio of (Yes, often)/(Yes, often+ Yes, sometimes+ never)



In reality, however, children learn not only from their families but also from other people or organisations. We asked children from whom they learned about the following:

- 1 How to use a mobile phone
- 2 The technical mechanisms of mobile phones
- 3 Places where it is forbidden to use a mobile phone (e.g. in a hospital)
- 4 Behaviour when using a mobile phone in a public place
- 5 How to use mobile phones safely (e.g. to avoid being involved in a crime)
- 6 The correct etiquette when talking / messaging on the mobile phone
- 7 Mobile phone filtering services (e.g. parental controls)
- 8 Mobile phones' electromagnetic radiation effect
- 9 M-learning.

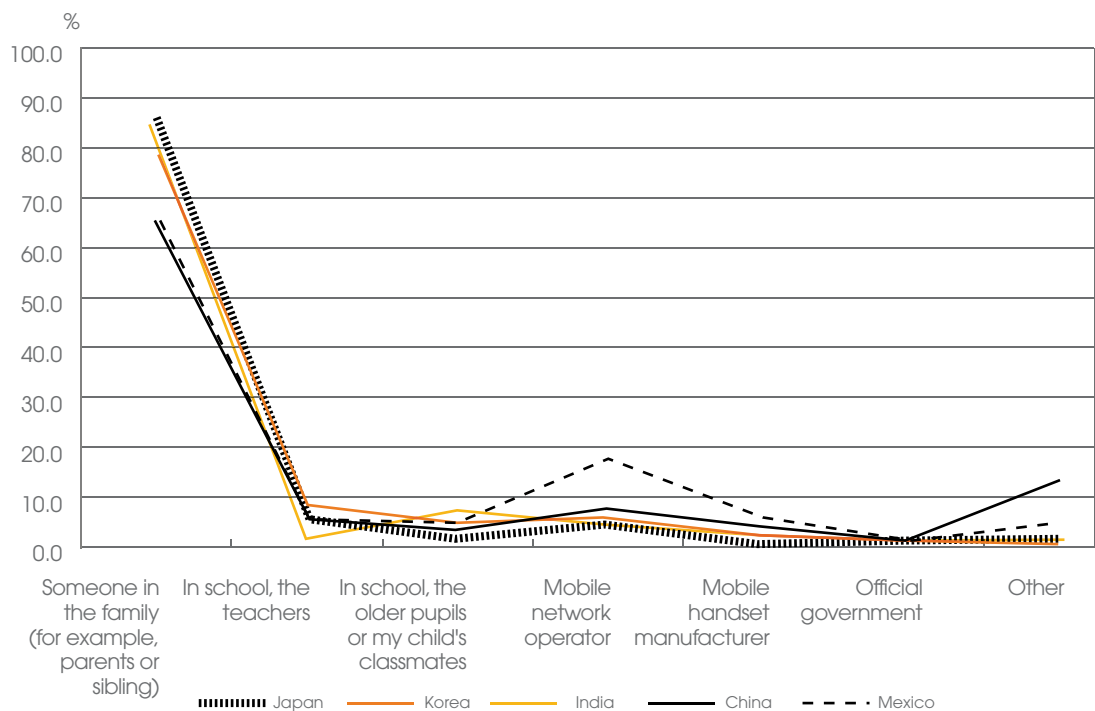
Children responded using multiple choice answers. The answer choices were the same as in the former question (Figure 8), but note that "others" includes cases where children never use nor know (and sometimes don't

want to know) the information. For example, regarding M-learning, many children chose "others" and replied in the free answer column that they don't know what M-learning is. To avoid any consequent ambiguity of interpretation, we have ignored the "others" choice in the following analysis. Also note that Japan is excluded from the analysis because Japan's choice options were different from the other countries.

Figure 9 shows the result. The graph shows the average percentage of children who learned from each type of person/organisation, over the total children in each country. (Note that the sum of the percentages in each case can exceed 100% because this is a multi-answer question.)

As the graph clearly shows, the family is the leading source of learning for children for all nine information types included in the analysis. This finding is consistent with parental responses (see Figure 8), and the 60% response rate for 'family' to question "1. How to use a mobile phone" is almost the same as the parental view. However, the percentage

Figure 8 Most appropriate person to teach children how to use a mobile phone



response to the other eight questions is around 30-40% which is far lower than the parents' responses.



The secondary sources that children say they learn from are teachers and friends in school, with percentage response rates of around 10-20%. It is interesting that there is no significant difference between teachers and friends. There may be a general perception that children's mobile phones are very private or even secret tools for communication with friends, and that children try to slip them through monitoring by teachers, but as far as a source of information on how to use phones is concerned, teachers play a role to the same degree as friends. In regard to the four questions ("3. forbidden place",

"4. usage in public place", "5. safety", and "8. electromagnetic radiation effect") their teachers' contribution is rated higher than that of their friends.

The third sources that children say they learn from are mobile phone operators and handset manufacturers, with percentages of between 0 - 10%. Children think that they learn about 5% more from mobile phone operators than from handset manufacturers. Question 2, on Technical mechanisms, scored relatively highly for the operators and manufacturers.

The final source that children say they learn from is the government, where the percentage response rate is less than 5%.

Figure 9 Who children learn from (Japan is excluded)

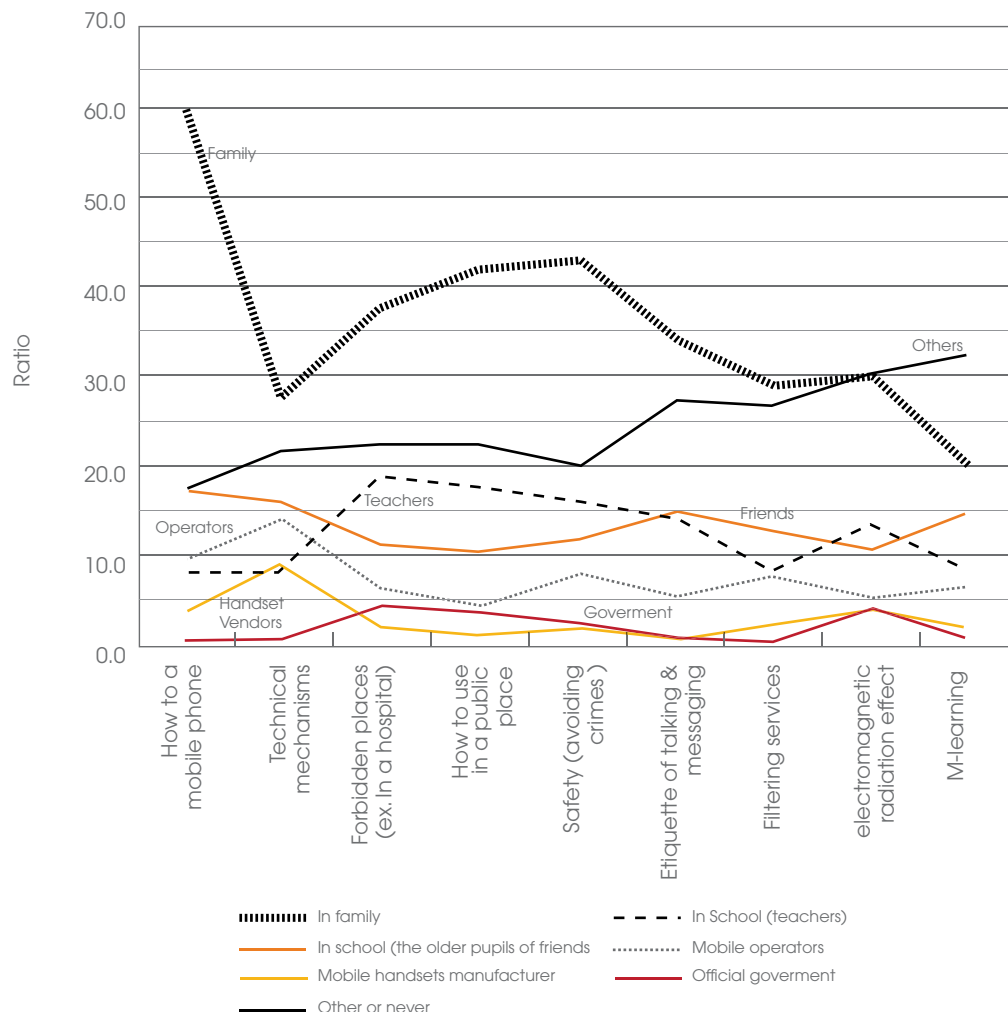


Figure 10 shows the country comparison for the same questions. Clearly, Korea shows the highest score for almost all the information sources. Korean teachers, in particular, contribute to children's learning almost twice as much as in other countries in the five areas of information: ("3. forbidden place", "4. usage in public place", "5. safety", "6. etiquette," and "8. radiation effect.")

