This is to certify that the
thesis entitled

VALUE NETWORK AND BUSINESS STRATEGY FOR MOBILE DATA THE MOBILE DATA MARKETS IN KOREA, JAPAN, THE U.K., AND THE U.S.

presented by

Yu-Chieh Lin

has been accepted towards fulfillment
of the requirements for the

M.A. degree in TELECOMMUNICATION, INFORMATION STUDIES AND MEDIA

Major Professor's Signature

12/12/03

Date

VALUE NETWORK AND BUSINESS STRATEGY FOR MOBILE DATA
THE MOBILE DATA MARKETS IN KOREA, JAPAN, THE U.K., AND THE U.S.

By

Yu-Chieh Lin

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

MASTER OF ARTS

Department of Telecommunication, Information Studies, and Media

2003

ABSTRACT

VALUE NETWORK AND BUSINESS STRATEGY FOR MOBILE DATA
THE MOBILE DATA MARKETS IN KOREA, JAPAN, THE U.K., AND THE U.S.

By

Yu-Chieh Lin

This thesis attempts to use the value network model as a research framework to analyze the market structure and the business strategy in the four mobile data markets: Korea, Japan, the United Kingdom, and the United States. The research goal is to find out the significant differences among these four cases and how these differences influence market development from interview conducting and publicly available resources. More emphases are put on the mobile network operators (MNOs) than other players since they have the greatest influence on the market. MNOs' interaction with their partners, core capabilities, and value creation is the main study focus.

Several differences are revealed from the information collected: the overall model of the value network, mobile network operators' market share and business strategies, the relations between mobile network operators and other players, the value created in the market, the policy framework, and the cultural and social factors. With these differences, the four markets thus exhibit diverse market structures and performances.

ACKNOWLEDGMENTS

It was tough work for me to write this thesis. The thoughts of giving up came to my mind lots of times in the past year. Fortunately, there were so many wonderful people giving me help and encouragement, so I could get my thesis done at last.

Professor Johannes M. Bauer was the person who I want to thank the most. He was an excellent teacher in advising me how to do research and write an academic work. Besides, he was always so patient with listening to me, answering my questions, and giving me feedback about my writing. Working with him was one of the greatest experiences I had in MSU. I also want to thank Professor Charles Steinfield and Professor Dan Jong Kim for their valuable suggestions on my thesis.

Many people gave me emotional support and helped me through some bad time. I was very grateful to them; especially to my parents, Mao-Yu, Pinjia and Kevin. Even though they were far away from me, their lovely care made me feel nice and warm. I was also grateful to have Lois, Roy, Nate, Julie, and the MSU Writing Center help me with my presentation and English writing.

Finally, I would like to express my appreciation to several experts from SK Telecom and KT Freetel for their assistance. They provided me much useful information for my study. Without their generous help, I would have had to spend an even longer time and greater energy in this study.

Thank you all, truly and sincerely.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Chapter 1

Introduction

I. Research Motivation

More and more people are longing to gain useful information and obtain better communicational systems. Throughout history, people have been seeking faster and more convenient approaches to mass and personal communication. Different kinds of media were invented in different time periods, and they have evolved into being essential parts of our lives, such as newspapers, magazines, radio, movies, TV, and Internet. Mobile technology is one of the significant approaches of communication. Mobile services have been used since the early 1900s. In the 1980s, cellular voice services started to grow quickly. Even though mobile was used for voice transmission only in the beginning, it was expected to become an advanced multi-medium that can carry all kinds of data. The first step of this goal was made by the International Telecommunication Union (ITU). In 1985, it began planning the next generation of digital cellular system: the Future Public Land Mobile Telecommunications Systems (FPLMTS). FPLMTS is known as IMT-2000 today (Nokia Networks, 2001). The necessity of mobile data was justified later by the popularity of the Short Messages Service (SMS) and NTT DoCoMo's i-mode service. Then more attention was attracted to the 3G service, due to the astonishing bidding price for 3G license auctions in some European countries. However, the Internet bubble and economic recession slowed down the development of mobile data in some countries, especially in Europe. Whether mobile data have a bright future and how they can develop successfully became the popular issues argued by experts with different opinions.

I chose mobile data to be the subject of my study because its prevalence may allow

people to access the information highway at any time and from any location. Not only can mobile data enrich our lives, but it also can shorten the distance between people, and perhaps even between cultures. However, the complexity of technology, market management, and regulation issues in the mobile data market make it difficult to fully utilize mobile data and accomplish these dreams. Many technical and non-technical difficulties need to be overcome, such as the problems of roaming between different systems, the drawbacks of mobile handsets' small screen and limited keys, unfinished exploration for the killer applications, the financial burden caused by the upfront investments, and an immature market structure.

Instead of trying to address all these problems, I will focus on aspects of market structure and the interaction between different players because a sound environment for service creation and distribution is essential for successful industry development. Given the different skills needed, it is unlikely that mobile data and services can be created by one company alone. Rather, many players will be involved, such as content providers (CPs), content intermediaries, application service providers (ASPs), mobile network operators (MNO), mobile virtual network operators (MVNOs), handset manufacturers, network equipment manufacturers, and standard developers. Together, they form an industry network which is more complicated than previous mobile industries or the fixed Internet industry, therefore resulting in the complexity of the mobile industry. To meet customers' needs for the mobile data, players must contribute their expertise and cooperate with one another to ensure quality services and smooth delivery. These aspects will be studied later.

The structure of this thesis is as follows: In chapter two, I will develop a theoretical framework using the concepts of value chains and value networks, and propose the

research strategy for the study. In chapter three, I will describe the context of the mobile data markets, which includes the development of mobile technology and services as well as the critical policy issues. In chapter four, I will use the research framework to analyze two case studies for Korea and Japan. In chapter five, I will present case studies for the U.K. and the U.S. In chapter six, I will examine the differences among the four cases, the findings of my research, and the conclusion.

II. Research Methodology

To examine the market structure and the essential factors of market performance, I utilize the value network model as the framework of my study. The value network model is an analytical tool for understanding the significant interactions in markets. I intend to apply this model on my research to explore the following questions:

1. The status quo in 2003 of the industry structures and value networks in the selected mobile data markets
2. The essential differences between these mobile data markets
3. How those differences influence market performance
4. The advantages and disadvantages of different value networks

This research represents a multiple-case study design. Since the case study method is criticized as being not amenable to generalization (Wimmer & Dominick, 2000), diversity of case selection helps to shed light on the broader range of countries and to find the key factors encouraging the development of mobile data. Four markets were chosen for this research– Korea, Japan, the U.K. and the U.S. Not only are they in different geographic areas, but also in different stages of mobile data development. Korea and

Japan have very successful mobile data markets and took the lead in the service and network development. They may serve as examples of relatively mature mobile data markets. The U.K. is one of the pioneers in the European mobile data markets, but suppliers are still struggling to find good approaches to sell the new services. As for the U.S., it does not yet have broad experience in advanced mobile data services and is still in the take-off stage compared to the other three markets.

Four strategies were applied to collect the information required for this research:

1. Literature review: This includes books, periodicals, academic papers, research reports about the development of the mobile data market, and significant statistics, such as mobile penetration and Average Revenue Per User (ARPU).
2. Supplier information: Important information was collected from business reports, operators' company and service websites, and operators' press releases.
3. Business news: Since the mobile data services are new and in flux, it is essential to follow daily news and every event about this industry. Daily news and news analyses from telecommunications news websites (ex. www.totaltele.com and www.the3gportal.com) were utilized to track current developments.
4. Intensive interviews: Given the constraints of an MA thesis, I could not conduct interviews with every mobile data company. Therefore, my work is based on convenience samples. I interviewed several experts from KTF (KT Freetel) and SK Telecom. For those who were in the U.S., personal interviews were conducted. For those who were in Korea, e-mail interviews were conducted. The interviews were conducted by asking open-ended questions (see appendix). After the respondents answered those questions, follow-up questions were asked to acquire more in-depth

information where needed. All of those interviews were conducted from June to August 2003. In the other cases, a strong effort was made to collect comparable information from publicly available sources.

Chapter 2

Literature Review and Research Framework

I. Literature Review

In this part, some literature which is helpful to develop the research framework will be reviewed. First, I will discuss the concept of value creation. Second, I will review the value chain model. Third, I will describe an expanded model of the value chain---the value network concept. Lastly, I will briefly examine the findings of related research that also apply the value chain or value network model.

A. Value Creation

Value is essential to any firm. It is what a firm wants to create, supply and benefit from. It seems reasonable to postulate that most firms pursue the goal of profit optimization. This goal is intricately related to value maximization. Even though shareholders' perspective on value may differ from customers', they must consider customers' value carefully to optimize profit.

Different definitions were developed for the concept of value. Some definitions stress cost and price. Anderson and Narus (1998), quoted in Evans and Berman (2001), state that "Value in business markets is the worth in monetary terms of the technical, economic, service, and social benefits a customer company receives in exchange for the price it pays." Walters and Lancaster (1999) define value as "the utility combination of benefits delivered to the customer less the total costs of acquiring the delivered benefits." Some definitions concern the comparison with competitors. Porter (1995) states: "Value is what buyers are willing to pay, and superior value stems from offering lower prices

than competitors for equivalent benefits or providing unique benefits that more than offset a higher price." Kothandaraman and Wilson (2001) say, "Value is the relationship of a firm's market offering and price weighed by the consumer against its competitor's market offering and price." Sometimes the value can be conceptualized as consumers' satisfaction instead of price. Walters and Lancaster (1999) bring up the concept of the relative value and define it as the perceived satisfaction obtained (or assumed available) from alternative value offers.

B. Value Chain

The value chain can be regarded as a chain of processes for creating and delivering value. Porter is the person who first introduced the value chain model as an analytic tool to examine the activities in a firm. He says: "The value chain disaggregates a firm into its strategically relevant activities in order to understand the behavior of costs and the existing and potential sources of differentiation" (Porter, 1995). He claims a value chain can represent all the value activities that are performed to design, produce, market, deliver, and support its product (Porter, 1995) and also analyze how they affect both a company's costs and the value delivered to buyers (Porter, 2001). Instead of viewing a value chain just as the total of all the value creating activities, he pays detailed attention to the linkages and interaction within these activities.

The value chain model has been broadly adopted by other scholars in business studies since it is systematic and efficient, but some critics pointed out that the value chain analysis could not be applied to real business environments very well. First, value creation does not happen sequentially but concurrently (Vesa, 2003). But Vesa argues that Porter did realize the limitations of the sequential approach and thus the value chain

model just needs some revisions to be more applicable. Second, the value chain model was originally developed for a firm-level analysis. However, firms usually do not operate in isolation. They need partners to add value-creation ability and must be able to manage these partnerships so that each partner profits from being within the partnership (Kothandaraman & Wilson, 2001). For improving those limitations, a wider approach for an industry-level analysis has been developed----the value network model.

