

Chapter XV

Media Life Cycle and Consumer-Generated Innovation

Yuichi Wasida, Hakuodo Inc. & Tokyo University, Japan

Shenja van der Graaf, LSE, UK

Eva Keeris, Utrecht University, The Netherlands

Abstract

This study examines the innovation in communication media, based on empirical survey results from five countries. First, the authors create a general framework of the media life cycle by exploring the replacement of communication media used in daily life. The shift from voice communications to mobile e-mailing is at the forefront of the media life cycle in the personal communication area. This framework also implies future media replacements in other countries. Second, by comparing two empirical surveys, done in 2002 and 2003, of communication means used among Japanese family relations, the authors discover that certain consumer clusters lead in the innovation of communication media. This framework and discovery can be useful to deal with the vacuum between conventional media studies and the latest information technology.

Diffusion of New Communication Media

The wide and rapid diffusion of the use of e-mail and mobile phones, called cell phones or currently smart phones in the U.S., has entirely changed the paradigm of human communications. We use e-mail and mobile phones as a part of our everyday life. These two communication means, major products of information and communication technologies (ICTs) during the last two decades, are gradually replacing some conventional communication means, such as physical mailing or talking on fixed phones. These replacements can also change human behavior and may create new social norms and cultures. Obviously, the driving forces behind these replacements are the massive marketing activities of dot com companies and telecom operators.

However, there has been a relatively small number of social science researches on these areas because the technology changes so rapidly. Relentless and endless change of information technology is problematic for academic social science research, when it faces cutting edge technology. That kind of technology always threatens to overturn the conventional social context with rather destructive ways, and then it is difficult for scholars and academic researchers to examine the actual impact of each technology. But, we should not think that a new communication means supported by such a new technology is not a suitable subject for academic research. Looking at it from the viewpoint of social norms and cultural transition, even the newest communication means can be examined scientifically.

The most important point in the examination of the communication means and new technologies is, we believe, the innovation processes that occur while these technologies diffuse among users or consumers. Investigating the changes of interpretation in our society for each communication means and its technology is especially significant from a social scientific viewpoint. According to a common framework of innovation analysis, such as Rogers' (1995), innovation is not merely a technological matter, but the diffusion of a new understanding and behavior toward the technology. Moreover, Von Hippel (1988) examined a lot of examples in which certain user communities can act as sources of innovations. In fact, in some cases suppliers follow the innovations created by users, instead of creating innovations by themselves. By investigating such innovation processes, we can examine the evolution of social norms and emergence of new cultures rather than merely tracing superficial trends of ICTs.

In this chapter, we would like to focus on the role of each user cluster throughout the innovation process that has taken place since new ICTs began affecting human communications. Inevitably, there are many different usage patterns by consumer cluster, such as age, class, family relation, and gender, with new electronic communication means, as well as those within conventional, face-to-

face, communication means. Especially, the gender effects on the new communication usage should be considered more. As a matter of fact, many people point out that most ICTs have been developed by males, and thus, principles of these technologies have obviously been “masculine.” Rogers also pointed out that especially in the ICT area in the middle 1980s, there was a significant difference of usage and innovation patterns by gender (Rogers, 1986), due to the gap of mathematical performance between male students and female students.

However, in the late 1990s, the situation began to change. Especially when useful graphical user interfaces (GUIs) were introduced into the ordinary consumer market, ICTs became much friendlier to all kinds of people. The wider the penetration of these new communication means has grown, the more supported they have become by ordinary people including women, instead of by masculine techno-fanatics. Based on these intuitive observations, we think that a certain kind of gender study in these areas will have a particular importance.

Central Question and Hypothesis

In this article, we focus mainly on the case of Japanese mobile phone usage. The Japanese mobile phone penetration rate is now approximately 70%, which means the diffusion process has already reached the “majority” stage (Rogers, 1995). In the majority stage, we can see an interesting target-switch phenomenon from male-dominant user clusters to female-dominant ones in Japanese high-tech sectors (Washida, 2004). Moreover, after this target-switch phenomenon, Japanese mobile phone services achieved greater technological innovations. This observation implies that today’s prominent innovations of Japanese mobile phone products are driven by the requirements of female users. We would like to call this type of phenomenon *consumer-generated innovation* or *the demand side innovation*, with which we can theoretically define that certain types of technological innovations emerge among users, in other words, the demand side, not the supply side.