This result indicates that Korean children have many more information sources than other countries' children and may partially explain why Korean parents are less concerned than other parents about mobile phone usage by children and why they let their children have mobile phones at an earlier age than in other countries. This result suggests that providing multiple information sources is a factor in increasing penetration amongst children. The country with the second highest score is India, followed by China and Mexico.



Figure 10-1 Whom children learn from: by country (Japan excluded)
Learn from family

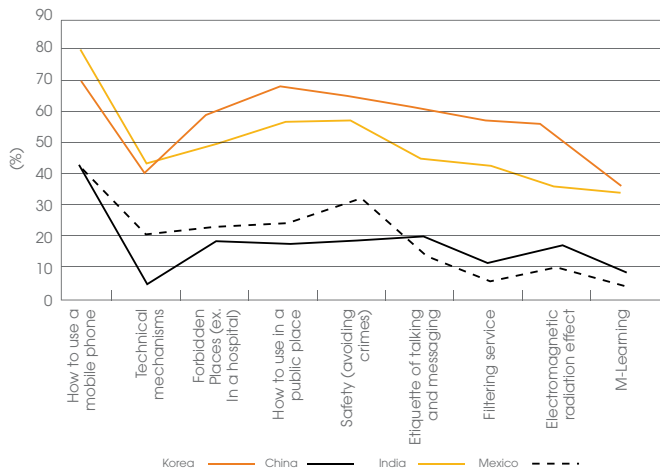


Figure 10-2 Whom children learn from: by country (Japan excluded)
Learn from teachers

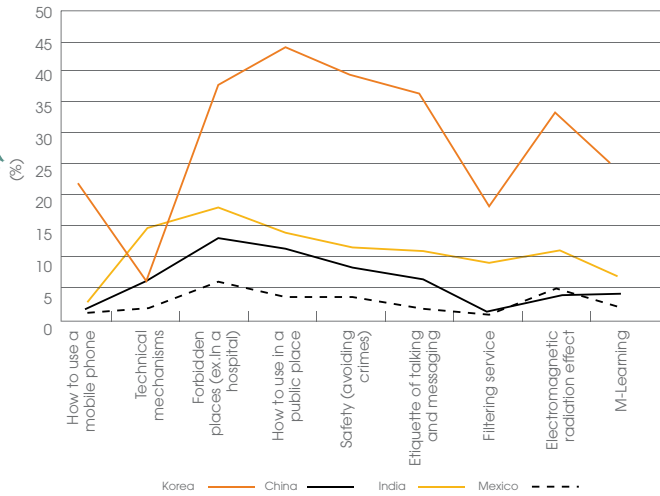


Figure 10-3 Whom children learn from: by country (Japan excluded)
Learn from friends

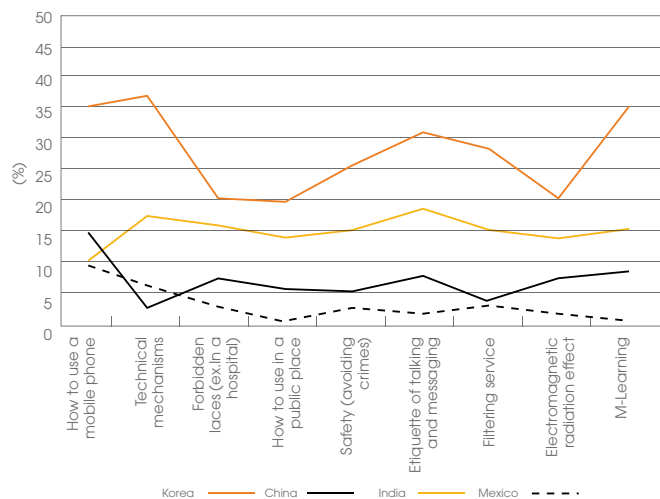


Figure 10-4 Whom children learn from: by country (Japan excluded)
Learn from mobile operators

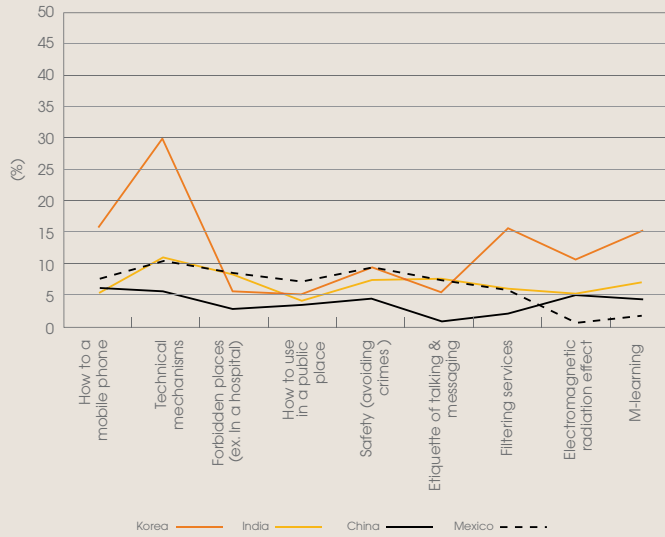
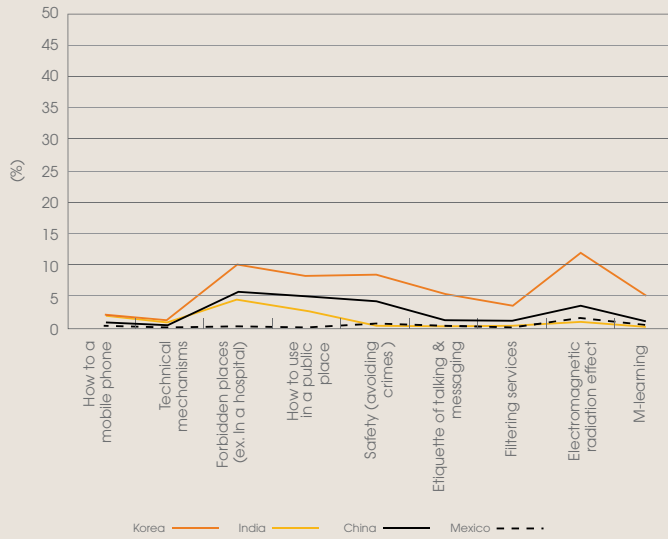


Figure 10-5 Whom children learn from: by country (Japan excluded)
Learn from official government





To check whether the result is still robust if we include data from Japan, we aggregated the information sources into three categories: family, school, and others (operator, government etc), in line with the response options offered in the Japanese

questionnaire. Figure 11 is a result of this aggregation. The pattern is almost the same as that in Figure 9. Figure 12 shows the result of including Japan, and suggests that the position of Japan is below India and above China.