C. Value network

The concept of value network broadens the scope of what the value chain exams. Li and Whalley (2002) see the value network as a series of inter-twined value chains where some nodes are simultaneously involved in more than one value chain. A similar term, value chain networks, also is used for explaining the same idea. Srinivas & Sarkis (1999) used VCNs to describe how network organizations, virtual corporations and value adding partnerships are envisioned by experts as solutions for rapid introduction of a variety of products while maintaining quality and low costs (quoted in Olla & Patel, 2002). Snow (1992) pointed out the VCN model is a dynamic model. In the dynamic networks, there are a group of independent companies. The lead firm acts as a broker to identify the potential partners who own a large or sometimes the entire portion of the network (quoted in Olla & Patel, 2002). Olla & Patel (2002) state: "The VCN is an alliance of independent business enterprises each contributing core competencies in their various areas of expertise."

Kothanddaraman & Wilson (2001) proposes another term--- value-creating networks. In this approach, "firms are moving into an environment in which they will not compete against each other but will become a member of a network of firms that will compete

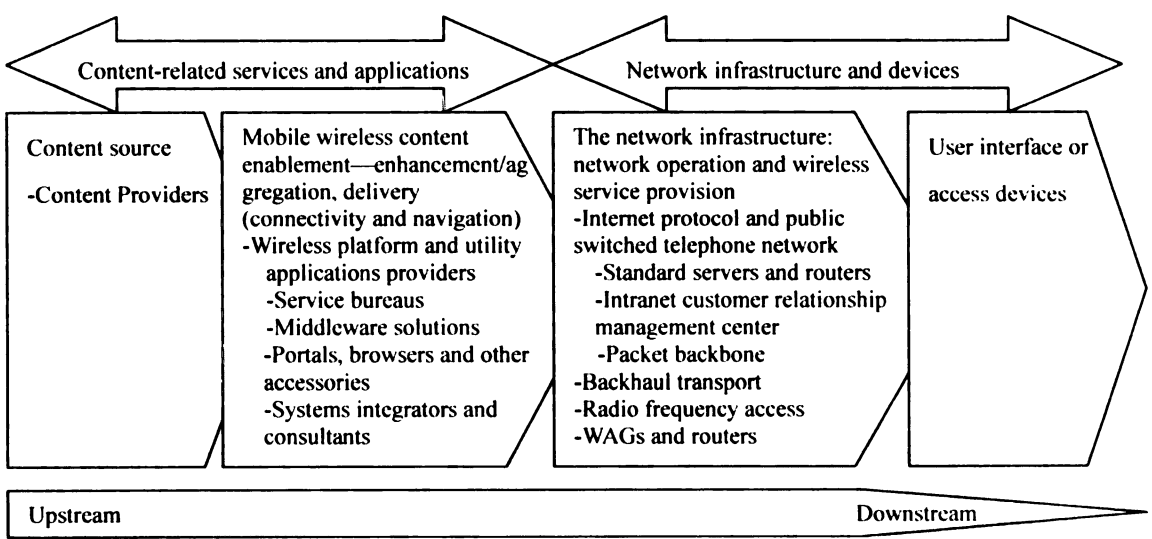
against another network of firms." These sets of firms are value-creating networks since they are assembled for creating value. How they perform in the industry is determined by the three core concepts: relationships, superior customer value and core capabilities. More details of this model will be discussed later in this chapter.

Steinbock (2002) adopts the term " value system" in his study. The value system model contains the concepts of value chains and vertical systems. For example, a firm's value relationships are embedded in a larger flow of activities in the wireless industry can be called the wireless value system. He looked into the industry value system because "Achieving, sustaining, or renewing strategic advantage depends not just on an individual firm's value relationship, but on its role in the broader value system." He also points out that the value systems are not steady and linear, but dynamic and changeable.

D. Findings of related research

The value chain and value network models have been used to study mobile markets and provide insights into their unique features.

Figure 2.1: The Mobile Wireless Value Chain

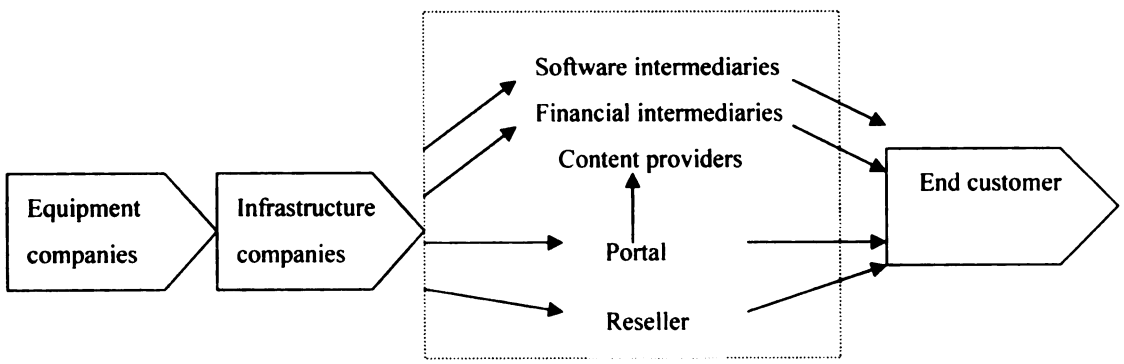


Source: Sabat, 2002

Sabat (2002) established a mobile wireless value chain according to the involved players' offerings to the industry (see Figure 2.1). The value chain includes two broad segments: content-related services and applications, and network infrastructure and access devices. The content-related segment provides upstream activities which include content, applications, and a wireless platform. The network-related segment provides downstream activities. It operates the network, provides the access devices, and enables the smooth connection between network and devices.

Li & Whalley (2002) interpret the value chain for telecommunications in a different way. They identify three routes connecting equipment and infrastructure companies with the end customer: software and financial intermediaries, portal and content providers, and reseller (see Figure 2.2).

Figure 2.2: Deconstruction of the Telecommunications Value Chain

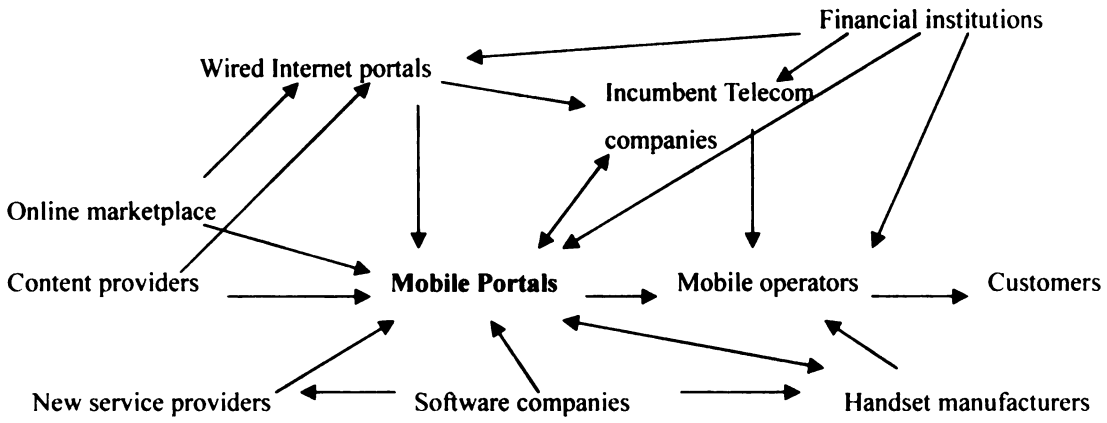


Source: Li & Whalley, 2002

With increasing complexity in the telecommunications industry, the linear value chain has been transformed into a value network containing a series of intertwined value chains. Li & Whalley (2002) also argue that the transformation from value chains to value networks

is not only evident in the whole telecommunications industry, but also in some sub-markets. Therefore they develop a value network model to analyze the business model of the mobile portals market (see Figure 2.3). The interaction of player and users of the mobile portals are depicted in this value network.

Figure 2.3: The Value Network of Mobile Portals



Source: Li & Whalley, 2002

Steinbock (2003) suggests a value system model for analyzing the wireless business. Instead of observing the industry at some fixed time, he puts more attention on how the industry changes over time and sees the wireless business as a dynamic system that includes three stages: monopoly, transition, and competition. The monopoly stage contains the pre-cellular phase (pre-1983) and the 1G era (1983-1992). The great transition stage is the 2G era (1992-2001), and the competition stage starts from the 3G era (2001-present). He adds the concept of evolution to the value system and makes a comparison between the value chains in different stages. For example, in the

2G-transition stage, there were only contract manufacturers, equipment manufacturers, and network operators. But when it comes to 3G-competition stage, the system becomes more complicated and includes contractors, equipment manufacturers, platforms, enablers, content aggregators, retailers, and network operators.

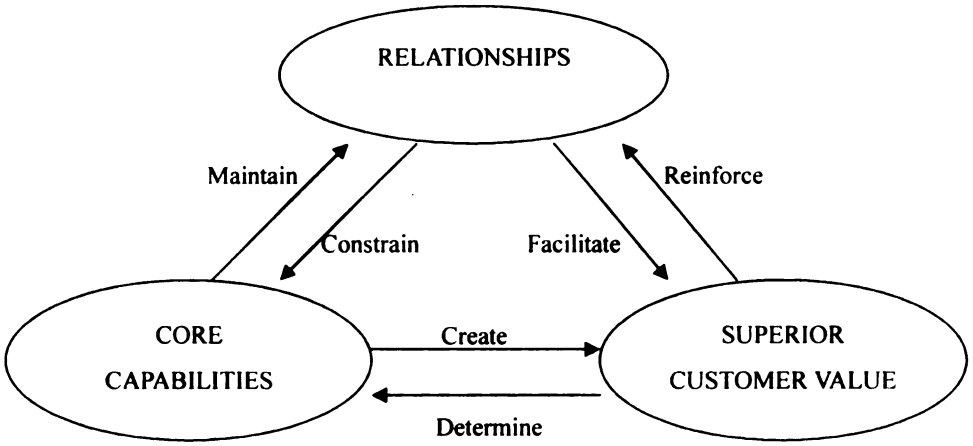
II. Research Framework

As new services are launched and new players become involved in the market, the mobile data industry is getting more and more complicated. To have a broader view to examine the crucial complexity in the industry, a value network model is adopted as the research framework. How the value network is organized is a primary and essential question to figuring out at first. In most mobile markets, the mobile network operator (MNO) is an industry organizer and acts as a broker (Snow, 1992). It invites other players to contribute their core capabilities for creating value and supervises this ecosystem. Therefore, this study will focus more on the MNO while examining the value network.

Kothandaraman & Wilson's (2001) value-creating network model will also be used as an analytic tool to understand the value networks (see Figure 2.4). There are three core concepts included in this model: superior customer value, core capabilities, and relationships. These three concepts have deep and reciprocal influence on one another. Core capabilities of the member firms in the network are helpful in creating superior customer value. On the other hand, the core capabilities of the firms are also influenced by customers' value, to which the firm needs to respond. Superior customer value will also be facilitated by the good relationships between member firms. If superior customer value is produced, the existing relationships will be reinforced. Besides facilitating customer value, the quality of relationships also helps member firms to continue to

maintain and improve their core capabilities. If the firms have sufficient core capabilities, it will be beneficial to keep the good relationships with other firms.