In neoclassical economics, however, scholars have thought that all innovations are supplied by producers, and consumers can only choose good products that consist of good technologies and are sold at appropriate prices. This perspective is one of the most basic views in neoclassical economics, in which almost all of the neoclassical economic theories, such as supply and demand curves theory, the economical equilibrium theory, and a series of the marginalism theories, are built. We can say that these theories are some of the fundamental settings of today’s capitalism, especially in the 20th century. Moreover, these perspectives and economic theories have deeply influenced the major ideas in conventional

media studies. Therefore, in conventional media studies, new technologies that created new media have been considered a “given” element in society. In fact, most innovations in mass media, such as broadcasting technology, writing narratives for various broadcasting programs, creating sounds and visual images, and acting in mass media, were “supplied” by a very limited number of people, compared with the millions of people making up the audience in a society. In other words, in mass media, making innovations has been highly centralized.

However, today’s rapid development in the ICTs brings a new stage in media history. The ICT innovations are much more distributed, therefore, not only a small company, but also every ordinary user can make an innovation by adding a new meaning or value to a new technology. Although this characteristic of ICTs is intuitively apparent, few researchers empirically validate the emergence of this new stage of media history. We should say that the distributed characteristic of ICTs and their demand-side innovation effects can be important elements of the innovation in the big picture of media transition history.

The major purpose of this chapter is to examine the innovation process carried by the demand side, and explore the trajectory of near-future media transition. Which medium in which country emerges in the forefront of the media history in taking a global overview of media innovation? How social norms have been compiled in ICT usages? Who actually leads the current ICT innovation in our society? What is the difference between male users and female users? To examine potential answers for these questions, we have conducted two series of empirical surveys. The technical hypothesis for the surveys is addressed in two steps.

First, for Method 1 to identify which medium in which country is at the forefront of the media transition, we have compared frequencies of use of several electronic communication means by country. By examining the result of Method 1, we could learn which electronic communication means is dominant in each country, and which confirmed that mobile phone usage in Japan is in a unique circumstance. Based on the results of Method 1, we concluded that current increase of Japanese e-mailing use via mobile phones should be considered as the forefront of the global media transition. Second, for Method 2 to validate that a certain type of innovation emerges on the demand side, we surveyed, in both 2002 and 2003, the usage patterns of communication means in Japanese families. By comparing these two-year results, we could see changes in usage patterns during the period and distinguish which user cluster has led the change. Moreover, by adding ethnological analyses toward such Japanese usage patterns, we concluded that emerging Japanese female usages led major ICT innovations during the period. Details of both methods are explained in the following sections and appendix.

Method 1: Comparative Survey on Communication Media Environment

Method 1 consists of an international comparative survey program, named Media Landscape Survey 2003-2004 (MLS), which includes comparative surveys in the U.S., The Netherlands, Sweden, South Korea, Japan, and China. All six surveys used the same questionnaire translated into each language. The survey targeted people age 15-34. The major purpose of the survey was to examine the communication media environment in each country. The total sample size was 2,578 (details of the surveys are included in the appendix). In each survey we asked respondents about several aspects of communication behavior using fixed phones, mobile phones, e-mailing, instant messaging, and Web logs. Regarding mobile phones, we asked them about both the call usage and the e-mail usage. We also asked respondents whether they used online game sites and music file-sharing sites.

Based on MLS, in Method 1, we compared the usage of several communication means in five countries (the United States, The Netherlands, Sweden, South Korea, and Japan), but not in China. MLS is basically done for those who are interested in using various digital communication means in their daily lives. The five countries are relatively well developed in terms of digital communications, which are common enough to represent “ordinary” life in each country, while China is still developing. For instance, the penetration rate of PCs in China is approximately 5%; therefore, we have to say Chinese results in MLS do not represent “ordinary” Chinese lifestyle to any certain extent. Thus we exclude Chinese data in Method 1.

The purpose of Method 1 is to take an overview of each communication means usage and to map them. By doing so, we try to investigate the meanings of each communication means in the social norms and culture. As we focus on mobile phones in this article, we identify the meaning of mobile phones in the various communication environments. Of course, every country has a unique society and culture that is reflected in each country’s usage pattern. However, by comparing five developed countries’ results, we can see some general macro tendencies.

Result of Method 1

Tables 1-3 show percentages for each communication means usage per day and by country. In Table 1, we can see the daily usage of calls on fixed phones for personal purposes. In many countries 40-70% of ordinary people make fixed phone calls at least once a day, but not in Japan. Also, Table 1 reflects the same

information on mobile phone calls, and we find that the overall tendency is very similar to that of fixed phones. Generally speaking, fixed phones and mobile phones compete with each other, and their usages seem to cannibalize one another. But it is interesting that in our survey, call usage on fixed phones and on mobile phones actually tends to be in direct proportion to one another, rather than in inverse proportion.