Figure 11 Whom children learn from (Japan included)

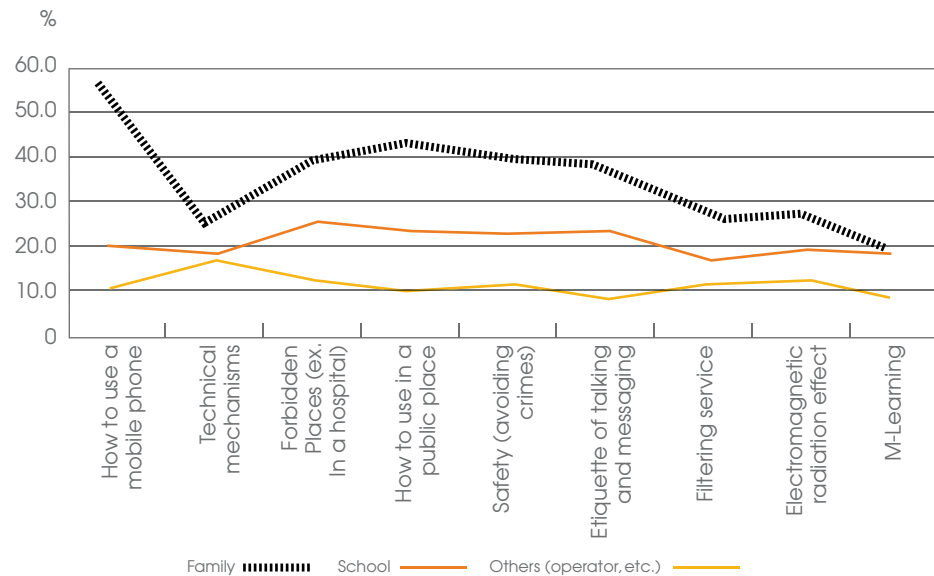
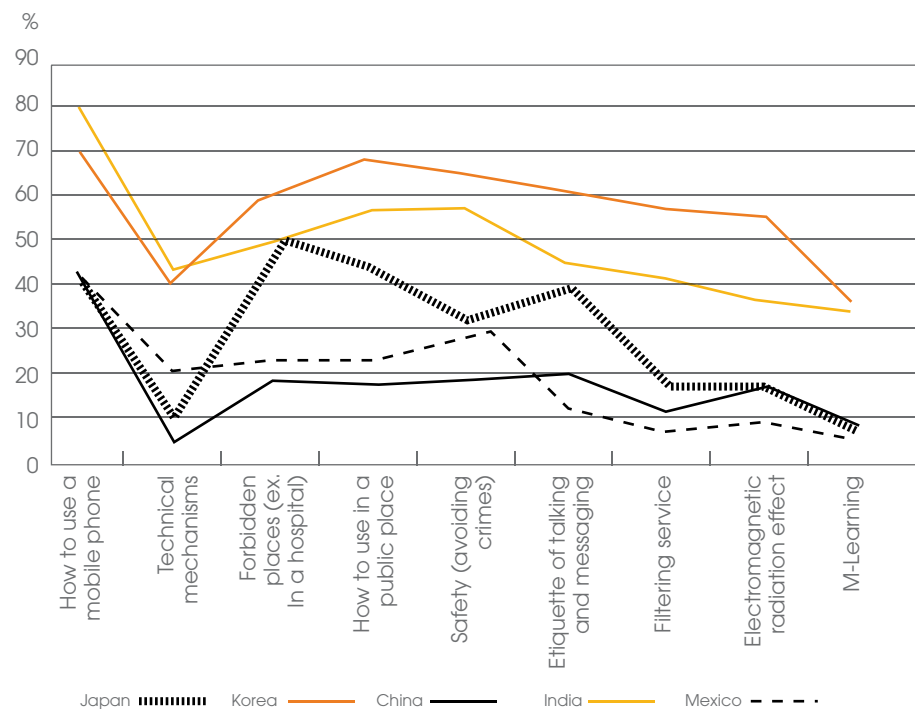


Figure 12 Whom children learn from: by country (Japan included)
Learn from families



Conclusion

In this report, we examined the penetration of mobile phones among children and its effects. Below is a summary of our findings:

- 1 Without doubt, age is the most important factor influencing the take up of mobile phones among children. Network externality also plays an important role. Network externality is an effect whereby as the number of the people who use a certain product increases around its user, the benefit of owning the product for the user also increases. When network externality starts to take effect, the penetration of the product accelerates. We observed that 24% (on average) of the children surveyed bought their mobile phones when one of their three closest friends started to use a mobile phone; this indicates the network effect for children.
- 2 Network externality has an effect in three of the countries surveyed. Its effect is relatively small in India, however, and Korean data was excluded from this analysis.
- 3 We observed the supplementary relationship between the ownership of video game consoles and PCs and the ownership of mobile phones. The results suggest that ownership of the former may promote ownership of the latter.
- 4 Children of parents with higher income tend to own mobile phones. However, we could not find any clear effect from expenditure on education, the educational level of parents, or children's daily schedules on children's ownership of mobile phones. It is often argued that the ownership of a mobile phone is related to a child's lifestyle and his/her education. However, we have not been able to justify such an argument from the findings of this survey.
- 5 We found that children who use mobile e-mail/SMS more frequently tend to show higher levels of trust in new media such as the Internet. Furthermore, although it

was slight, we found a tendency for the frequent use of mobile phones to reduce trust in traditional media including TV and newspapers.

- 6 Children who make voice calls or send/receive mobile e-mail/SMS more frequently tend to feel more strongly that their mobile phone is an essential tool in their life. By gender, girls feel more strongly about this than boys (this difference by gender was observed in Japan, Korea and Mexico).
- 7 When it comes to selecting a mobile phone, children using the mobile phone for voice calls place a heavy emphasis on the basic functions, such as service area, quality of voice and battery life, while children using the mobile phone for mobile e-mail/SMS tend to focus on multiple functions, design and brand. By country, Korean and Mexican children place a higher priority on design than on functionality when selecting a mobile phone model. In Japan, children put a higher priority on basic functions as their selection criteria.
- 8 On average, over 60% of parents in total have concerns about their child's use of a mobile phone and, of the five countries, Korean parents demonstrated the lowest concerns. The primary source of information about how to use a mobile phone correctly and safely is the family. The second source of information is teachers and friends in school, the third is mobile operators and handset vendors, and the fourth is the government. Korean children appear to have many more information sources than other countries, which could explain the low level of parental concern and the high mobile penetration at an early age in Korea.
- 9 When compared by country, the responses show the following. In Japan, network externality is a factor and there is a clear increase in mobile phone ownership at the point at which children move up to a higher level of schooling.

Without doubt, age is the most important factor influencing the take up of mobile phones among children.



Ownership of mobile phones is more likely to be restricted if they have siblings, and children focus more on basic functions than design when selecting a mobile phone. In Korea, widespread use of mobile phones by children is seen earlier than in any other country, and users of mobile phones tend to trust new media more than traditional media. The more focused parents are on education, the more likely they are to allow their children to own a mobile phone. China's children show clear growth in mobile phone ownership in line with age, with network externality there having the strongest effect of all the countries surveyed. Chinese boys begin owning mobile phones at an earlier age than Chinese girls; another trend which is different from other countries. Many children in India share a mobile phone with their parents, with network externality playing almost no role. Parents who are focused on education tend not to let their children own a mobile phone. Network externality is in play in Mexico, and children place a strong emphasis on design when selecting a mobile phone.

Finally, let us look back on the whole report and consider two important points. One is the effect of network externality; the other is the importance of messaging (mobile e-mail and SMS). Here, we will consider both points with reference to the interviews conducted with parents and children in Japan and Mexico. (These interviews are reported in their entirety in Appendix 1 of this report.)

The first finding is that network externality takes effect when mobile phones penetrate the children's market. The network effect was clearly visible in three countries (India was an exception and the Korean data was excluded from this analysis as the penetration rate is already very high in Korea.) This fact is supported by remarks heard in the interviews:

"During junior high school about half my friends had phones and the other half did not, so I didn't feel left out or inconvenienced by not having a phone. But once I got into high school, most of my friends had a mobile phone, so I think it's more necessary in order to stay in touch."
(2nd grade high school student, male, Japan)

From the statement above, it can be concluded that the fact that only half of his classmates had mobile phones did not cause the child to think he also needed a mobile phone. However, when faced with a situation in which most of his friends had their own mobile phones, he began to feel he also needed one. This supports the conclusion that network externality plays an important role.