Figure 2.4: A Model of Value-creating Networks

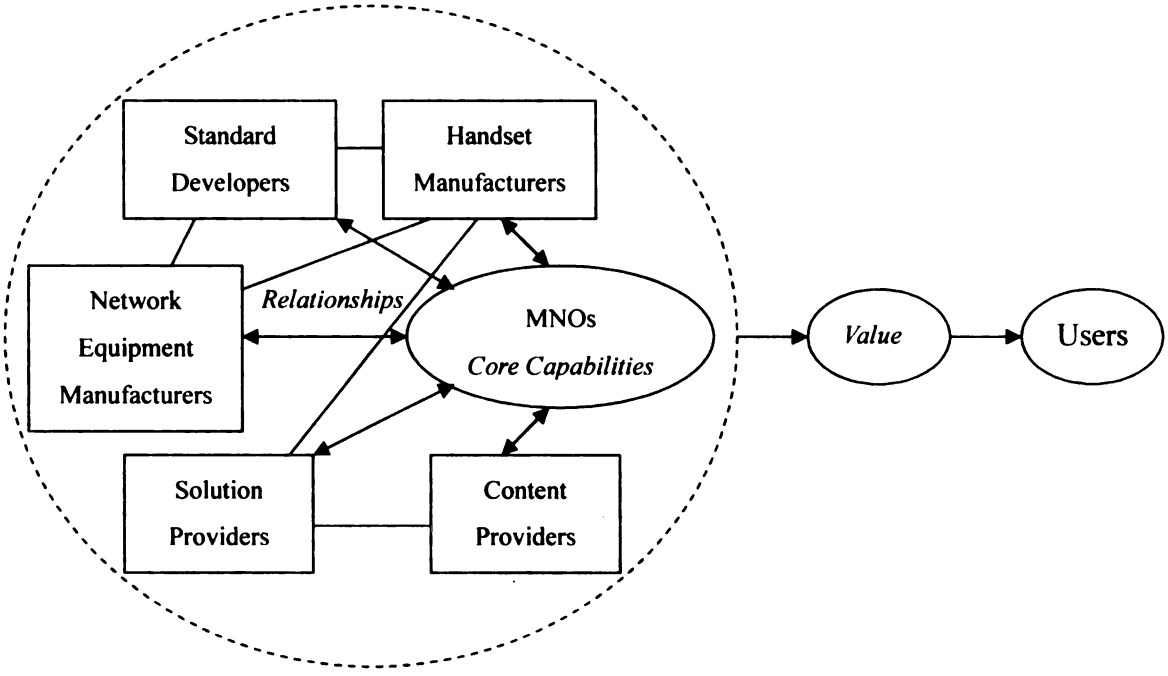


Source: Kothandaraman & Wilson, 2001

Combining the value network model and three value-creating concepts, a basic framework for analyzing the mobile data market is formed as Figure 2.5. Instead of looking into every player's core capabilities and the relationships between every player, I will just focus on MNOs' core capabilities and their linkages with their partners since they have the greatest influence on the market according to the result of literature review. The next step is to see what kind of value MNOs create for the customers and how they deliver the value. In my study, I regard the mobile data services provided as the value created since they are the output from the cooperation of every company in the industry network. As for the strategy for delivering value, the mobile data tariff is the key dimension that needs to be looked into. Because the variety and quantity of services the customers can get depends on the price plans they subscribe, the mobile data tariff is a

key aspect of the service provided.

Figure 2.5: A Framework for the Mobile Data Value Network



Source: Partially adapted from ITU Internet Reports, 2002

Chapter 3

Context of the Mobile Data Markets

I. Development of Mobile Data Communication

A. First generation services

During 1970s and early 1980s, cellular systems used analog signals for voice transmission. They were the first generation systems of the mobile evolution. The most common analog cellular systems were Advanced Mobile Phone System (AMPS), Nordic Mobile Telephone (NMT), and Total Access Communication System (TACS). AMPS was the first and most used cellular analog system. It was developed by AT&T and first applied in the U.S. NMT was developed by the Nordic countries and also applied by some Asian and Eastern European countries. TACS was developed by the U.K. and also applied by some Asian countries.[1]

The analog cellular systems were mainly used for voice service, but the voice quality was bad. In addition, the analog cellular systems were not suitable for developing a data service due to the slow transmission rate. These major drawbacks caused analog cellular systems fail to be an ideal communication technology.

B. Second generation services

The most significant difference between the first and second generation of cellular systems is the signals used for conveying information. The 2G cellular systems are digital, not analog. In the 1980s, digital cellular systems were first developed and gradually replaced analog cellular systems since its first launch in 1992. The 2G systems include

---

[1] Source: ITU, http://www.itu.int/osg/spu/ni/3G/technology/index.html, 2002
The sections about first, second, and third generation services refer to this source greatly.

Global System for Mobile Communications (GSM), Time Division Multiple Access IS-136 (TDMA IS-136), Code Division Multiple Access IS-95 (CDMA IS-95), Personal Digital Cellular (PDC), and Personal Handyphone System (PHS).

GSM is the European 2G standard but also applied by many other non-European countries. It is the most successful cellular system ever and is still in common use. At the end of April 2003, there were 847.3 million GSM subscribers. They accounted for 70.4% of all the wireless systems subscribers in the world.[2] GSM uses the frequency of 800 MHz, 900 MHz, 1800 MHz and 1900MHz. Most of the subscribers are using GSM 900 or GSM 900 plus GSM 1800.[3]

TDMA IS-136 used to be called Digital-Advanced Mobile Phone Service (D-AMPS). It is the upgrade system of AMPS, and uses the same frequency as AMPS.[4] It applies TDMA technology on AMPS to triple the number of channels, so it can increase the capacity of one original channel.[5] It is the dominant cellular system in the United States and also adopted by many other countries. In April 2003, there were 110.4 million TDMA IS-136 subscribers in the world.[6]

Rather than using TDMA technology like GSM and TDMA IS-136, CDMA IS-95 uses the method of assigning digital codes for improving the efficiency and capacity of a channel. According to the EMC World Cellular Database, CDMA systems accounted 13.1% of global wireless subscribers in April 2003.[7]

---

[2] Source: EMC World Cellular Database, http://www.emc-database.com, 2003

[3] Source: EMC World Cellular Database. There were 426.2 millions of worldwide GSM 900 users, 298.01 millions of GSM 900/1800 users, and 0.0233 millions of GSM 900/1900 users in 2003.

[4] AMPS uses the frequency between 800 MHz and 900 MHz

[5] Source: Search Mobile Computing, http://searchmobilecomputing.techtarget.com/search/1,293876,sid40,00.html?query=D-AMPS, 1999

[6] Source: EMC World Cellular Database, 2003

[7] There were 157.9 million CDMA subscribers while there were 1202.8 million wireless subscribers in the world in 2003.

PDC was introduced to Japanese cellular market by NTT DoCoMo in 1991. Like GSM and TDMA IS-136, it is based on TDMA technology. It was mainly used in Japan and accounted 5.1% of wireless subscribers in the world.[8]

PHS was also developed by NTT DoCoMo. It can provide the high-quality voice communication and the cheaper price than PDC. Comparing to other cellular systems, it is suitable used in the populous metropolitan areas since it has the flaw of the shorter transmitting distance and the need of more base stations in the same area. The PHS subscribers around the world were approaching 20 million.[9]

The 2G cellular systems above are still mainly used for voice communication. As for the 2G data services, the most popular services are SMS, E-mail, and Microbrowser. However, 2G data services have different development results in different countries. For example, i-mode is a very successful microbrowser service in Japan. It provides games, music, news, and shopping services. In Europe, the Wireless Application Protocol (WAP) also provides the similar services, but it ended up with failure.

C. Current era--the third generation

i) Transitional stage to 3G

Between 2G and 3G, there is an intermediary step, which is called 2.5G. The transmission rate of the 2.5G systems is slower than the 3G systems, but is much faster than the 2G systems.[10] Therefore, 2.5G is sometimes regarded as an early stage of 3G. The most common 2.5G technologies are CDMA2000 1X (also known as CDMA2000 1XRTT),

---

[8] According to EMC Worldwide Cellular Database, there were 61.7 million PDC subscribers in April 2003.
[9] Source: PHS MoU Group, http://www.phsmou.org, 2003
[10] In terms of comparison between GSM and GPRS, the transmission rate of GPRS (64~115Kbps) is four to eight times faster than GSM(14.4Kbps). In terms of comparison between IS-95B and CDMA2000 1X, the transmission rate of CDMA2000 1X (153~614Kbps) is two to nine times faster than IS-95B(64 Kbps).

GPRS (Global Package Radio Service) and EDGE (Enhanced Data for GSM Evolution).

CDMA2000 is the mobile communication standard developed by Qualcomm in the USA. CDMA2000 1X is one of the CDMA2000 standards. In Oct. 2000, the first CDMA2000 1X commercial system was launched by SK Telecom in South Korea and became popular. By the end of 2002, 57.7% of SK Telecom's 17.2 million subscribers used CDMA2000 1X services (SK Telecom Annual Report 2002). Next to SK Telecom, 45 operators across Asian, America, and Europe launched CDMA2000 1X commercial services during the following two and a half years.[11]

GPRS is the 2.5G standard in Europe and the upgrade of GSM. According to the GSM Association, GPRS is "a non-voice value added service that allows information to be sent and received across a mobile telephone network[12]." It is also applied by other non-European countries where GSM is the 2G standard and is the main competitor of the CDMA2000 1X standard. In mid-June 2003, there were 162 commercial GPRS networks. Most of them were in Eastern Europe and Asia.[13]

EDGE is another European 2.5G standard. Besides the advantage of transmitting data three times faster than GPRS,[14] it also provides the possibility to upgrade from both the GSM and TDMA (IS-136) networks. Therefore, EDGE is more attractive than GPRS to the operators who adopted TDMA-based system.[15] The first commercial EDGE service was launched by the U.S. wireless operator, Cingular, in July 2003.[16]

Due to the limitation of data transmission, a 2G network is mainly used for the text-only services, like SMS, text mail, text game and location based text information. A

---

[11] Source: CDMA Development Group, http://www.cdg.org/index.asp, 2003
[12] Source: GSM World, http://www.gsmworld.com/index.shtml, 2003
[13] Source: TOTAL TELECOM http://www.totaltele.com 01 July 2003
[14] The data transmission rate of EDGE is 144~384 Kbps.
[15] Source: THREE-G.NET http://www.three-g.net/, 2002
[16] Source: TOTAL TELECOM, http://www.totaltele.com 01 July 2003

2.5G network provides an increased data rate, and thus is suitable for both text and graphic transmission. Users can mail images, download music and video clips, access the World Wide Web or get other information that contains graphics over 2.5G networks.

ii) 3G technology systems

The concept of IMT-2000 (International Mobile Telecommunications-2000) was first discussed by the International Telecommunication Union (ITU) in the mid-1980s. In 1999, it was approved by the ITU to be the standard for the third-generation communication system. According to the ITU's decision, IMT-2000 includes five standards: CDMA2000, WCDMA, TD-SCDMA, UWC-136 and DECT+. Among them, CDMA2000 and WCDMA play the dominant roles in the current mobile data markets. All of the commercial mobile data services that have been launched are based on either the CDMA2000 or the WCDMA standard. Their potential competitor is TD-SCDMA (Time Division-Synchronous Code Division Multiple Access). It was co-developed by CATT (China Academy of Telecommunication Technology) and Siemens and may be applied by the world's largest mobile communication market--China. Yet, it is still far from the accomplished stage. The problem of connecting with other countries' networks will be an inevitable bottleneck for the network deployment. Moreover, both the CDMA2000 development group and the WCDMA development group are trying to persuade China to apply their standards. It is hard to anticipate the future trend at this moment.