As shown previously, people in Japan do not make as many phone calls as do people in other countries. Of course, being a well developed country, Japan does

Table 1. Usage of personal calls on fixed phones and mobile phones per day in each country (in %)

Country	Number of respondents	Frequency of usage
		More than once a day
Personal Calls on Fixed Phones		
Netherlands	177	41.0
Sweden	351	72.9
USA (East Coast)	850	62.1
Japan	400	12.6
South Korea	400	47.0
M	2178	47.1
SD	2178	21.7
Personal Calls on Mobile Phones		
Netherlands	177	63.3
Sweden	351	61.1
USA (East Coast)	850	74.9
Japan	400	31.8
South Korea	400	80.7
M	2178	62.4
SD	2178	18.6

Note. All numbers of data above are verified to have significant differences against the mean with the significance level $p < .05$, in the parametric statistical test - Dunnett test (multiple comparison).

Table 2. Usage of personal emailing via PCs or PDAs, and instant messaging per day in each country (in %)

Country	Number of respondents	Frequency of usage
		More than once a day
Emailing via PCs or PDAs		
Netherlands	177	68.8
Sweden	351	65.7
USA (East Coast)	850	74.8
Japan	400	42.8
South Korea	400	32.8
M	2178	56.9
SD	2178	17.5
Instant Messaging		
Netherlands	177	29.0
Sweden	351	39.8
USA (East Coast)	850	41.4
Japan	400	11.5
South Korea	400	50.8
M	2178	34.5
SD	2178	19.2

Note. All numbers of data above are verified to have significant differences against the mean with the significance level $p < .05$, in the parametric statistical test - Dunnett test (multiple comparison).

not suffer from a weak telecommunication infrastructure. Obviously, the low usage of phones to make phone calls indicates that in Japan voice communications are now being replaced by other communication means.

Therefore, we must determine what other communication means are replacing phone calls in Japan. The most conceivable answer is a variety of text messaging services. Table 2 and Table 3 show the daily usages of e-mailing services via PCs, instant messaging, and e-mailing services via mobile phones, respectively.

Table 2 reflects the usage of regular e-mailing services via PCs and PDAs. E-mailing services have been developed based mainly on PC-based networks. In

Table 3. Usage of personal emailing/SMS via mobile phones per day in each country (in %)

Country	Number of respondents	Frequency of usage
		More than once a day
Netherlands	177	28.4
Sweden	351	36.7
USA (East Coast)	850	5.1
Japan	400	51.0
South Korea	400	18.3
M	2178	39.9
SD	2178	22.0

Note. All numbers of data above are verified to have significant differences against the mean with the significance level $p < .05$, in the parametric statistical test - Dunnett test (multiple comparison).

MLS, we classified e-mailing via PDAs as a variation of regular e-mailing services because in many cases of PDA-based e-mailing usage, users are connected by the same type of network as PC-based ones, even though the physical shape of PDA usage is similar to the usage of mobile phones. Interestingly, Table 2 shows a cultural or historical difference of writing behaviors among Western countries and Eastern countries. In Western countries, word processing culture has a long history, reflected in the wider usage of PC-based e-mailing. Conversely, Eastern countries have a long history of handwriting and relatively short history of word processing, and thus e-mail usage in Eastern countries is less popular, although South Korea and Japan have very high penetrations of PCs and Internet usage.

Therefore, according to our data, we cannot say PC-based e-mailing services are effectively replacing Japanese voice communications. Also, Table 2 shows the usage of instant messaging. It is a relatively new, PC-based text messaging service, by which users can see a message automatically as soon as it arrives. Because of its convenience and quickness, instant messaging is becoming popular especially among heavy Net users. Moreover, because instant messaging is usually used among "trusted" relations, it can relatively keep users away from spam mails and virus mails. The five countries in MLS are all well

developed regarding Internet connectivity; Table 2 shows that 30-50% of Net users in these countries are using instant messaging, except those in Japan. Only in Japan, the percentage of the instant messaging usage is approximately 10%. Here again, we cannot say that Instant messaging, also a PC-based text messaging service, is replacing Japanese voice communications.

Finally, Table 3 shows the usage of mobile e-mailing services, or short messaging services (SMS). Here we find a popular use of it in European countries and especially in Japan. In the U.S. and South Korea, the usage of mobile e-mailing is not very popular, even though penetrations of mobile phones are not low in these two countries, per se. Interestingly, comparing Table 3 with Table 1, we can see the average shapes of mobile phone usage by country. In the U.S. and South Korea, voice communication is much more superior to mobile e-mail communications, while in Japan mobile e-mail communication is entirely dominant. In The Netherlands and Sweden, both voice and e-mail communications are equally popular. Based on this understanding, we can say that in Japan the frequent usage of mobile e-mail communication—in this case more than 60% of total respondents—is replacing voice communication.