In both cases below, it appears that children need mobile phones for receiving messages related to club activities, because it is common practice for children to receive mobile e-mail/SMS as a means of communication between club members :

"She's in the drama club at school, and the head of the club sends mobile e-mail/SMS to communicate with the members, so she needed a mobile phone to receive and send mobile e-mail/SMS daily."
(guardian of 2nd grade junior high school student, female, Japan)

"The school lets us take our phones in, and we get informed by mobile e-mail/SMS about the starting times for club activities and meeting places, etc."
(2nd grade high school student, male, Japan)

When we asked parents the reasons for allowing their children to have mobile phones, they tended to cite reasons why they need to communicate with their children. For example, children need to call parents when they came home from extra lessons or parents need to know where their children are, using GPS functions. However, for children, it seems that the incentive for having a mobile phone comes from their desire to communicate with other children rather than with their parents.

The second finding is that, for children, mobile e-mail/SMS plays a more important role in their lives than voice calling. The frequency of using mobile e-mail/SMS is higher than that of voice calling and the increase in mobile e-mail/SMS usage is also greater than that of voice calling. This is confirmed in the interviews with children:

"I only use my mobile phone to call someone when I'm in a hurry, perhaps less than four times per month. I use the mobile e-mail/SMS function between 0 and 10 times a day to contact my mother, friends and father, when I've got something to say or need to ask something."
(5th grade elementary school, male, Japan)

"I use it mainly for mobile e-mail/SMS, mostly to my friends. I send between 0 and 10 mobile e-mail/SMS per day. I only use the calling function if I'm in a hurry; I don't call my friends and chat to them."
(2nd grade junior high school student, female, Japan)

"I only use the voice call function when my mother calls me. I communicate with my friends by mobile e-mail/SMS." (2nd grade high school student, male, Japan)

"I use SMS more often than voice calls."
(age 10, female, Mexico)

"I use SMS more than the voice call function, because it's cheaper."
(age 17, female, Mexico)

Some children use different communication tools for different contacts, for example, using voice calls with their parents and mobile e-mail/SMS with their friends, whereas others exchange mobile e-mail/SMS with their parents. However, this survey confirms that mobile messaging (mobile e-mail/SMS) is the principal mobile phone function used by children. For example, as shown in Table 13, when the frequency of voice calls increased, the number of those who felt happy to use mobile phones decreased, and when the frequency of mail increased, the number of those who felt happy to use mobile phones increased. It is shown that the more children use mobile e-mail/SMS, the stronger their recognition of mobile phones as a necessary tool becomes. This tendency is stronger than with voice calls. Children think of mobile phones as "information gadgets" for using mobile e-mail/SMS and not just as a tool for voice calls.

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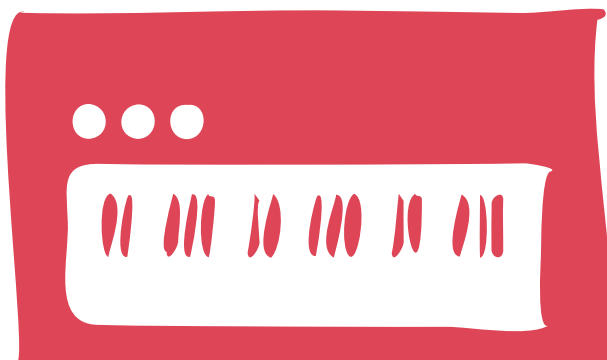
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Appendix 1: Examples of use of mobile phones by children in target countries

4 In the interview, we heard the child was 5th grade in elementary school, not their exact age. In Japan, the age in 5th grade in elementary school is usually 10-11 years old.

5 In the interview, we heard the child was 2nd grade in junior high school; the exact age was not given but the grade indicates a 13-14 year-old.

In this chapter, we introduce the actual conditions of usage of mobile phones by children in the target countries in order to add a cultural dimension to the results of our quantitative analysis. The target countries in this case are Japan and Mexico, in each of which three parent/child pairs were interviewed. Japan is known for the fact that its mobile phones are multi-functional and that network services are offered using Internet technologies. At the same time, Mexico borders with the giant US market, and is undergoing significant economic growth.

Sampling method:

In Japan, interview samples were extracted from monitors registered with NTT Resonant Inc., a research company which conducts web questionnaire surveys. The conditions requested were 1) a total of three girls and boys aged between 12 and 18 with her/his parent respectively 2) every child obtained should have been using a mobile phone for more than 1 year at the time of the interview 3) every child should reside in extended Tokyo (Tokyo, Kanagawa or Chiba prefecture). No other conditions were specified.

In Mexico, as interview samples, Professor Judith Mariscal of CIDE (Centro de Investigacion y Docencia Economicas, A. C.) organised interviews with a total of three girls and boys aged between 12 and 18 with his/her parent respectively. All interviewees lived in Mexico City. No other conditions were asked.

A-1. Japanese children

A-1-1. Case 1

Interviewed: Child (age 10 or 11⁴, male) and guardian (36, mother), living in metropolitan Tokyo region.

Q1 When did you/your child start to own a mobile phone? Could you tell us how you decided to own/let your child own one?

We bought him a mobile phone when he was in 3rd grade. He could already use mobile e-mail/SMS, and was fairly self-organised, so we figured he'd be okay with a mobile phone. He had been asking for a mobile phone since before that, but we made him wait for a while, until we felt he had grown up enough. We took out a family discount payment plan so he uses the same mobile network operator as us. (guardian)

Q2 Tell us about how you/your child use your/his/her mobile phone.

I only use my mobile phone to call someone when I'm in a hurry, perhaps less than four times per month. I use the mobile e-mail/SMS function between 0 and 10 times a day to contact my mother, friends and father, when I've got something to say or need to ask something. I text my mother about day-to-day stuff; to my father I text less often but I send him photos I've taken. 7 or 8 of my classmates (out of 26) know my mobile e-mail/SMS address. There are about 10 friends whom I text regularly, including friends outside of my class. We use mobile e-mail/SMS to agree to meet, and arrange a meeting place. Sometimes my friends send mobile e-mail/SMS that I don't understand the contents of, but I just don't answer them. (child)

The school prohibits children from bringing in mobile phones, so he only uses it after school. When we want to call him on his phone, we often find that the batteries have run out. His father and I both work, so if we can't get hold of him it causes problems. (guardian)

Q3 Do you/your child use functions other than the voice call and mobile e-mail/SMS functions?

I have a Nintendo DS, Wii and PlayStation 2, so I hardly ever play computer games on my mobile phone. I have downloaded a few "chaku-melo" tunes. (child)

I wanted to be able to use the GPS function, which lets you know where he is. But it only tells you roughly what area he's in and isn't as accurate as I'd hoped. (guardian)

Q4 Do you/your child use any other kind of information media other than the mobile phone?

I watch 2-3 hours of TV per day. I like cartoons and movies, and especially action movies. I use the Internet on my computer, but only for about 15 minutes per day, and I don't use mobile e-mail/SMS on the computer. I use it to look up strategies for games I'm playing. I read newspapers when it's my turn to make a news presentation at school, but not every day. I read comic magazines regularly. I use my mobile phone as a means of communication, and other media to access information. (child)

Q5 What rules do you have in your family regarding mobile phone use?

We don't allow game downloads from websites, or registration with any websites that cost money. We also check his mobile e-mail/SMS regularly and tell him to show us the mobile e-mail/SMS he has sent/received. We don't use website filtering services at the moment, but we do use the service that allows the parents to know the charges on child's mobile phone. He uses about 4,000 yen's worth per month and there doesn't seem to be any problem with his use at the moment.

A-1-2. Case 2

Interviewed: Child (age 13 or 14⁵, female) Guardian (47, mother), living in metropolitan Tokyo area.

Q1 When did you/your child start to own a mobile phone? Could you tell us how you have decided to own/let your child own it?

We bought her a mobile phone in September after she started junior high school (about half way through the first year of junior high school). She was going to lessons after school about three times a week (music and ballet) and as her parents, we wanted to be able to get in touch with her. She's in the drama club at school, and the head of the club sends mobile e-mail/SMS to communicate with the members, so she needed a mobile phone to receive and send mobile e-mail/SMS daily. (guardian)

Q2 Tell us about how you/your child use your/his/her mobile phone.