The principal criterion the ITU uses for defining a 3G service is transmission speed. A 3G service must qualify the following requirements.

* 2Mbps or higher for stationary users and indoor environments

* 384kbps for pedestrians

* 144 kbps for high-speed moving vehicles

W-CDMA and CDMA2000 1XEV are the most two significant technologies that reach the standard of transmission rate.

W-CDMA is the European 3G standard. UMTS (Universal Mobile Telecommunication System) is synonymous with W-CDMA. It is the next generation for the GSM system, so it is also the best choice for operators of GSM networks.

CDMA2000 1X EV includes CDMA2000 1XEV-DO (Evolution-Data Optimized) and CDMA2000 1X EV-DV (Evolution- Data and Voice). CDMA2000 1X EV-DO is an upgrade of CDMA2000 1XRTT. Its transmission rate can be up to 2.4Mbps. As for EV-DV, it is a higher upgrade whose transmission rate can be up to 5.2Mbps. Still, no commercial services based on EV-DV have been launched so far (June 2003).

iii) Launch dates of 3G services

After the booming success of the Internet and mobile phone market, the telecom operators shifted their attention to the mobile data market. In 2000, European operators went wild for bidding on the 3G licenses. Bidders in the British auction paid a total of $34.2 billion for 5 licenses. German operators paid a total of $46.1 billion for 6 licenses, and Italian operators paid $11.6 billion for 5 licenses[17].

Providing 3G services is a momentous goal for operators and they may want to be the first oneS who rolled out 3G services in their countries to grab the users' attention and get the predominance of the market share. However, the huge amount of license fees put financial pressure on operators. Operators also began to lose confidence in the profit

[17] Source: Perter Curwen, The Future of Mobile Communications, 2002

potential of mobile data because of the decay of Internet booming. These factors slowed down operators' steps for deploying the 3G network and launching services. Moreover, the problems of network deployment, handset provision, and uncertain market demand also forced operators to postpone the launch date.

Table 3.1: 3G Services Launched by June 2003

Country	Service provider	Date of launch	Technology applied
Australia	Hutchison	April 15th 2003	WCDMA
Austria	Hutchison	May 5th 2003	WCDMA
	Mobilkom	April 25th 2003	WCDMA
Brazil	Vesper	May 1ST 2003	CDMA 2000 1XEV-DO
Isle of Man	Manx Telecom	Dec. 4th 2001	WCDMA
Italy	Hutchison	March 3rd 2003	WCDMA
Ireland	Vodafone	May 2003	WCDMA
Japan	NTT DoCoMo	Oct. 1st 2001	WCDMA
	J-Phone	Dec. 20th 2002	WCDMA
Luxembourg	Tango	May 2003	WCDMA
Monaco	Monaco Telecom	Dec. 2001	WCDMA
South Korea	SK Telecom	Jan. 28th 2002	CDMA2000 1XEV-DO
	KTF	May 8th 2002	CDMA2000 1XEV-DO
Sweden	Hutchison	May 5th 2003	WCDMA
UK	Hutchison	March 3rd 2003	WCDMA

Source: Own research, June 2003

By June 2003, there were only 15 service providers in the world who had launched "true" 3G commercial services (see Table 3.1): Hutchison (Australia, Austria, Italy, the UK, and Sweden), Mobilkom (Austria), Vesper (Brazil), Manx Telecom (Isle of Man), Vodafone (Ireland), NTT DoCoMo (Japan), J-Phone (Japan), Tango (Luxembourg), Monaco Telecom (Monaco), SK Telecom (South Korea), and KTF (South Korea)

Surpassing European countries, NTT DoCoMo launched 3G services on Oct. 1st 2001, making Japan the country that opened up a new era for the mobile data communication history. Two months later, Monaco and Isle of Man began to provide 3G began to be provided. They were the first two European countries that launched 3G services. The 3G services launch by SK Telecom in South Korea was also a significant achievement. It was the first operator who adopted the CDMA2000 1XEV-DO technology.

iv) 3G services and applications

3G applications have several strengths. First, they can be put in use anytime. Because the mobile Internet is always on and users can take the handset with them all the time since it is small and easy to carry, users can apply 3G applications anytime they want. Besides, receiving and searching for timely information will be easy and convenient. Second, they can be put in use anywhere. The vision of 3G mobile communication is to provide seamless services anywhere on earth. As long as users can receive the signals, they may enjoy the use of 3G applications anyplace indoors, outdoors, on trains, in cars, and even in foreign countries. Third, there are a broad variety of 3G applications. They can contain lots of functions and be the synthesis of all the media and communication tools. Forth, 3G applications can be personalized. Users can choose applications based on their likes

and demands. Also, 3G applications can be sensitive to users' location. They can provide appropriate location-based services no matter where users are. For these reasons, the telecommunication companies were devoted to develop 3G networks and services even though we already had many media to fulfill the needs for entertainment, communication, and information seeking.

Nokia classified possible 3G applications into four main categories: information, communication, productivity and entertainment (see Table 3.2). However, operators decided on what to offer to the users after their assessment of the market demand. The following is the common services and applications over 3G networks available in the current markets.

Table 3.2: 3G Applications

INFORMATION	NEWS	BANKING & FINANCIAL	LOCAL SERVICES (City Guide)	BUY & SELL	TRAVEL	SPECIAL INTEREST
	-General Headline -Financial & Business -Politics -Tabloids -Cultural & Entertainment -Sports -Lottery	-Stock indexes -Stock prices -Metal prices -Stock alert -Currency rates -Interest rates -Account balance -Credit/debit balance -Check balance -Money transfers -Bill payments -Automatic call -Account status flash -Stock purchase -Financial products purchase	-Taxi -Restaurants -Cinema -Theatres -Concerts -Exhibitions -Night Clubs -Emergency services -Pharmacies -Household assistance -Weather -Time -Directory services -ATM Locator	-Classifieds -Cars -Properties -Jobs -Auctions -Shopping -Small daily items -Specific promotions -Tickets	-Traffic (traffic jams, radar, control....) -Public transportation -Navigation services -Train schedules -Flight schedules -Hotels -Holiday packages	-Mobile telephones -Internet sites and services -Computers and hardware -Automobile

COMMUNICATION	SMS	E-MAIL	FAX	BULLETIN BOARDS
	-Send/receive SMS message -SMS to postcard	-Send/receive e-mails -E-mail to voice (IVR)	-Send/receive fax -Special features (delivery and receipt report, storage for later delivery)	-Groups with common interest -Messages, News, etc

Table 3.2 (cont'd)

PRODUCTIVITY	ORGANIZERS	PERSONAL ASSISTANT	TOOLS	MISCELLANEOUS	FAMILY
	-To do lists -Calendar -Address book -Agenda -Reminders	-Call management -Correspondence management -Voice to SMS, E-mail and fax -Translation services	-Calculator -Dictionary -Translator -Currency converter	-Activating domestic appliances -Paying at vending machines -Identity verification	-Family VPN -Synchronised

ENTERTAINMENT	MUSIC	TV	LIFE-STYLE	FUN	CHATS	PICTURES	GAMES	ASTRO-LOGY	DATING
	-Ringtones -Short clips (e.g. MP3)	-Program schedules -High-light	-Gastro-nomy -Hobbies -Fashion -Parties	-Jokes -Sayings -Dream analysis	-Topic specific -Private	-Icons -Logos -Photos -Postcards	-Puzzles -Quizzes -Tamagotchi -Games -Gambling/Betting	-Horoscopes -Astrolove -Biorhythm -Specific horoscopes	-Chats -Dating services

Source: Nokia Networks, 2000

Personal communication: It includes voice and video telephony, short, multimedia and video messages, instant messenger, E-mail and file exchanging, and community communication.

Entertainment: It includes video-on-demand (VOD), music-on-demand (MOD), TV broadcasting, on-line games, horoscope, jokes, and dating services.

Information and latest news: Users can obtain information about public transportation, leisure activities and latest news about sports, finance, current events, weather, lotto results

Location-based services: These are for helping the users know where they are, direct them to where they want to go, and location specific advertising.

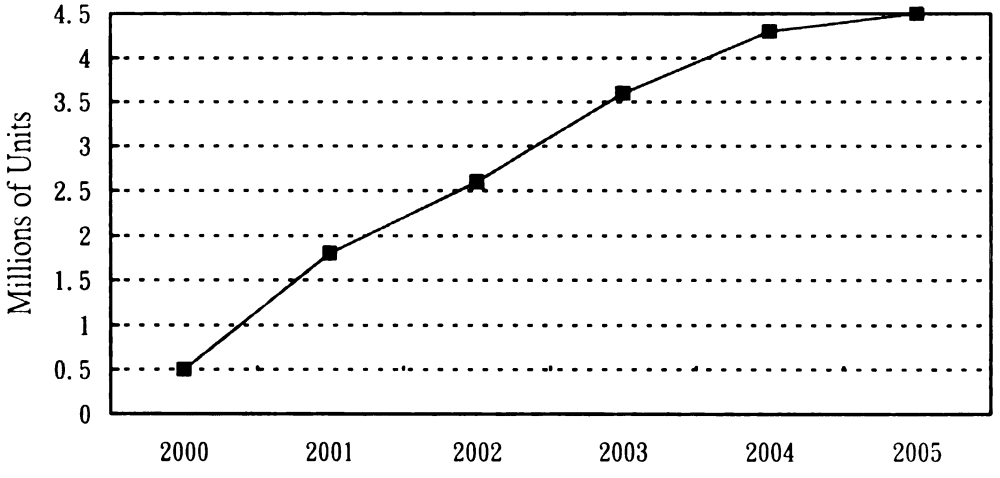
Internet access: Users can browse websites either by clicking the menu in the service portal or typing in the URL.