The Media Life Cycle

Summing up these survey results, we can envision a framework for the life cycle of a variety of communication media. When a new communication medium appears and becomes popular, an old one becomes obsolete and begins to decline. The important point here is finding a phenomenon of usage decline, rather than merely an emergence or increase of a new medium usage, because a declining phenomenon directly means a replacement of media, and the replacement implies the existence of the media life cycle. In other words, if we observe a declining phenomenon among consumer behaviors, it proves that there emerges a replacement of medium and its technology by other new media and their new technologies. We can define the media life cycle as this alternation of media and their technologies.

In our MLS, the declining phenomenon is seen in the case of Japanese voice communication. We have also found that mobile e-mail communication is becoming the alternative of voice communication. At this point, we cannot see any other declining phenomenon in the other countries. This strongly implies that Japanese society stands at the forefront of the media life cycle due to the wide penetration of mobile e-mail communication.

It is interesting, however, that PC-based text messaging services, such as regular Internet e-mail services and instant messaging, do not seem to replace any other

old communication medium, even though many analysts have pointed out that the Internet has started to replace some conventional mass media. For instance, it is true that certain kinds of newspapers, magazines, and music CDs are now in danger of decline due to the massive penetration of the Net media. However, in the personal communication arena that we see in MLS, instead of the mass media arena, the Internet is not a threat for conventional communication media at this point. In other words, there is coexistence between the Internet and conventional communication media.

Comparing mass media and personal communication media, we can also generalize the media life cycle to be a wider map of media transitions, as in Figure 1, which includes a variety of media and technologies we use in our everyday life. The two columns, which follow, represent mass media and personal communication media, respectively, and the four rows represent four generations of media, chronologically. By nature, mass media is based on a one-way communication, from one supplier to many audiences, while personal communication is based on an interactive communication among “one-to-one” relations.

First, Generation A indicates a primitive shape of public communication in each arena, which mainly consists of paper and ink. We can classify various print media, such as newspapers and magazines in mass media and physical mail in the personal communication media. The technology that supports Generation A

Figure 1. The framework of the media life cycle

	Mass Media one-way-based communication: basically one-to-many	Personal Communication Media interactive-based communication: basically one-to-one
Generation A: (before the 20 th century) The initial shape of public communication system with paper	Mass print media (include newspapers and magazines)	Physical mail
Generation B: (the 1 st half of the 20 th century) Telecommunication with voice and sound	Radio broadcasting	Calls on telephones (include both fixed and mobile)
Generation C: (the 2 nd half of the 20 th century) Transferring rich contents with multiple-channels	TV broadcasting (includes cable TV)	Email via PCs (include instant messaging)
Generation D: (beginning of the 21 st century) Allowing users to establish communication completely on-demand	Internet portals (include news groups and file sharing)	Email via mobile phones

media was invented several 100 years ago. These media were widely developed as public communication services long before the 20th century. However, because Generation A media are very useful and efficient in many ways, most of them survive as a part of the basic social infrastructure and coexist with new generation media even now.

Second, Generation B indicates the emergence of telecommunications with relatively simple voices and sounds in the early 20th century. We classify radio broadcasting in the Generation B mass media, and calls on telephones in the Generation B personal communication media. The basic technologies that developed the Generation B media were invented at the end of 19th century, but the public communication services for ordinary consumers using these technologies began in the early 20th century. Telecommunications enabled us to communicate, and therefore to overcome any time lag, even when there is a considerable distance between communicators. Inevitably, this was one of the most important developments of the 20th century.

Third, Generation C indicates that we can communicate a great variety of content, such as visual images, movie images, and high quality stereo sounds, through multichannel information distribution systems. TV broadcasting systems and e-mail via the Internet are classified in this category. Thanks to advanced telecommunication techniques and broader bandwidth of transmission networks, we can exchange rich content among ourselves. This revolutionary media environment gave birth to an extremely creative visual culture in the late 20th century. The visual culture is so impressive that it has overshadowed the former generation media. Actually, radio broadcasting began to decline under the influence of TV broadcasting, and physical mail began to decline due to a massive increase in e-mailing. However, as previously mentioned, e-mailing has not begun to replace voice communications at this point.

Finally, Generation D enables us to access rich content whenever and wherever we want. In this sense, Generation D is the second wave in the process of being able to overcome distance and time as Generation B did. However, we need to examine carefully what the difference is between TV broadcasting and Internet portals, or between e-mail via PCs and e-mail via mobile phones.

Let us start with Internet portals and TV broadcasting. When we compare newsgroups in Internet portals with conventional news on TV, what is the actual benefit from it? The answer may be its chronological nonlinearity and ubiquity of news content. From a news list of Internet newsgroups, we can obtain any news in any order we want to see it, while we have to obey the program schedule of broadcasting stations if we want to receive the same content from conventional TV news programs. In general, TV news programs are designed in a chronological order. Consequently, we have to behave synchronously when we depend on TV news. Conversely, if we regularly obtain information from

Internet newsgroups, we are free from such synchronicity, using our limited time resources more efficiently. Moreover, Internet newsgroups are also free from geographic limitations. By nature, conventional TV news programs focus on individual regions and countries, limiting the scope of news content. However, we can watch and read all countries' news simultaneously with Internet portals.