I use it mainly for mobile e-mail/SMS, mostly to my friends. I send between 0 and 10 mobile e-mail/SMS per day. I only use the calling function if I'm in a hurry; I don't call my friends and chat to them. It's useful for communicating with my friends when school is off, though, for example in the summer holidays. The frequency with which you send mobile e-mail/SMS depends on who you are friends with at school. My friends place importance on talking together at school, and I think we probably use mobile e-mail/SMS less than some groups. I send my mother mobile e-mail/SMS to ask her to pick me up from practices, but I hardly ever text my father. (child)

The school bans mobile phones, so she doesn't take it with her. We give her the mobile phone out of school so she can contact us when she's at practices. She doesn't contact her father very often, partly because his mobile phone is on a different mobile network operator, so her family discount doesn't apply. (guardian)

Q3 Do you/your child use functions other than the voice call and mobile e-mail/SMS functions?

I use purikura photo-sticker machines when I'm out with my friends a lot. The new machines let you send the photographs to your mobile phone. I also use my mobile phone to download sample contents from Internet radio station websites and listen to them. I'm not subscribing to a flat-rate plan, so I don't download "chaku-uta" that are very data-heavy; I just download "chaku-melo" tunes. I also download cartoon images from websites, but I don't download videos because the volume of data is too large. (child)

Q4 Do you/your child use any other kind of information media other than the mobile phone?

I watch TV for about an hour a day, mostly cartoons. I browse the Internet about once a week, looking up things I'm interested in and finding things out for homework. I don't read magazines very often. I don't trust the things you read on websites when you access them via computers or mobile phones, so I tend to believe what I read in the newspapers or see on TV instead. (child)

Q5 What rules do you have in your family regarding mobile phone use?

We don't allow her to take her mobile phone into her own room. She has to leave it in the living room and use it there. There's been a lot of talk about late-night mobile e-mail/SMS and other problems, but this rule prevents us from getting involved in that. She has been warned at school about spam texts and website browsing. I have heard that there are a lot of mothers of young boys, however, who are worrying about what kind of communication their children are having with mobile phones, since they are experiencing difficulties in getting involved with their sons. (guardian)

A-1-3. Case 3

Interviewed: Child (2nd grade high school, male), guardian (49, mother), living in metropolitan Tokyo area

Q1 When did you/your child start to own a mobile phone? Could you tell us how you have decided to own/let your child own it?

I was bought the mobile phone just before I graduated from junior high school. During junior high school about half my friends had phones and the other half did not, so I didn't feel left out or inconvenienced by not having a phone. But once I got into high school, most of my friends had a mobile phone, so I think it's more necessary in order to stay in touch. 32 out of 33 people in my class have a mobile phone. (child)

Q2 Tell us about how you/your child use your/his/her mobile phone.

I only use the voice call function when my mother calls me. I communicate with my friends by mobile e-mail/SMS. I use the voice call function about twice a week, and mobile e-mail/SMS about 20 times a day. School lets us take our phones in, and we get informed by mobile e-mail/SMS about the start time for club activities and meeting places, etc. My mobile e-mail/SMS to my friends are short, about five lines or so, and usually just responses to mobile e-mail/SMS they have sent me. I don't tend to initiate discussions by mobile e-mail/SMS. I'm not really interested in message boards of websites and SNS. (child)

Q3 Do you/your child use functions other than the voice call and mobile e-mail/SMS functions?

I look at some websites, and use it to look up the times of trains and get information about the

entertainment world. I think online dictionaries are quite useful. I use the camera to take pictures, and play online games. I have an iPod for music so I don't listen to music on my mobile phone. (child)

Q4 Do you/your child use any other kind of information media other than the mobile phone?

I watch TV when I have time, but I don't watch any programs regularly. I use my personal computer to search information by Internet, to download music for my iPod, and for mobile e-mail/SMSing. I go to preparatory school four times a week, and have a part-time job on three nights a week, so I don't have much time for information media. I have a PlayStation 2 and PlayStation Portable at home, but I don't use them much. I don't read the newspaper much. If you asked me to rank them in order of how I trust the information, it would be (1) TV, (2) Internet used by PC, (3) Mobile internet. (child)

Q5 What rules do you have in your family regarding mobile phone use?

We pay a maximum of 4,000 yen per month for his mobile phone, and if he goes above this he has to pay the additional costs himself. His phone costs tend to be about 7,000 yen per month at the moment. We aren't registered with any filtering service as it seems to stop you accessing so many sites. We have a rule that he has to let us know the PIN number for his mobile phone, though, so that if there's a problem we can look at the mobile e-mail/SMS he has sent/received. When he was a junior high school student he asked for a mobile phone because he said all his friends had them, but we made him wait for it to learn some self-control. (guardian)

A-2. Mexican children

A-2-1. Case 1

Interviewed: Child (age 10, female), guardian (mother), living in Mexico city.

Q1 When did you/your child start to own a mobile phone? Could you tell us how you have decided to own/let your child own it?

My parents knew that I wanted a mobile phone from a while ago and my father bought it for me on my 8th birthday. I have a phone which you can change its exterior and I use three different outer coverings for it. (child)

We chose a plan that restricts use to a certain limit per month so that she can't use more than that per month. We have prepaid mobile phones and so it's convenient for us because we can communicate as a family wherever she is. (guardian)

Q2 Tell us about how you/your child use your/his/her mobile phone.

I have the mobile phone so I can call my parents in an emergency, so if I call anyone it's them, but I don't call my friends that often. I do call them if I have something I want to say or I need help with homework, but I use the phone at home to do that if I'm at home. I use SMS more often than voice call. I send SMS when I get to school, when I leave school to come home, or when I want to let my parents know what is happening, probably 3 or 4 times per day. Most of my classmates have a mobile phone. (child)

She goes to school on a school bus, and I do worry about what is happening when she is not with us, but since she's had a mobile phone we know where she is, so we feel safer. We don't use mobile phones when we're out as a family, like on a picnic, but we use them if she goes out on her own with her friends. (guardian)

Q3 Do you/your child use functions other than the voice call and mobile e-mail/SMS functions?

I download games from the mobile phone's Internet and play them. I sometimes use it to look things up for homework but I don't download large files because it's expensive. I do sometimes use it to look things up during tests. I don't use mobile e-mail/SMS because it's expensive, but I use SMS. I use Bluetooth to share photos with my friends, because it doesn't cost money.

Q4 Do you/your child use any other kind of information media other than the mobile phone?

I watch 2-3 hours of TV a day, mainly drama and cartoons. I have a TV in my room which I use to watch drama and music programs. I don't read newspapers or magazines very often but I read books because I like them. I use a personal computer a couple of times a week to look things up for homework, for about an hour each time. I use the computer to download music, too, and listen to it on my mobile phone or MP3 player. I don't have a video game console. A lot of my friends who are boys have them but most of my girlfriends don't. (child)

Q What rules do you have in your family regarding mobile phone use?

In principle, we gave her the phone so she can use it in an emergency, and we have banned her from downloading music or images. We check her phone regularly, as her parents, and delete anything we think is inappropriate. She seems to understand how these things work better than we do, however, and so we're probably not really checking sufficiently. (guardian)

A-2-2. Case 2

Interviewed: Child (age 13, male), guardian (mother), living in Mexico city

Q1 When did you/your child start to own a mobile phone? Could you tell us how you have decided to own/let your child own it?

I'd like to get one, but I don't own it now. (child)

Most of his classmates have got a mobile phone now but we want him to understand the value of money, so we are making him save up himself before we add a little to his savings and buy him a mobile phone. The fashion is for hi-tech phones, but I don't think it's a good thing if it causes a breakdown in family communication. As his mother, I don't think family communication should be by mobile phone, but rather by direct contact. When we give him a mobile phone, we will set an upper limit on use to teach him about the value of things, and we've already decided that we'll make it a prepaid phone. I think a simple one will be best. (guardian)

Q2 Tell us about how you/your child use your/his/her mobile phone.

No response as child does not have a mobile phone.

Q3 Do you/your child use functions other than the voice call and mobile e-mail/SMS functions?

No response as child does not have a mobile phone.

Q4: Do you/your child use any other kind of information media other than the mobile phone?