Mobile commerce: M-commerce includes banking, tickets and hotel booking, and shopping.

v) A threat to 3G--WiFi

WiFi is another name for the IEEE (Institute of Electrical and Electronics Engineers) 802.11b standard of WLANs (Wireless Local Area Networks). It utilizes unlicensed spectrum in the 2.4GHz band for transmission. The current WiFi technology can provide the data rate up to 11Mbps for laptops, PDA, or other mobile devices to access Internet without cables, but only in an area within 100 meters of an access point. Due to the short range for the Internet access, WiFi is mostly being used in indoor areas. For this reason, the places which apply the WiFi technology have been called " hotspots".

Figure 3.1: Predicted Growth of WLAN Access Points: Worldwide



Source: Gartner Dataquest, Feb. 2002

Most of the commercial hotspots are set up in the populous areas such as hotels, coffee shops, bookstores and airports. People who spend a lot of time staying at those would be more willing to pay for the Internet access than they usually are. WiFi operators can make money from the subscribing fee. The location owners also can attract more consumers to

their places if they have WLANs. Therefore, the number of hotspots increases fast. (See Figure 3.1) In addition, there are numerous non-commercial hotspots being set up in schools, company offices and hospitals. It is getting easier for users to find a hotspot in a city, so people shifted part of their attention from 3G to WiFi. Moreover, WiFi has two advantages over 3G. First, its transmission rate is more than five times faster than 3G. Second, building a WiFi base station does not cost much. Operators do not have to invest large sums of money before they launch WiFi services like 3G operators do. Therefore, WiFi seems to be a big threat to 3G. While many operators are pessimistic about the future of 3G, if WiFi flourishes, then may be threatened the position of 3G.

However, WiFi also has some weaknesses compared to 3G. The short range for transmitting is the most serious limitation. The area that one 3G base station can cover would take 10,000 WiFi base stations. If we are trying to set up WiFi base stations to achieve the goal of seamless networks, it will generate tremendous costs and require much work While it is difficult to apply WiFi technology for surfing the Internet anywhere, people have to endure an inconvenience of disconnection when they move from one hotspot to another one. What users get from WiFi is just the confined mobility. In addition, the security problem of WiFi hasn't been resolved yet. When users are doing transactions on the Internet in the hotspot, it is easy for other users in the same area to intrude their on-line bank system.

Based on the reasons above, WiFi seems to be a complement to 3G rather than being a replacement. WiFi could satisfy some users' need for accessing Internet and exempt them from subscribing to 3G services. However, this is just for a small part of users who are only surfing Internet in fixed areas. WiFi still cannot satisfy most of users' need for mobility.

D. Developments in the future

3G is definitely not the terminal stage of mobile-communication development, since 4G has evolved. A 4G network is an integration of a 3G network and WLAN. It can provide a data speed of 100Mbps for downloading and 20Mbps for uploading. With such a high transmission rate, 4G can offer premium-quality multimedia services to mobile device users and broadband Internet services to home and office users, just like the cable modem and DSL. Besides speed, 4G has another strength-- not only can it be applied to the handset, but it can also be used as a wearable device, such as a wristwatch. 4G terminals will be more convenient to carry and can function as fashionable ornaments at the same time. Although the 4G standard has not been set up yet, 4G's commercial deployments are working in America, Canada, China, Japan, New Zealand, South Korea, Germany, Italy, and the Netherlands. NTT DoCoMo even declared the date for 4G services' launching would be advanced from 2010 to 2006.

Because 3G systems are costly and do not have a bright and clear outlook, some people suggested that 3G be completely abandoned in favor of 4G. However, 4G probably will also face the same problems as 3G. First, a key element for a new technology's success is the application of it. It is essential to find out what kind of applications are important to users' lives and can only work well on the 4G networks at. There will be little market demand for 4G, if users can be fully satisfied with other technologies. Second, it would take years to set up the international standard for 4G. Even though 4G is superior to 3G in some ways, it is not able to replace 3G in the mobile data market immediately.

II. Policy Issues in the Mobile Data Markets

To achieve the goal of public benefits, the government regulates the market with various policies. Those regulations could have a great influence on the development of the industry. Therefore, even though governmental regulations are not the main focus of this study, four significant policy issues in the mobile market are discussed in this chapter: spectrum licensing method, handset subsidy, standard regulation, and resource sharing.

A. Spectrum licensing method

The necessity for allocating and assigning spectrum is commonly justified with the scarcity of spectrums[18]. Since spectrums are the finite public resources, they need to be assigned to those users who best serve the public; hence the appropriate spectrum assignment is crucial to the efficiency of spectrum use. How the licenses are assigned to the operators also has a great effect on the development of the mobile data market. First, the number of licenses issued influences the number of players and the competitive degree in the market. Second, the criteria for qualified applicants may establish the barriers to enter the market. Third, the time consumed in the processes and the rules about launching deadlines can affect the date when the services are supplied to the public. Forth, the license fee might be a large investment that reduces funds available for infrastructure investment. It might also create an incentive for the operators to raise the service price to recover the costs of the license.

There are several methods for license allocation: lotteries, comparative evaluation processes (or beauty contests), and auctions. Auctions, beauty contests and combined

[18] However, some researches challenge the scarcity assumption, eg. Reed, DP (2002) "How wireless networks scale: the illusion of spectrum scarcity."

auction/comparative methods are most frequently used.

When adopting the auction method, spectrum licenses are usually assigned to the operators who offer the highest bids. Sometimes the selection is not based on financial bids alone, but also on service-related criteria like the time required to meet a roll-out target or commitments on maximum prices for consumers (Telecommunications Regulation Handbook, 2000). The auction approach has the advantages of transparency and efficiency. Besides, the winning bidders are usually the ones who value the licenses the most and have the highest motivation to launch the services. However, if the auction approach is improperly designed, it may lead to very high bids. It may also bring the market development some negative influences. First, the bids could be passed on to the customers and indirectly diminish customers' willingness to subscribe to the new services. Second, if companies overbid, the bids could be a heavy burden for them and consequently cause them difficulties with deploying the networks and launching the services. Table 3.3 shows some examples of countries that used the auction method for assigning the licenses.

If the beauty contest is adopted, the regulatory institutions will make an assessment of the applicants according to a list of criteria and then issue the spectrum licenses to the best-qualified operators. It is claimed that the beauty contest is not as efficient and transparent as the auction approach. The regulators have to devote much time and energy to the complicated examining processes and might still fail to make an unbiased decision. On the other hand, the approach of beauty contest may save operators money. In most of the cases, the winners of the beauty contest pay less for licenses than the winners of the auctions. Sometimes they even just pay a nominal fee (see more details in Table 3.3). This is helpful to lessen the operators' financial stress created by production costs in the

initial stage, and might also contribute to lower service prices in the later stage of market development.

Table 3.3: Allocation of 3G Mobile Licenses in Selected Countries Worldwide

Country	No. of licenses	Mobile incumbents	Method	Date awarded	Amount bid (US$ million)
Australia	6	3	Regional auction	March 2001	610
Austria	6	4	Auction	November 2000	618
Belgium	4	3	Auction	March 2001	421.2
Czech Republic	2	2	Auction	December 2001	200
Denmark	4	3	Sealed bid auction	September 2001	472
Finland	4	3	Beauty contest	March 1999	Nominal
France	4 (2 awarded, 2 still on offer)	3	Beauty contest + fee (Auction for two outstanding licenses closed in May 2002)	July 2001 (Results of revived auction due in September 2002)	4.52 billion (subsequently reduced to 553 million each, plus 1% of revenue)
Germany	6	4	Auction	August 2000	46,140
Greece	3	3	Hybrid	July 2001	414
Hong Kong, China	4	6	Hybrid	September 2001	Minimum 170 each plus royalties
Israel	3	3	Beauty contest + fee	December 2001	157.1
Italy	5	4	Hybrid	October 2000	10,180
Japan	3	3	Beauty contest	June 2000	Free
Korea (Rep.)	3	2	Beauty contest + fee	August 2001	2,886
Malaysia	3	3	Beauty contest	December 2001	Nominal

Table 3.3 (cont'd)

Country	No. of licenses	Mobile incumbents	Method	Date awarded	Amount bid (US$ million)
Netherlands	5	5	Auction	July 2000	2,500
New Zealand	4	2	Auction	January 2001	59.9
Norway	4	2	Beauty contest + fee	November 2000	88
Singapore	3 (+1?)	3	Cancelled auction	April 2001	165.8
Slovenia	1	2	Cancelled auction	December 2001	82.2
Spain	4	3	Beauty contest + fee	March 2000	480
Sweden	4	3	Beauty contest	December 2000	Nominal
Switzerland	4	2	Auction	December 2000	119.8
Taiwan, China	5	4	Auction	February 2002	1,400
UK	5	4	Auction	April 2000	35,400
Total (25)	99+	79	13 auctions 9 beauty contests 3 hybrid		105,286+

Source: ITU Internet Reports—Internet for a Mobile Generation, 2002

The third approach is a hybrid of the auction and the beauty contest. The qualified bidders would be filtered out from all the applicants based on selection criteria. In a second stage, an auction is used to determine the final winners. The hybrid method could ensure that every bidder is competent to make a good use of the spectrum and provide decent services to the public. However, it is more time-consuming and less transparent than the pure auction. Greece, Hong Kong, and Italy are examples of countries that adopted the hybrid method.

B. Handset subsidies

A handset subsidy is a marketing strategy often seen in the mobile markets. To lure new subscribers, the mobile operators either partially or fully subsidize the handset price even though this increases the costs of acquiring subscribers. Handset subsidies can bring the operators positive network effects. It is good for the operators to draw some new users and then acquire even more as a result of word-of-mouth. Besides, it is helpful in reducing the churn rate in the short term by signing contracts to bind the subscribers for an extended period. Handset subsidy is also good for the subscribers because they can have a new handset with a much lower upfront payment.

However, it is argued that there are some downsides about handset subsidies. First, the operators with greater financial strength are more capable of subsidizing the handsets. This may further their significant market power and destroy the health of competition in the mobile market. Second, subscribers may want to upgrade their handsets more frequently. As soon as their previous service contract expires, they can switch to other service plans or other operators and easily get a new and more advanced handset. This will be a wasteful use of handsets. Third, once consumers get used to obtaining new handsets for cheaper prices, it is difficult for operators to get rid of the cost of handset subsidies. Regulators usually take no notice of this issue, except the Ministry of Information and Communication (MIC) in Korea. The MIC adopted a law to eliminate handset subsidies in Korea starting in June 2000. It put a ban on any kinds of behavior that amounts to subsidizing handsets, such as paying the handset makers or rewarding the retailers. Those who violate the regulation will be fined heavily. In fact, the mobile data market in Korea is still thriving. Customers do not shy away from subscribing to new services because of the expensive handset prices. Some countries also worry about the

downsides of handset subsidies, but no one has adopted the same rule yet.