Next, let us examine the actual benefit from using mobile e-mail instead of regular e-mail via PCs. We find the same benefit: a chronological nonlinearity and ubiquity in communicating with others. We can receive and send mobile e-mail immediately, wherever we are. This does not mean that we are only free from geographical limitations of Net accessibility, but also from chronological limitations of communication. As many mobile e-mail users know, constant and seamless connection between friends and family consequently dispels a feeling of time lag between sending and receiving and creates a comfortable feeling of "always being linked." In general, when we send e-mail via PC, we cannot expect the receiver to immediately read it, because the receiver is not necessarily in front of a PC. But in the case of mobile e-mail, especially in Asian and European countries, we can expect the receiver to see the e-mail immediately, even though the receiver may not reply to it instantly. This difference of expectation in the receiver's behavior makes the sender feel more connected. It is curious that the loss of communication time lag leads us to a loss of chronological limitation of e-mailing behavior, even though the actual transaction of e-mail exchange in mobile e-mail is more chronological than regular e-mail via PCs. However, it is unfortunate that in the U.S., due to the low penetration rate of mobile e-mail usage at this point, ordinary U.S. people have not experienced this feeling yet.

One may think these benefits from Generation D are not absolute technological improvements but merely false benefits in the users' minds. However, from the viewpoint of social norms, we believe that the benefit in the user's mind is the most important thing. Users have spontaneously changed the meaning of communication and its technology from *interactive* to *on-demand* in the case of Internet portals, or, from *wireless* to *ubiquitous* in the case of mobile e-mail.

Of course, the framework of the media life cycle shown in Figure 1 may seem to be overly generalized to some extent, and we can be more careful to examine each medium's specific meaning in each period. However, by having a macro viewpoint as in this framework, and especially by observing the replacement of a conventional medium by a new medium, we can understand the meaning of each technology in our society.

Conventional Media Studies and ICTs Studies

To maintain the theoretical history of media usages, the analysis of the newest media, such as the Internet and mobile phones, is not sufficient at this point. We hope that our framework of the media life cycle can be helpful to fill this vacuum to some extent. One of the most typical of conventional media analysis frameworks is Harold Innis's (1951). He classified various media into two categories, time-binding media and space-binding media, by using the terminology *media bias*. The time-binding media includes manuscripts and oral communications, and are favorable to relatively close communications in a community, while the space-binding media includes all of print media, mass media, and probably current ICTs, and are concerned with today's wide variety of commercialism. Innis and Marshall McLuhan, Innis's colleague at The University of Toronto, thought that media and technologies were "given," and media, per se, could be messages to our society. This approach is so-called *media determinism*, and is a popular approach in media studies, journalism, and critical studies even now. This approach is quite useful to compare the magnitude of influences of various media regardless of the content of each communication. In fact, we can see a variety of examples in which current critical media researchers use a theoretical framework that can be evaluated as a natural evolution of Innis's approach. For instance, Chesbro and Bertelsen (1996) show a media comparison framework using three categories of media classification, oral culture, literal culture, and electric culture, and explore each characteristic of these three types.

The approach of media determinism has been, of course, significant since we have observed the history of media, especially the evolution of mass media and its culture, during the decades in the middle and latter 20th century. But it is also obvious that such types of frameworks are no longer efficient enough to classify the current vast number of emerging media that includes advanced mass media and ICTs. Media determinists think that all kinds of media must be extensions of the human body, in other words, ways of self-expression. In this perspective, technology is always defined as a "given" thing, and thus it is hard to examine the degree of participation of ordinary people within the technological innovation. In the ICT area, innovation and user participation are both indispensable aspects to examine its social impact. Therefore, we have to think that media determinism is not sufficient to become a basis of our media life cycle framework.

On the other hand, Rogers (1986) has also tried to build a new framework of media classifications based on his diffusion theory. He thinks media and technologies should be "variables" in human and organizational communications, instead of a "given" thing. This approach is more efficient to include any

emerging technology, because we can add a “variable” of communications on the same framework when one new medium emerges. In this article, we basically adopted his approach and tried to widen the map to include the latest situation by adding current ICT analyses. However, Rogers did not sufficiently analyze the dynamics of technological replacements in the media innovations, because in the 1980s and the beginning of the 1990s, no ICT was powerful enough in our society to encompass the conception of the media life cycle. As we showed with a variety of empirical survey results, today we can observe a clear signal of the replacement phenomena between old and new media. Therefore, we can build this media life cycle framework in this article.