I don't watch more than 1 hour of TV per day. I am very busy with club activities so I hardly have time to watch TV. But I do go to watch movies regularly. I read the newspapers a bit, but hardly any magazines. I read books and comics a lot. I listen to the radio when my parents have it on in the car. I have an iPod so I import music that my dad copies onto the computer for me. I like rock music, and I've got about 150 songs on my iPod. We have a family computer, but I would like to have one of my own. I'd like to use it for homework. (child)

Q5: What rules do you have in your family regarding mobile phone use?

I think he wants a mobile phone so he can communicate with his friends, but we worry that he will lose his concentration if he has a mobile phone. I don't think we can let him have a mobile phone till he's aware of how much it will cost, and I want to give him that responsibility. A lot of people let their children have a mobile phone without thinking about it, but it is of a problem that they can download pornography and other things from the Internet. I don't think they're necessary for junior high school students. (guardian)

A-2-3. Case 3

Interviewed: Child (age 17, female), guardian (mother), living in Mexico city.

Q1 When did you/your child start to own a mobile phone? Could you tell us how you have decided to own/let your child own it?

I got the phone from my parents on my 15th birthday. I had told my parents that I'd like a phone before that, because I wanted to be able to talk to my friends. I think a mobile phone is better than the fixed line phone because you can talk about your secrets. My current phone is my second. I changed it just a month ago. I bought this second one with my scholarship money. I had the previous phone

for a year and a half and it wasn't broken, but it didn't have many functions and I was tired of it so I changed it. This phone has a better camera on it and it takes good images, plus it can hold a lot of music, and has Internet functions, so I'm very pleased with it. (child)

The monthly charges for a mobile phone are quite expensive but I think it's worth the cost. The handsets have come down in price a lot and I think it's an appropriate cost given the functions. The second phone she got has a GPS function, which is good for our peace of mind as parents. (guardian)

Q2 Tell us about how you/your child use your/his/her mobile phone.

I use SMS more than voice call function, because it's cheaper. I send about 20 SMS messages a day. I send more messages to my old friends than to friends at my current school. I use it to arrange to go out with my friends, and also just to send a message like "how are you?" I only call someone in an emergency. I don't use mobile e-mail/SMS, just SMS because mobile e-mail/SMSing costs a lot. I'd use mobile e-mail/SMS if it were cheaper. (child)

Some of her friends live in places without a fixed line phone so she uses the mobile phone to talk to them. Two or three years ago I thought a mobile phone was a luxury but it's become something everyone seems to have. I hear that all her classmates have one. (guardian)

Q3 Do you/your child use functions other than the voice call and mobile e-mail/SMS functions?

I take photos, but I don't send them attached to SMS, I just exchange them with my friends using Bluetooth. It's fashionable to have music on your phone and listen to it, and there are 53 songs on my phone altogether. (child)

Q4 Do you/your child use any other kind of information media other than the mobile phone?

I watch 2-3 hours of TV a day, I like drama. I often read the newspaper and books, but almost no magazines. I don't really listen to the radio either. I have a personal computer but it's not connected to the Internet. I copy CDs and listen to them on my mobile phone. I don't have a dedicated music player.

I used to have a PlayStation but now I don't have a video game console. (child)

Q5 What rules do you have in your family regarding mobile phone use?

Our family doesn't have particular rules, but at school, up until junior high school it was forbidden to use the phone during classes. At high school, it's okay to use it if you don't make a noise. (child)

I worry that she seems to spend a lot of time sending and receiving SMS. Sometimes she's so busy sending SMS that she doesn't listen to what people are saying. She doesn't touch her mobile phone when she's eating with the family, though, so I think she still takes the idea of eating together with the family seriously. I feel it's socially necessary for children to have a mobile phone nowadays. We are thinking about helping our younger child buy a phone now, once he/she has saved up some more money. I don't believe children should be bought things as soon as they want them, though, it's against my educational principles. (guardian)

A-3. Summary of interviews

Six cases of children using mobile phones were studied in Japan and Mexico. These cases reflected different generations and social backgrounds, but some aspects were the same, particularly the fact that the relationship of parent and child before the parent buys his/her child a mobile phone seems to have an influence on the way the child uses his/her mobile phone. The use of mobile phones seems to be primarily for communication, and children's first time experience of communicating with someone usually involves their parents. The impression gained is that parents' attitudes to education and ethics appear to be reflected in the children's attitudes to mobile phones as information media.

A firm home education appears to assist in ensuring children have a healthy attitude to mobile phone use. This may be an important fact when considering the further development of the market in mobile phones for children.

Appendix 2: Survey methodology

The survey was organized by the GSM Association (GSMA) and Mobile Society Research Institute (MSRI) in Japan.

The implementation of the questionnaire survey was commissioned to researchers in each of the five selected countries (Japan, Korea, China, India and Mexico). The survey was carried out in the summer of 2008 and the survey's target audience was pairs of parents or guardians and their children. In households with more than one child, the questions were asked in relation to the oldest child. The survey consisted of two parts - questions to be answered by the parent or guardian, and questions to be answered by the child. In this paper, the term "children" covers teenagers up to 18 years old. The number of respondents (by gender), children's age range, children's mobile phone ownership, and research and sampling methods are shown in Table 2 below.

The number of respondents was 2000 for Japan and approximately 1000 for each of the other countries. The male/female ratio was close to 50:50 in all countries. The minimum age of the children was 9 for Japan, 12 for Korea and 10 for the other countries. The maximum age for all groups was 18. The survey was implemented between June and September 2008.

Sampling methods were as follows:

Japan

Samples were extracted from monitors registered with NTT Resonant Inc., a research company which conducts web questionnaire surveys. The extraction was based upon the Ministry of Education, Culture, Sports, Science and Technology's 2006 "Basic Survey of Schools", dividing the

country into eight regions based on the distribution of child population. A preparatory survey was implemented among web monitors and the main survey was implemented on the targets extracted. The survey was carried out via the Internet as a web questionnaire.

Korea

Couples comprising a child, aged between 12 and 18, and a parent or tutor were surveyed. The sampling method was two-stage, with proportional population by cities. Five cities were selected as below:

Seoul (largest city by population), Pusan (2nd largest city by population), Daegu (3rd largest city by population), Guangju (5th largest city by population), Daejeon (6th largest city by population)
The contact method was a face-to-face interview.

China

The country was divided into three areas - East, Central and West - and surveyed in the ratio 2:2:1, based on population distribution. Initially, a random sample was selected of between one and several elementary and junior high schools (In China, junior high school includes the equivalent of Japanese high school). From the selected sample schools, students aged in the target range of between 10 and 18 were selected along with a parent able to respond to the survey.

Once the selected samples (parent/child pairs) had been collected, a group questionnaire survey was undertaken. This was implemented by researchers, who offered respondents the necessary advice to complete the survey. There were a total of 60 researchers (university students). The following 31 provinces, municipality

cities and autonomous regions were surveyed as part of the three regions of China:

- 1 Municipality Cities (4) Beijing, Shanghai, Tianjin, Chongqing.
- 2 Provinces (22) Anhui, Fujian, Gansu, Guangdong, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang.
- 3 Autonomous Regions (5) Guangxi, Inner Mongolia, Ningxia, Tibet, Xinjiang.

India

In order to meet the need for statistical information, quota sampling was conducted using socio economic classification (SEC). India is divided into 20 states, excluding the capital city, Delhi, and the following 10 cities, most of which are state capitals, were selected.