C. Standard regulation

A big question in the 3G market is adopting a standard of W-CDMA or CDMA2000. Operators usually make a decision based on which standard is more convenient and cheaper to adopt when they upgrade from the networks they are running. They also have to take into account which standard is beneficial for service interconnection and roaming. Usually the operators have a free choice of a standard selection. However, operators are stipulated or encouraged to make a certain choice. For example, the European Union named W-CDMA as UMTS and set UMTS as European 3G technology. The European Union recommends operators adopt UMTS, even though UMTS is the best choice for European countries because it is the upgraded technology of the GSM system, which has prevailed in Europe. Korea has a regulation on standard selection. Instead of supporting only one standard, it provides two W-CDMA licenses and one CDMA2000 license. The operators can apply for both of them, but they have to adopt one certain standard according to the license they get.

D. Network and equipment sharing

Deploying the service network is time-consuming and involves large initial costs. Sharing networks or equipment will be very helpful to lighten the load and lessen production costs. According to Bauer, Westerveld and Maitland (2001), there are several forms of sharing arrangements: antenna site sharing, antenna towers sharing, radio access network sharing, geographical split network with mutual roaming, and common network sharing. They all can speed up the network deployment as well as contribute to the cost savings,

which range between 10% and 40% of the capital expenditure, depending on the depth of the sharing arrangement reaches into the network.

Despite the high benefits from sharing network infrastructure, a sharing agreement may be difficult to reach due to discrepancies in operators' bargaining power (ITU, 2002). This situation is especially unfavorable to the new entrants and small operators and may have adverse effects on the market competition. Therefore, some countries impose regulations on this issue. For example, the operators who acquired 3G licenses in Finland, Netherlands and France have obligations to share the network facilities. The Italian operators must share their network and equipment if requested by another operator[19]. The Irish operators will be rewarded for sharing their network. If the winner of the "A" license agrees to allow an MVNO to use its network, it can get an additional spectrum[20].

[19] Source: Bauer, Westerveld and Maitland, 2001.
[20] Source: Curwen, 2002.

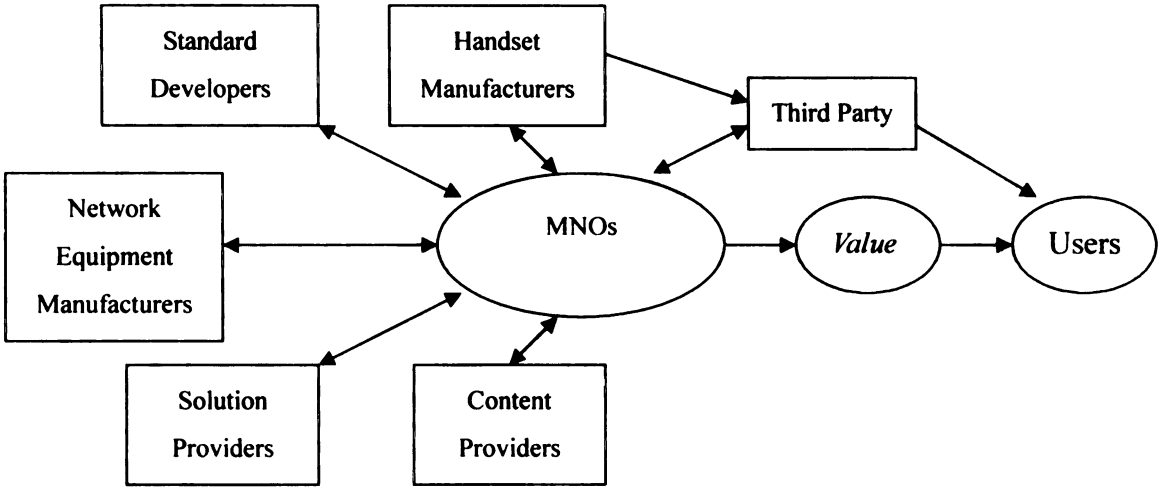
Chapter 4

Industry Structures and Business Strategies: Korea and Japan

I. The Mobile Data Market in Korea

Korea has the most advanced and thriving mobile data market in the world. As of April 2001, KT Freetel became the first company that launched CDMA 2000 1x service. In January 2002, SK Telecom launched the world's first commercial CDMA 2000 1x EV-DO service. Korea also has a fast-growing wireless data market. The total revenue in the wireless data market was 690 billion KRW ($590 million) in February 2001. One year later, the market revenue increased to 1.2 trillion KRW ($1.026 billion).[21] Moreover, the wireless penetration rate in May 2003 was 69%.[22] 88% of subscribers owned handsets that are enabled for use with the wireless Internet.[23]

Figure 4.1: Value Network of the Korean Mobile Data Market



Source: Own research

[21] Source: MIC, http://www.mic.go.kr/index.jsp, 2003
[22] Source: MIC, http://www.mic.go.kr/index.jsp, 2003
[23] Source: SK Telecom, 2003

Figure 4.1 is the value network of the mobile data industry in Korea. The three mobile network operators, SK Telecom, KT Freetel and LG Telecom, have chosen to be in charge of coordinating handset manufacturers, solution providers, content providers and other players. Therefore, these three operators occupy the most significant position in this industry. Not only did they establish the business models between themselves and players, but also influenced the business model between different players. In the value network of the Korean mobile data market, the network operators bear the highest responsibility for the development of the market. The way the operators cooperate with other players strongly influences the market. The relations between the network operators and other players are discussed below in more detail.

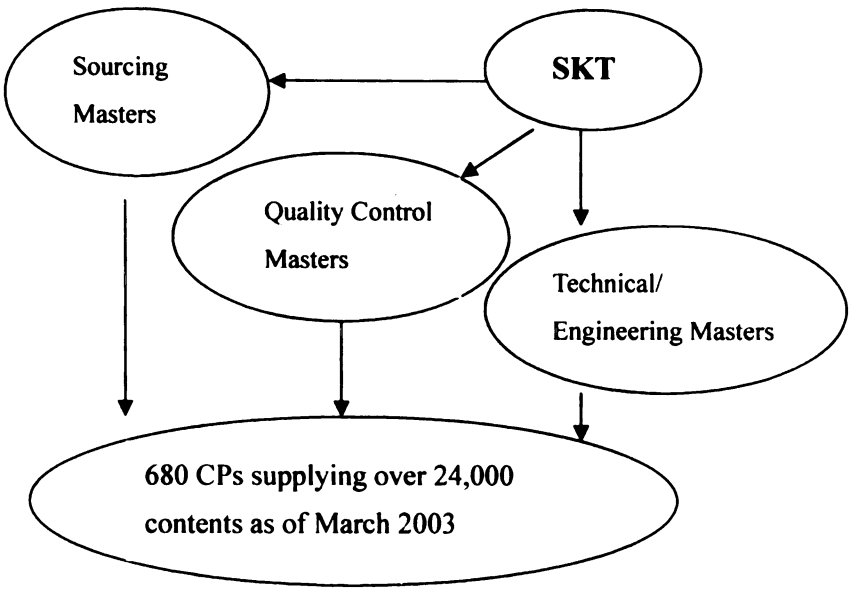
A. Network Operators vs. Content Providers

Content generates 30% of total wireless Internet revenue for the market.[24] Quality and abundance of content will likely help the ARPU to rise. Therefore, it is essential for each network operator to have a sound strategy for cooperating with content providers. In the case of SK Telecom, they do not interfere with how content providers develop new content, but they have the power to adopt or veto proposed services. However, it is time-consuming to evaluate every provider's content. Instead of examining 24,000 services from 680 content providers[25], SK Telecom mostly deals with "master content providers". Even though some individual content providers contact SK Telecom directly through the official website, SK Telecom still have "master content providers" evaluate those services for them. SK Telecom need not participate in the process of selecting

[24] Source: SK Telecom. SMS is excluded here.
[25] Source: SK Telecom. March 2003

content and still receive quality content from providers. Master content providers, also known as content aggregators, are mostly independently owned, although a few of them are subsidiaries of SK Telecom. Master content providers collect content from content providers, then sift it based on quality control criteria and test the selected content to see if it works well with the network platform. Once the content has been uploaded to the service website, SK Telecom manage the menu and the ranking according to the content's performance (see Figure 4.2).

Figure 4.2 : SK Telecom's CP Management & Support

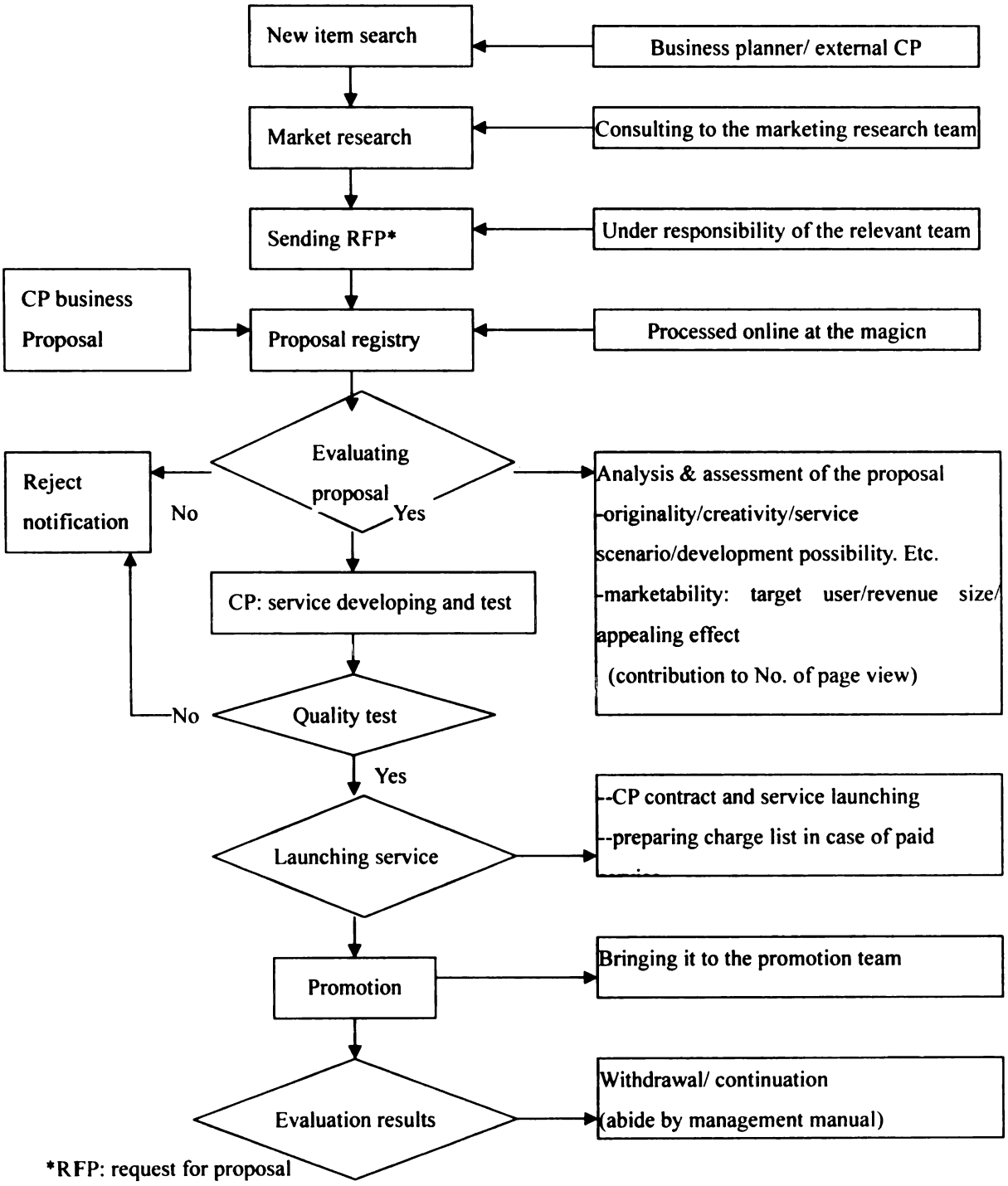


Source: SK Telecom, 2003

As for KT Freetel, they have a standard process for launching a service (see Figure 4.3). If content providers want to provide new services via KT Freetel's mobile network, they register their service proposal on KT Freetel's website. KT Freetel then evaluates the proposal considering the development possibility, target users, revenue potential and so forth. If the evaluation is passed, content providers can go on developing the new services and perform quality tests. After the tests are done and the new services are available, KT Freetel plans promotional activities for the new services according to their marketability.