By using our framework of the media life cycle, we can foresee the future changes of our communication behavior, both in the sphere of mass media and the sphere of personal communication. In the sphere of personal communication, mobile e-mailing is now replacing voice communications through telephones. In other words, Generation D media can replace Generation B media, while Generation D media can coexist with Generation C media. At this point, this replacement phenomenon appears only in Japan. But in the near future we may observe a similar transition in other countries in proportion to the technological innovation in mobile e-mailing. On the other hand, in the sphere of mass media, we do not observe a similar phenomenon at this point. But according to this theory, Internet portals (Generation D in the sphere of mass media) can replace radio broadcasting (Generation B in the sphere of mass media) in the near future in proportion to the technological innovation. For example, the distribution of new songs from music creators to ordinary listeners, one of the important functions of radio broadcasting, is now being replaced by MP3 music file sharing through a certain kind of Internet portal. In fact, the current MP3 controversy has been caused by a threat against new technology among present media business, not by any theoretical correctness, or any change of the ways of self-expression among music creators. In other words, the anticipation of the media replacement between Generation D and B even in the mass media sphere is already shared widely among many people.

Method 2: A Comparison of 2002 with 2003 in Japan

Our next goal is to distinguish the exact user cluster that leads to innovation in the media life cycle. In this section, we especially focus on Japanese mobile e-mail usage as a good example of the forefront of media innovation. By investigating the forefront of the innovation in detail, we can understand what the innovation of media is.

We conducted a small, preliminary survey in 2002 that had the same questions as the MLS in 2003. Both surveys asked respondents about electronic communications with family members, all of which can represent typical communication patterns in a daily life. By comparing the two-year survey results, we can empirically distinguish one user cluster from another to determine who led the innovation from voice communications to mobile e-mailing. The preliminary survey was taken only by Japanese people aged 18-29. Then we selected a similar respondent bracket in MLS to compare results as precisely as possible.

Table 4 indicates the comparative results of the same question, in the preliminary survey in 2002 and MLS in 2003, regarding the communication rate with six family members using electronic communication means. Here it excludes any face-to-face communication. Due to a slight difference between survey methodologies from 2002-2003, the reactions in 2003 seem to indicate a reluctance to provide information. But, as a whole, we find little difference between the two survey results. The order of the surveyed family members by the communication rate in both survey results is completely the same, and the communication rates

Table 4. Communication rate, using electric communication means in daily life, with family members in Japan (in %)

Person with whom the respondent communicates	Communication rate in each year	
	2002 (n = 89)	2003 (n = 200)
Mother	82.9	81.0
Father	57.3	55.0
Sister	48.0	45.0
Brother	47.3*	31.5*
Spouse	43.7*	29.0*
Cousin	10.9	15.5
M	48.4	42.8
SD	21.2	21.1

Note. All numbers of comparison data between 2002 and 2003 above are tested by the parametric statistical test – T-test. * $p < .05$.

themselves have not changed greatly during 2002 and 2003. It is interesting to note the correlation between the order of family members surveyed and the descending level of their response rate. We can say that, in general, the condition of Japanese communications, using electronic means, among family members has remained unchanged.

On the assumption that the general condition of Japanese communications is unchanged, in Method 2, we wanted to see whether there was any local change in the usage rate among family members during the period. If we could observe that, we would be able to identify the forefront of media replacements along with the media life cycle framework. In other words, who led it, and how did they do this?

Result of Method 2

In this section, in order to make all analyses simple and clear, we examined the survey results based on communications with four major family members, mother, father, brother, and sister, and by four typical electronic communication means; calls on fixed phones, calls on mobile phones, e-mail via PCs and PDAs, and e-mail via mobile phones. Table 5 and Table 6 indicate usage rates for all combinations of family members by communication means. Table 5 shows changes between 2002 and 2003 among male respondents, and Table 6 shows the same result among female respondents.

In Table 5, we notice that calls on mobile phones to brothers significantly decreased during the period of 2002-2003, while there seemed to be no significant change in other respects. On the other hand, in Table 6, we find a couple of significant changes and some interesting tendencies in female usages; calls on mobile phones to both parents tended to decrease, while e-mail via mobile phones with both parents and sisters tended to increase. E-mailing via PCs and PDAs significantly decreased. The means and the standard deviations are indicated in Table 7.