Delhi: Capital city of India
Mumbai: Capital of Maharashtra (most populous state)
Pune: 2nd most populous city in Maharashtra (most populous state)
Bangalore: Capital of Karnataka (3rd most populous state)
Kolkata: Capital of West Bengal (4th most populous state)
Chennai: Capital of Tamil Nadu (5th most populous state)
Hyderabad: Capital of Andhra Pradesh (6th most populous state)
Patna: Capital of Bihar (15th most populous state)
Ludhiana: Capital of Punjab (18th most populous state)

Mexico

Three-stage sampling was conducted for couples comprising a parent or tutor and a 10-to-18-year-old child, living in urban areas with cellular telephony coverage. A double

Table 2 Data sampling and mobile phone ownership of children

	Japan	Korea	China	India	Mexico
Date	June, 2008	Aug-Sep, 2008	Jul, 2008	Aug, 2008	Aug, 2008
Number of respondents (pair of parent&child)	2000	1000	1237	1008	1030
Male child	894	500	685	544	507
Female child	1106	500	533	464	523
No answer for gender of child	0	0	19	0	0
Children's age range	9 to 18	12 to 18	10 to 18	10 to 18	10 to 18
Mobile phone ownership of child					
Child has mobile phone	1331	800	645	290	615
Child doesn't have mobile phone	669	200	582	717	415
No answer for ownership	0	0	10	1	0
Research method	internet	interview	interview	interview	interview

Unit=person

stratification was considered, according to the economic region of the country and the socio-economic level of households within cities.

The country was divided into four geographical regions (North, West, Center and Southeast) and the cities below were selected from each region:

Mazatlan, Sinaloa (North), Leon, Guanajuato (West), Mexico City (Center), Port of Veracruz, Veracruz (Southeast)

Interviewers visited the each region and conducted interviews.

The sampling method was different from country to country. For example, in India and Mexico, measures were taken to ensure that a certain number of children owning mobile phones were available. This is because formal random sampling would produce an extremely low number of households where children own a mobile phone. If this number fall as low as 1 in 10, it becomes difficult to make assumptions about mobile phone ownership, so sampling controls were introduced to ensure that a certain proportion of mobile phone owning children were surveyed. As a result of these controls, the mobile phone ownership rate of young people at the upper end of the age range (18) in each country sample becomes about 7 in 10 ~ 9 in 10.

Survey cost was another factor affecting the sampling method used. In most cases large cities were chosen to reduce the survey cost and, in Japan, a web monitor survey was employed because face to face surveys were too expensive.

Since the sampling was not completely random, it would be incorrect to make an international comparison of the absolute level of mobile phone ownership rates among children. There would be no point in

comparing the 30% of children in India and 80% of children in Korea who own mobile phones. The meaningful aspect is not the comparison of statistical levels, but the strength of relationships to the other variables; in other words, a comparison between the strength of correlation. For example, there is meaning in an international comparison of the correlation between the rising age of children and the increased ownership of mobile phones, or how children are affected by the desire to own a mobile phone, when their friends acquire one.

Of course, this sort of correlation can also be affected by the sampling controls. If the sample is chosen from families with a high proportion of mobile phone ownership, the factors specific to that type of family (for example, higher income or increased preference of new technologies) may act as stronger influential elements, and distort the correlation. If only families from wealthier sectors of society are selected, for example, it may be assumed that, since they have sufficient income, the correlation between income and mobile phone ownership would be relatively small. Our assumptions are made based on the premise that such effect on correlation would be very small. In fact, in the process of assumption, the sampling controls did not seem to have a strong distorting effect on correlation.

In the case of Korea, however, the fact that the lowest age of the sampled group was a comparatively high 12 years of age, and the rate of mobile phone ownership was also high (at over 80%), caused problems in analysing the factors behind the increase in ownership with increasing age. Table 3 shown below contains trends in mobile phone penetration for each country, by age. This table

divides samples by age group and calculates the proportion of children in each group who own mobile phones. Japan, China, India and Mexico all show increasing mobile phone ownership with increasing age, but Korea shows hardly any change between age 12 and 18, with roughly 80% of children owning mobile phones. For this reason, the phenomenon of increased mobile phone ownership alongside increasing age cannot be analysed in regard to Korea. Put another way, the major increases in mobile phone ownership amongst children in Korea take place in the years before they reach 12 years old. As these ages were not covered in this survey, in the chapters 3 and 4 where the estimate equations for ownership of mobile phones are presented, the results for Korea are treated as reference data and have been removed from the scope of analysis regarding factors behind penetration.

In terms of the survey methods, an Internet-based questionnaire survey was only utilised in Japan. In other countries, interviews were carried out face to face. In the Internet survey, it was confirmed that there was no significant bias in respondents' attributes in terms of employment, age, income, residence region etc. Restricting respondents to those using personal computers, however, biases the results slightly. For this reason, it must be noted that it was not possible to study the effects of whether or not the respondent is using a personal computer, and that there was a disproportionately high number of respondents who have knowledge of personal computer use - in other words, have a high level of IT literacy.

In addition to the questionnaire survey, an interview survey was also conducted in Japan and Mexico to obtain an insight into those countries' cultural backgrounds.

Table 3 Mobile phone penetration amongst children by age

age	Japan		Korea		China		India		Mexico		percentage owning a mobile phone				
	not have	have	not have	have	not have	have	not have	have	not have	have	Japan	Korea	China	India	Mexico
9	100	67									40.1				
10	128	105			58	12	119	12	121	30	45.1		17.1	9.2	19.9
11	124	66			49	10	80	8	55	30	34.7		16.9	9.1	35.3
12	105	105	10	71	68	26	107	14	50	41	50.0	87.7	27.7	11.6	45.1
13	82	113	21	127	70	29	84	10	54	47	57.9	85.8	29.3	10.6	46.5
14	77	103	31	118	59	38	81	11	43	82	57.2	79.2	39.2	12.0	65.6
15	29	196	42	150	80	67	64	23	25	69	87.1	78.1	45.6	26.4	73.4
16	13	268	41	150	80	101	62	43	24	71	95.4	78.5	55.8	41.0	74.7
17	9	232	19	93	72	125	57	52	19	100	96.3	83.0	63.5	47.7	84.0
18	2	76	36	91	55	233	64	117	24	145	97.4	71.7	80.9	64.6	85.8

Unit= person

Unit= %

Appendix 3: Summaries of country reports

6 W. Chan Kim and
Renee Mauborgne,
“Blue Ocean Strategy”
Harvard Business
School Press

A-1. China

The research study in China was conducted by the Centre for Science Technology & Society, Tsing Hua University, Beijing.

The popularization of mobile phones among Chinese children is the result of global development and progress of mobile communications and is very high. Because of the nature of Chinese society, its focus on education and the policy of one child per family, the popularization rate of mobile phones among children in China is much higher than in Chinese society as a whole. However, the survey of children who do not own a mobile phone indicates that there is still considerable potential for growth in this market.

Among the factors that have an impact on decisions about children's ownership of mobile phones, the desire and demands of children themselves as they grow older is the main reason. As children's age increases, more and more of them begin to use mobile phones. As their knowledge, capability and communication skills increase, their dependence on mobile phones become stronger, and they begin to use more mobile functions and services. But, so far the popularization of mobile phones in China has been realized very simply and independently, and is not based on online or Internet connectivity. So the use of mobile functions and services by children is typically confined to the functions which the mobile phone itself offers. Children only use mobile phones as communication tools for making phone calls and sending or receiving SMS. Compared to developed countries, in China mobile functions and services/ contents are still relatively immature; there is a long way to go.

Many working parents let their children use mobile phones and that is strengthening communication between children and parents. Most of the parents are satisfied with the feelings of safety and reassurance created by the use of mobile phone. On the other hand, children who are alone at home have extended their connections with the outside world and enriched their lives through entertainment on the mobile phone. Therefore, the general attitude towards mobile phones is positive. However, some parents do recognize an increase in problematic or excess use of mobile by children, and some of them restrict their children's use of mobile phones.

At present in the Chinese mobile phone market, major global corporations still hold the major market share. They continuously launch new generation products which both

boost technology development and inspire fashion in China, thus having a dual and very profound influence on children's lives.

A-2. India

The research study in India was conducted by TNS India.

The mobile industry in India is one of the fastest growing mobile markets in the world with its current 290 million subscriber base, which is second largest in the world. In the survey, almost 94% of the respondents have either one or more mobile phones in one household and more than 76% of children either use their own or shared mobile phones.

In India, family bonding plays a very important role and almost half of the parents have provided mobile phones to their children to communicate with them whenever needed. Parents also feel that by providing mobile phones, their children would get better opportunities for their future endeavours. Social status also plays a very important role especially when selecting mobile phones.