In the final part of work, KT Freetel evaluates the results to see if service adjustments are needed or not.

Figure 4.3: KT Freetel's Service Launching Process



*RFP: request for proposal

Source: KT Freetel, 2003

Both SK Telecom and KT Freetel are more powerful than content providers in negotiations. They have the right to decide who can be connected to their portal websites. They also can decide the order of the content list. Although they usually list content based on the number of hits[26], they still put some new content on the top of the list for several days to promote it. If the new content is not popular enough, its rank will be assumed by more popular content. However, SK Telecom and KT Freetel adopt a win-win profit sharing strategy with the content providers. To attract more content providers, a large part of the content fee will be given to the content providers to encourage them to develop more high-quality content. SK Telecom gives 90% of the collected content fee to their content providers and keeps 10% of the fee for maintaining the services and billing system. KT Freetel's basic model for profit sharing strategy is the same. In the case that content providers utilize the platform provided by KTF, the fee retained by KTF is 10% to 30%.

B. Network Operators vs. Handset Manufacturers

Samsung is has the highest market share in Korea of all the handset manufactures. The handsets produced by Samsung are widely used in Korea, and are far more popular than the products from other leading makers like Motorola, Nokia, and Sony Ericsson. Even though SK Telecom and KT Freetel can produce handsets, they still need handsets from Samsung because they are preferred by customers. Besides, these two operators tend not to choose LG Electronics as their main handset providers because LG Telecom, LG Electronics' related company, is one of their competitors in the market. Therefore, Samsung is more powerful than the network operators during their negotiation.

[26] The more hits a content has, the higher it will be ranked.

One of the significant issues between the network operators and handset manufacturers is the handset subsidies. It used to be very common that operators subsidized the handset price to let users buy the handsets at a lower price. This policy facilitated the growth of subscribers, but it cost operators around 30 % of sales and increased the users willingness to change their handsets. The Korean government banned mobile phone subsidies in June 2000, and even prohibited any direct profit-involved interaction between the network operators and the handset manufacturers. The network operators have to apply other approaches for assuring the handset manufacturers of the low risk in producing new handsets. For instance, SK Telecom does not formally purchase the handsets but is still involved in the purchasing and distribution process. SK Global, SK Telecom's related company, signed the handset contract with Samsung for SK Telecom. SK Telecom can still guarantee a certain volume of purchasing for a specific handset model via SK Global. Then SK Global resells the handsets purchased from Samsung to SK Telecom's retail agents. The users can buy the handsets from those agents. The new regulation helped the network operators reduce their cost in selling services as well as reduce the churn rate, since the users have to pay a higher price for buying new handsets if they want to change the service providers. However, when users' willingness to purchase new handsets decreases, it could entail reduced sales for the handset manufacturers. This is why the handset manufacturers need the operators to bear some risk of bad sales by guaranteeing a certain volume of purchasing.

C. Network Operators vs. Solution Providers

Network operators in South Korea play a big part in the solution providers' development process. To acquire good solutions for their services, they are generous in providing

financial support to solution providers. Therefore, the content providers and handset manufacturers can enjoy the use of the solutions by paying a small amount of revenue or even nothing. Take SK Telecom's VOD service as an example. SK Telecom used two kinds of technology, MPEG-4 and Wavelet, for its NATE multimedia services (SK Telecom, 2001). Wavelet is the multimedia wireless solution which supports real video image, animation, photo slide and graphics. It was developed by Thin Multimedia Inc. of the U.S.A. SK Telecom signed two contracts, a solution development contract and an ASP contract with Thin Multimedia. According to these two contracts, Thin Multimedia had to develop the Wavelet solution as well as operate and manage the data center, and SK Telecom provided the financial support to Thin Multimedia for their contributions. Thin Multimedia provided their solution to the handset manufacturers at no charge because they had already been paid well by SK Telecom, As for the content providers, Thin Multimedia merely charged them 5% of the total sales revenue. The biggest revenue stream is still from SK Telecom. The business models with other solution providers are similar. Therefore, the content providers and handset manufacturers can invest the money they save from the cost of utilizing the solutions on their own research and development, and produce more high-quality content and handsets. SK Telecom will also have more subscribers or higher ARPU because of the attractive content and handset, and gain a far more amount of the profits than the amount they have paid to solution providers. Therefore, everyone benefits from this model.[27]

D. Mobile Data Services

There are three 2.5 G mobile Internet service brands and two 3G service brands in South

[27] This section greatly referred to SK Telecom's report: Wireless Internet Business, 2001

Korea. The three 2.5G service brands are SK Telecom's *NATE*, KT Freetel's *Magic n* and LG Telecom's *ez-i*.[28] *NATE* was launched in October 2000. *Magic n* and *ez-i* both were launched in May 2001. These service brands rival one another and provide similar services: picture and ringtone downloads, location-based services, life information, news, m-books, broadcasting, games, e-payment, mobile coupons, lotteries, fortune, jokes, adult content and communication including chatting, e-mail, date matching and message sending. Of those services, ringtone downloads, picture downloads and games are the top three revenue streams. However, these service brands also have some distinguishing characteristics. For example, *NATE* was positioned as the single Internet portal for multiple devices including the PC, handset, PDA (Personal Digital Assistant) and VMT (Vehicle-Mounted Terminal). *ez-i* were designed for cellular phones as well as PDAs.

The two 3G service brands are SK Telecom's *june* and KT Freetel's *FIMM*(First in Mobile Multimedia). They are both based on CDMA2000 1XEV-DO network. *june* was launched in January 2002, and *FIMM* was launched in May 2002. With the advanced network technology and higher transmission speed than 2.5G services, they aim to offer multimedia services including VOD, MOD, MMS, live news, TV programs and video telephone. The 3G services emphasize on entertainment services while the 2.5G services emphasize on communication services. The 3G services' target users are also different from the 2.5G users. *june* and *FIMM* target younger generations more than other services since they are entertainment-oriented.

[28] This mobile service information of SK Telecom, KT Freetel and LG Telecom draws from those companies' home page: http://www.sktelecom.com ; http://www.ktf.co.kr, http://www.lgtelecom.co.kr

E. Mobile Data Tariff

Korean operators have similar tariff strategies for mobile data. Since the connection is always on, they charge users according to the usage instead of connecting time. Table 4.1 shows the price plans for SK Telecom's *june*. Table 4.2 shows the price plans for KT Freetel's *FIMM*.

Table 4.1 : *june*'s Price Plans

Price Plan	Basic Monthly Fee	Free Allowance		Discount for the excess
June 50	5,000won ($4.26)	13,000won ($11.07)	10,000 packets	30%*
June 95	9,500won ($8.09)	32,500won ($27.68)	25,000 packets	50%*
June 150	15,000won ($12.78)	65,000won ($55.37)	50,000 packets	70%*
June 250	25,000won ($21.29)	156,000won ($132.88)	120,000 packets	80%*

*one packet= 512 bytes

*Rate for data download: Daytime-----1.3won ($.0011)/packet

Nighttime---0.3won ($.0003)/packet

Source: SK Telecom, Sep. 2003

Users can choose a plan from different flat-rate plans according to their needs. Users pay a basic monthly fee and have a certain amount of bundled packets for free. The higher the price plan users choose, the more free packets they will have. If the data transmitted exceeds the bundled free amount, users will be charged for the excess part per packet. However, the excess part will be discounted. The high-volume-plan consumers receive a higher discount rate from the operators since operators want to encourage users to consume more.

Table 4.2: FIMM's Price Plans

Price Plan	Basic Monthly Fee (Won)	During Promotion	After Promotion		Over bundled free packets (per packet*)		
		Bundled free packet (packet)	Bundled free packet (packet)	Price for VOD per packet (Won)	MagicN	Multimedia	Video discount
FIMM45	4,500 ($3.83)	33,000	11,000	0.41 ($.00034)	6.5Won ($.00554)	2.5Won ($.00213)	30%
FIMM87	8,700 ($7.41)	78,000	26,000	0.33 ($.00028)			50%
FIMM140	14,000 ($11.93)	153,000	51,000	0.27 ($.00023)			70%
FIMM240	24,000 ($20.44)	Unlimited	124,000	0.19 ($.00016)			80%
FIMM490	49,000 ($41.74)	Unlimited	520,000	0.09 ($.00008)			90%

*one packet = 512 bytes

-Text service: 30 Won ($.0256)/ Per time

-Multimedia service: 2.5 Won ($.0021)/Packet

Source: KT Freetel, Sep. 2003

II. The Mobile Data Market in Japan

In 2002, Japan had the world's third largest mobile market. According to ITU's statistics, Japan had 79 million cellular subscribers. It was only next to China (207 million) and the U.S. (141 million)[29]. However, Japan had higher cellular penetration rate (62.11%) than China (16.09%) and the U.S. (48.81%), and the biggest mobile data market. The number of mobile Internet subscribers in Japan was 59.5 million[30]. It exceeded China's 35 million mobile Internet users[31] and America's 9.9 million mobile Internet users[32]. Besides the astonishing number of subscribers, Japan is also remarkable for taking the lead in the development of mobile data. Japan was the second country to launch 3G services, five months after Korea[33], and the first country to launch WCDMA services.

The three mobile operators in Japan are NTT DoCoMo, KDDI and J-Phone (Vodafone KK)[34]. They also play the roles of mobile Internet service providers and mobile Internet portal providers in the Japanese mobile data market. Adopting the centralized management approach, these operators are responsible for integrating all of the products provided by the other players (see Figure 4.4) and distribute mobile data services, which consist of handset, mobile network, and mobile portal, to the users (Vesa, 2003).