Table 8 focuses on the increase or decrease of each communication means by measuring the average usage rate of each communication means in total amount of usage with four family members. The average usage rate of a communication means x , $AUR(x)$, is defined as:

$$AUR(x) = \frac{1}{n} \sum_{h=1}^4 u(x, h) \quad (1)$$

Table 5. Comparison of communication media usage between 2002 and 2003 in Japan (in %): Male

Person with whom the respondent communicates	Communication rate		Number of respondents	
	2002	2003	2002	2003
Calls on fixed phones				
Mother	38.7	33.2	31	78
Father	43.5	32.1	23	56
Brother	10.0	10.3	20	29
Sister	6.3	24.4	16	41
Calls on mobile phones				
Mother	45.2	42.3	31	78
Father	47.8	44.6	23	56
Brother	60.0*	24.1*	20	29
Sister	37.5	24.4	16	41
SMS or email via mobile phones				
Mother	12.9	20.5	31	78
Father	4.4	10.7	23	56
Brother	25.0	48.3	20	29
Sister	50.0	39.6	16	41
Email via PCs or PDAs				
Mother	3.2	1.3	31	78
Father	4.4	9.3	23	56
Brother	5.0	10.3	20	29
Sister	6.3	4.9	16	41

Note. All numbers of comparison data between 2002 and 2003 above are tested by the parametric statistical test – T-test. * $p < .05$.

Table 6. Comparison of communication media usage between 2002 and 2003 in Japan (in %): Female

Person with whom the respondent communicates	Communication rate		Number of respondents	
	2002	2003	2002	2003
Calls on fixed phones				
Mother	39.5	42.9	35	84
Father	28.6	29.6	28	54
Brother	0.0	5.9	22	34
Sister	11.1	10.2	25	49
Calls on mobile phones				
Mother	44.2	28.6	35	84
Father	53.6	31.5	28	54
Brother	27.3	26.5	22	34
Sister	14.8	8.2	25	49
SMS or email via mobile phones				
Mother	14.0	25.0	35	84
Father	7.2*	33.3*	28	54
Brother	36.4	52.9	22	34
Sister	59.3	73.5	25	49
Email via PCs or PDAs				
Mother	2.3	1.2	35	84
Father	10.7	3.7	28	54
Brother	36.4*	11.8*	22	34
Sister	14.8*	2.0*	25	49

Note. All numbers of comparison data between 2002 and 2003 above are tested by the parametric statistical test – T-test. * $p < .05$.

Table 7. Means and standard deviations in Tables 5 and 6 (in %)

Male						
Person with whom the respondent communicates	Means and Standard Deviations				Number of respondents	
	2002		2003		2002	2003
	M	SD	M	SD		
Mother	25.0	17.4	25.0	12.0	31	78
Father	25.0	20.7	25.0	15.0	23	56
Brother	25.0	21.5	25.0	15.6	20	29
Sister	25.0	19.2	25.0	12.4	16	41
Female						
Person with whom the respondent communicates	Means and Standard Deviations				Number of respondents	
	2002		2003		2002	2003
	M	SD	M	SD		
Mother	25.0	17.4	25.0	15.0	35	84
Father	25.0	18.4	25.0	12.1	28	54
Brother	25.0	14.9	25.0	18.2	22	34
Sister	25.0	19.9	25.0	29.1	25	49

where $u(x, h)$ is the response number of the communication means x with the family member h ($h \leq 4$), and n is the sum of each number of effective respondents for four questions: communication with mother, father, brother, and sister. The number of $AUR(x)$ indicates the average degrees of presence for the communication means x when a person communicates with all family members. By comparing the $AUR(x)$ in 2002 with that in 2003, we can directly understand the change of presence for the communication means x in ordinary life during the period.

Table 8. Change of communication media usage pattern between 2002 and 2003 in Japan (in point)

Communication means	Communication rate			
	Male		Female	
	2002 (n = 90)	2003 (n = 204)	2002 (n = 110)	2003 (n = 221)
Calls on fixed phones	27.8	27.9	22.7	26.7
Calls on mobile phones	47.8	36.8	36.4*	24.4*
SMS or email via mobile phones	20.0	25.5	27.3*	42.1*
Email via PCs or PDAs	4.4	5.4	14.5**	3.6**
M	25.0	25.0	25.0	25.0
SD	15.6	11.5	7.9	13.7

Note. The numbers of respondents in this table indicate the sum of each number of respondents for four questions (communication with mother, father, brother, and sister). All numbers of comparison data between 2002 and 2003 above are tested by the parametric statistical test – T-test under the total numbers of respondents. * $p < .05$, ** $p < .01$.

With regard to calls on fixed phones, there is no significant change. In Method 1, we argued that in Japan, calls on fixed phones are already less popular than those in other countries. However, the result of Method 2 implies that the decline of calls on fixed phones in Japan is not the most current incident. Conversely, it is interesting that, among female respondents, calls on mobile phones significantly decreased, which implies that the forefront of the voice communications decline has started shifting from fixed phones to mobile phones.