Parents in India at present do not have many concerns over how their children use their mobile phones. On the other hand, they find family members are the appropriate people to educate their children on how to use their mobile phones.

More families are becoming nuclear families and with the growing household income, parents can easily afford to provide mobile phones for their children.

Children mainly communicate with their parents through face to face conversation. Many children learn various aspects of mobile usage from their parents.

Unlike teenagers who use messaging services most often to communicate, younger children prefer to make and receive calls, which are easier and more convenient.

Children use voice calls mainly for arranging to meet someone and use messaging services mainly to communicate for telling someone how they are feeling.

Many children think mobile phones are fun to use and not having a mobile phone would make them feel inconvenienced and insecure. Children like to give either their landline number or their mobile number to their friends rather than communicating through Mobile e-mail/SMS.

Battery life is one of the most important features which children look for when selecting their mobile phones. This can be attributed to the fact that children like to play games on their mobiles with 97% of the children who use mobile phones spend some of their time playing games.

More than 50% of the children who currently do not own a mobile phone would definitely like to have their own mobile phone and one of the important factors driving them is their friends who have started using mobile phones. It can be also seen that more than 50% of the children's close friends use a mobile phone.

Many children go to extra tuition and coaching classes after school and children feel it is helpful to be able to communicate with their family when they come home late.

Many children who do not want a mobile phone feel that since their parents have a mobile phone, it does not matter whether they themselves have a one or not.

In short from the study, it can be summarised that mobile phones have become popular among children and there is a growing trend among children to have their own mobile phones.

A-3. Japan

The research study in Japan was conducted by the Mobile Society Research Institute (MSRI).

In Japan, children in general start to have a mobile phone at the age of 12, when they enter junior high school. The penetration of mobile phones among children is about 20% throughout their elementary school years (9 to 11 years). This rate begins to pick up to 40 to 50 % when they enter junior high school (12 to 14 years). The age of 12 is a cut-off point not only quantitatively, but also qualitatively, in terms of whom children contact via a mobile phone. Elementary school children largely use a phone to reach their parents, while junior high students or older are more likely to communicate with their school friends. This inclination is especially noticeable in their email communication. As they grow older, their contacts are almost dominated by their school friends. The percentage of children who say they feel lonely without receiving mobile e-mail/SMS addressed to them also increases as they become older. The presence of friends is a major factor that contributes to the rising mobile phone ownership among children.

Having additional mobile phone users among friends must certainly increase

the utility of having a mobile phone. The ownership of mobile phones among junior high school students has exhibited an upward trend in the past several years. Some data indicates that their mobile phone ownership rose from 48% to 59% during the 14 months from December 2006 to February 2008.

We can conclude that the most significant factor that affects children's mobile phone ownership is their age, followed by their friends' ownership. As children grow, they desire to have a mobile phone to create and secure personal spaces to be shared with school friends independent of their parents. However, children are unlikely to desire to have a mobile phone so much unless their friends have one. It is worth noting that income level is not a significant factor, contrary to our expectations. Since mobile phone bills normally account for a considerable part of household expenditure, the income level of parents should affect the status of mobile phone ownership among their children. Based on our survey, however, parental income has little impact on whether their children have a mobile phone, when they get one or how much is spent on their mobile phone use. This is a surprising finding. It means that mobile phone use by children is now becoming a phenomenon regardless of their parents' wealth.

A-4. Korea

The research study in Korea was conducted by Korea Telecom Freetel (KTF).

The total number of mobile subscribers is 43.5 million and the total population of Korea is 48.5 million. However, despite this apparent market saturation, there is still potential for further growth through stimulation of the children's mobile market according to the following two factors. First, it seems that targeting the market for under 12 year olds could have a 'blue ocean' effect in a quantitative way since children mostly obtain a mobile phone at around age 12. Second, because children tend to have phones with new and advanced functions, providing various high-end services such as data services could dramatically increase mobile phone usage and service revenues. Children frequently use potentially lucrative camera, music/video player and games on their mobile phones to kill time.

Korean children exchange messages with friends mainly using mobile phones. Other reports also indicate that messaging via mobile phones and PCs are popular communication tools, because they are more

convenient vehicles for children to exchange messages with their friends. Note that children usually have very tight daily schedules and cannot answer incoming calls in many cases. Third, mobile phones are necessities for children to maintain social group networks. Even when they use a mobile phone for the first time, they use messages to contact their friends. Other survey reports also indicate that children make every effort to answer incoming messages unless they deliberately intend to neglect the sender. From the fact that children feel troubled and anxious at the same time, it can be inferred that a mobile phone can become a necessary evil.

A-5. Mexico

The research study in Mexico was conducted by Professor Judith Mariscal Aviles of the Centro de Investigación y Docencia Económicas (CIDE).

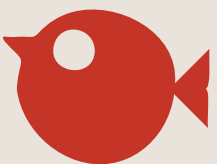
In Mexico, mobile telephony penetration has grown rapidly at all socioeconomic levels in recent years. The child population has participated in this phenomenon: according to survey results, more than 60% of children own a mobile phone. This high penetration rate is accompanied by the early adoption of this communication tool. Most children begin to use a mobile phone at age 12, when they are still in primary school, mainly to communicate with parents. The possibility of being in contact at all times is the main reason driving the adoption of the mobile phone, behind which there are motives associated with children's security. This is very important as parents believe that their lives changed after their children obtained a mobile phone since they now have greater peace of mind. The second most important reason is the use of mobile phone functions. Both responses were mentioned by children who do not have a mobile phone but would like to own one.

As age increases, mobile penetration grows and although parents remain a key contact, friends gain ground as a target of communication through this medium. Friends who have a mobile phone play a key role in influencing children to obtain or want one. The importance of ownership increases with age, which may be explained by the effect of social networks that children build over time. Age also has an impact on the adoption of technology and the increased dependency on mobile phones, to the extent that some children report feeling sad or insecure when they do not have their phones with them. Therefore, children's age appears to be a major factor explaining ownership of and the desire to

own a mobile phone. The level of urbanization and the education level of parents are associated with early mobile phone use but are not determinant factors.

Income does not have a clear effect on technology acquisition; in this study, income had little impact on children's mobile phone ownership or service expenditures. Survey respondents spent an average of 1,617 MXN on their handset. The vast majority of children's phones were purchased new while a much smaller percentage owned used phones bought at a lower price. Average monthly spending on mobile service used by children is 531 MXN for postpaid (93%) and 250 MXN for prepaid service (87%). In both cases, the average expenditure is above the average revenue per user in Mexico, which underscores the importance of mobile communication for survey respondents.

The main functions of the children's mobile phones are associated with entertainment. Mobile functions such as GPS or Internet were seldom used. Children most frequently use the text-messaging function. Older children send and receive more messages than do younger ones. The level of penetration and frequency of use, as well as the variety of functions, has made the mobile phone a basic tool for communication and entertainment, as well as an information source, to a lesser extent. However, it is still difficult to establish the real impact of mobile phones as an information source given that few individuals in this study used mobile Internet service. Finally, for parents, the key criterion for selecting a mobile phone for their children was cost, whereas for children it was handset design.





The GSM Association (GSM) is the global trade association representing more than 750 GSM mobile phone operators across 218 countries and territories of the world. The Association's members represent more than 3 billion GSM and 3GSM connections - over 86% of the world's mobile phone connections. In addition, more than 200 manufacturers and suppliers support the Association's initiatives as key partners. The primary goals of the GSM are to ensure mobile phones and wireless services work globally and are easily accessible, enhancing their value to individual customers and national economies, while creating new business opportunities for operators and their suppliers. For more information, please visit www.gsmworld.com



NTT DOCOMO is Japan's premier provider of leading-edge mobile voice, data and multimedia services. With more than 54 million customers in Japan, the company is one of the world's largest mobile communications operators.

Since 2004, the Mobile Society Research Institute (MSRI) within NTT DOCOMO has been studying the social impact of mobile phone use. The research institute, which operates independently from NTT DOCOMO, conducts research studies into both the present and future influence of mobile communications. Its findings are widely disclosed to the public through reports, publications and symposia.