On the other hand, we can find very important differences by gender with e-mail communications. With regard to mobile e-mail, we can find a significant increase among female respondents, while e-mail via PCs among female respondents is significantly in decline. Among male respondents, we cannot find significant change of e-mailing behavior via either mobile phones or PCs.

As a whole, this result of Method 2 strongly implies that women in Japan lead the shift of the communication media cycle from voice communications to mobile e-

mailing. Among male respondents, we can only observe a tendency of decrease regarding calls on mobile phones, but among female respondents we can observe both a tendency of decrease and a tendency of increase. This fact means that among male respondents the replacement of communication media has just started recently, but among female respondents the replacement is already in progress. Thus, female respondents are in a more advanced stage of the media life cycle.

From an ethnological viewpoint, this tendency has been argued widely in the Japanese mobile phone industry. Since the late 1980s and the beginning of the 1990s, Japanese social ethics regarding female lifestyles have drastically changed and been liberated, as many women are encouraged to have full-time jobs, instead of staying home as housewives. Mobile phones are considered very useful tools to maintain family communications even though women go out frequently. Young girls are ordinarily allowed to stay with their friends until late at night if they make calls or e-mail via mobile phones to their mothers. The sense of “always being linked” caused by a wide penetration of mobile phones is becoming a new social norm in Japan. Many Japanese sociologists say that this new social norm concerning mobile phone usage may generate a new shape of family relations in Japanese society. Japanese women are no longer tied to their family and houses, and owning mobile phones encourages this new ethic. That is why, for women, mobile phones are considered as a symbol of freedom of lifestyle.

Conclusion and Discussion

In this chapter, we started our exploration from the rapid and wide penetration of new communication means such as mobile phones and e-mailing through the Internet. Based on an empirical survey in five countries, (MLS), we examined one of the forefront phenomena of the media life cycle in Japan, in which voice communications are gradually being replaced by mobile e-mailing communications. This discovery of media replacement from an old one to a new one in the Japanese personal communication sphere, and the framework of the media life cycle imply other future media replacements, such as those in different countries or those in different spheres.

Next, we explored deeper details of the media innovation by examining a case of Japanese mobile e-mailing usage. The most significant finding is that, during the period between 2002 and 2003, ordinary female users clearly led media innovations, instead of, for instance, techno-fanatic male users. This implies that certain types of media innovation in Japan have been generated by consumers,

in other words, demand side, in which consumers can generate the innovation by choosing appropriate usage of new media in their daily lives, instead of creating new products or developing technologies.

Integrating two conclusions, we can say that the media life cycle is now being processed toward the next stage by the demand side, and during this process, new social norms with the new technology are generated among consumers. In this fashion, we can observe that the media innovation with new technologies is not deterministic, and mobile e-mailing can replace the conventional voice communication by phones, which is an unexpected trajectory of the ICT future for some techno-fanatic analysts.

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Appendix

The Source of Method 1:

Survey name: *Media Landscape Survey 2003-2004* (MLS)

Survey countries, the effective sample populations: 850 samples in the U.S. (east coast), 400 samples in Japan, 177 samples in The Netherlands, 351 samples in Sweden, 400 samples in South Korea, and 400 samples in China (Shanghai area): total 2,578 samples

Respondents: ordinary people who are interested in digital communications, aged 15-34

Sampling procedure: Internet panel survey method, provided by professional survey companies, was used in the U.S., Japanese, Swedish, South Korean, and Chinese surveys. In The Netherlands, a multi-stage recruiting method was used. In the United States, parental permissions had been taken to conduct the survey among respondents aged 15-18.

Response rate: Due to the nature of Internet surveys, it is difficult to fix the precise response rates. However, the average response rate in this Internet survey system is reported as 15-25%. In The Netherlands, the response rate was 25.3%.

Survey date: Oct. 2003 to Mar. 2004

Measurement of reliability: All numbers of data in Method 1 are verified that they have significant differences against each average with the significance level $p < .05$, in the parametric statistical test—Dunnnett test (multiple comparison).

The Source of Method 2:

Survey in 2002 (preliminary survey):

Respondents: Men and women aged 18-29 living within a 40km radius of the Tokyo metropolitan area

Sample population: 89 respondents (40 males and 49 females)

Setting and sampling procedure: Self-administered questionnaire mailed and left with members of a predetermined panel.

Response rate: 100% (predetermined)

Period: January 2002

Survey in 2003 (in MLS):

Respondents: Men and women aged 20-29 living in Japan

Sample size: 200 respondents (100 males and 100 females)

Setting and sampling procedure: Internet survey

Response rate: Due to the nature of Internet survey, it is difficult to fix the precise response rate. However, the average response rate in this Internet survey system is reported as 15-25%.

Period: November 2003

Measurement of reliability: All numbers of comparison data between 2002 and 2003 in Method 2 are tested by the parametric statistical test—T-test.