---

[29] Source: ITU http://www.itu.int ,2003

[30] Source: Ministry of Home Management, Public Affairs, Posts and Telecommunications (MPHPT) http://www.soumu.go.jp/joho_tsusin/eng/index.html ,2003
There were 59,527,000 Internet service users via mobile phone terminals. It was the total number of subscribers to the i-mode, ez-web and J-Sky services.

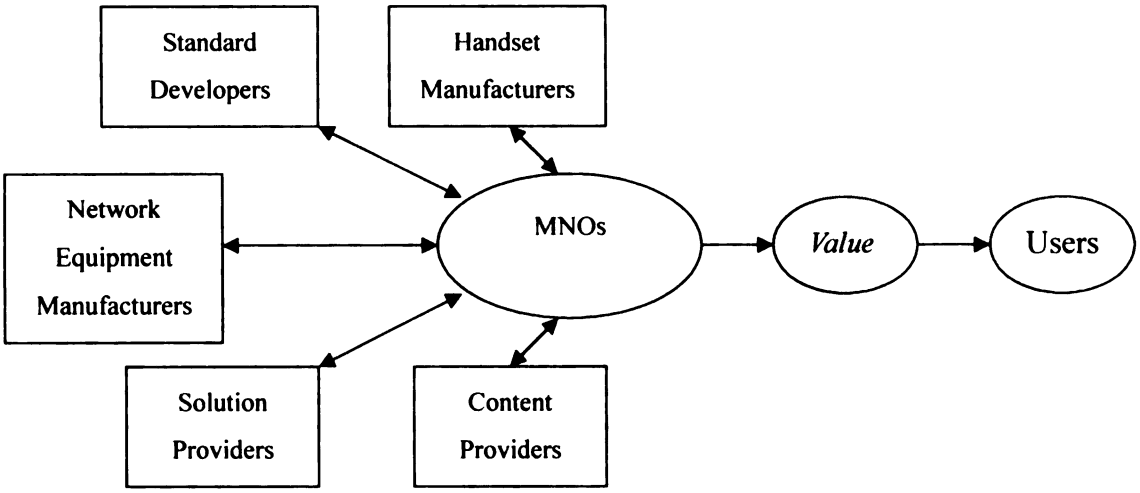
[31] Source: IIAS Newsletter http://www.iias.nl/iiasn/29/IIASNL29_55_Nielsen.pdf ,Nov. 2002

[32] Source: Comscore Networks http://www.comscore.com ,2002 Those 9.9 million mobile Internet users include 5 million people who use a handheld computer to access Internet services and 5.8 million use a wireless phone.

[33] NTT DoCoMo's 3G FOMA service was launched at Oct. 1st 2001.

[34] J-Phone changed its name to Vodafone KK from October 2003.

Figure 4.4: Value Network of the Japanese Mobile Data Market



Source: own research

With 39 million subscribers[35]and 59% of the market share in Japan, NTT DoCoMo's *i-mode* undoubtedly contributed to the flourishing market the most. *i-mode*'s success story was studied extensively and became a blueprint of what a successful business model should be. The most common explanations of its success are *i-mode*'s always-on functionality, its bit-based charges, the lower fixed Internet penetration in Japan and the market strategy for targeting the young generation (Fransman, 2002). KDDI and J-Phone provide similar services and pricing plans, but they did not benefit from the first-mover advantage. KDDI and J-Phone launched their mobile Internet services after people were aware of the brand name of *i-mode*, and they both were slower in upgrading services than NTT DoCoMo. J-Phone's 3G service[36] was 14 months behind NTT DoCoMo and KDDI still used 2.5G technology (Sep. 2003). Even though KDDI had merely 25% and J-Phone

[35] Source: NTT DoCoMo http://www.nttdocomo.com ,2003
[36] J-Phone launched WCDMA service at Dec. 2002

had 16% of market share, they still had a large number of subscribers compared to the number of WAP users[37].

A. Network Operators vs. Content Providers

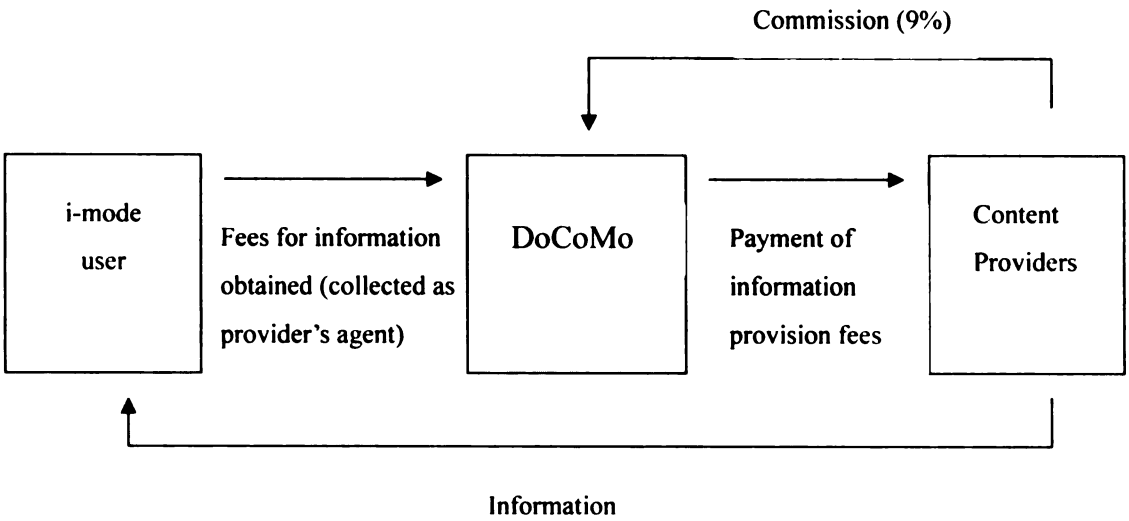
Because the three Japanese mobile network operators are portal providers simultaneously, they control Internet access. These operators all have their own service portals which have direct links only for the "official" content. Even though users could access the "unofficial" websites by typing the URL, hitting the links of the portal menu on their handsets is still easier and more convenient. The providers who want to supply content in the service portals have to make an application for being "official content providers" at first. Then the operators will decide who are qualified to list on the service menu. Besides, they restrict access of their service portals. Since the portals are part of their products, they offer their portals exclusively for their subscribers and block the access from non-subscribers.

To attract more subscribers, the operators need more quality content providers joining them. NTT DoCoMo's *i-mode* is an example of a successful model. When it bills its users for mobile Internet connecting fees, it also collects content fees for their official content providers. NTT DoCoMo takes 9% from the content fees collected as commission. The other 91% goes to the content providers (see Figure 4.5). Not only does it leave out multi-bill inconvenience for the users, it also frees the content providers from billing and collecting.

---

[37] In 2001, there were 18 million WAP users in the world. http://www.wapforum.org, 2001. At Jan. 2001, KDDI had 14.47 million subscribers, of which over 5 million utilize KDDI's ez-web. http://www.intage.co.jp/express/micjapancom/market/0102/0102.html, 2001. At Mar. 2001, J-Phone reached 10 million subscribers, of which 61 % subscribed its mobile Internet service---J-Sky. http://www.j-phone.com/english/release/2001/index.html ,2001.

Figure 4.5 *i-mode*'s Content Provider Bill Collection System



Source: NTT DoCoMo Annual Report 2002

The Internet standard used on the *i-mode* website is another advantage of attracting content providers. NTT DoCoMo adopted cHTML (compact HTML) for *i-mode* menu and content. cHTML is embedded in the fixed Internet standard: HTML, so content providers can convert their HTML-based content into cHTML-based content with only slight changes (NTT DoCoMo,2002). The user-friendly format decreases the entry barrier of providing content and contributes to *i-mode*'s fast growth of content providers. By Aug. 2003, there were 3,732 *i-mode* menu registered sites and 67,598 independent sites listed in " OH! NEW i-search"[38].

B. Network Operators vs. Handset Manufacturers

Japanese operators are deeply involved in handset design and production. To create handsets which can fill their requirements and deliver their services smoothly, they

[38] Source: NTT DoCoMo http://www.nttdocomo.com 2003

actively participate in the R&D work. The handsets are produced just for one specific operator and have operator's brand name and special function keys. Each phone can only be used for one specific operator's mobile service since SIM cards are not used in Japan and the telephone number has already been hardcoded in the phone (Vesa, 2003). Operators regard the handset as one of their products, not just the tool for carrying their service. Operators ordered the handsets from handset manufacturers and then sold those handsets under their brand names. Instead of selling "NEC" or "Sharp", they named the handsets in their way. For example, J-Phone named its handsets as J-SH53, J-T51, J-SA06, etc. NTT DoCoMo named its FOMA (Freedom of Mobile Multimedia Access) enhanced handsets as FOMA F2102V, FOMA N2102V, FOMA N2701, etc. Phone branding is helpful to deepen users' impression on their brand images and strengthen users royalty to their services. Besides, their handset partners can fully concentrate on product research and development and do not have to worry about sales volumes of handsets since the operators highly subsidize the handset price and they are also responsible for marketing and selling the handsets.

C. Mobile Data Services

There are four major mobile data service brands in Japan: NTT DoCoMo's *i-mode* and *FOMA*, KDDI's *au*[39], and J-Phone's *J-Sky* (see Table 4.3). Among those four services, *i-mode* is the most successful service but based on the most primary network technology. The two principal services it offers are mail and website access. Website access includes the voluntary web sites and *i-menu* sites. *i-menu* is *i-mode*'s portal service. Through

[39] KDDI has another mobile service besides au---Tu-Ka. It was especially designed for business users. Tu-Ka's subscribers can also subscribe the same mobile Internet service, ez-web, as au's subscribers. So basically Tu-Ka and au's mobile data services are the same.

i-menu, subscribers can directly access the official websites. Ringtones/screens was the most popular content. Games and horoscopes were the next[40].

Table 4.3: Mobile Data Services in Japan

Carrier	NTT DoCoMo		KDDI	J-Phone
Brand	i-mode	FOMA	au	J-Sky
Service	-i-menu: The gateway for easy access to Internet. -i-appli: Applications download -i-mode mail -Messages -Check i-center for new messages and mails -Bookmark: register URL in the phone -Go to Location: Access a site by entering URL	Basic services: -Voice service -Videophone -64K digital communications -Packet communications -Short message service -Multi-Access service (simultaneous-communication) Additional services: - i-mode - Video distribution service - mopera - Voice mail service - Call forwarding service - Call waiting service	- Movie mail - Photo mail - ezmovie: different streaming video services - eznavigation : location applications - ezplus[41]: download service - ringtunes download - pictures and wallpaper download - Internet access (144kbps) - Searching services - Living information -Community communication (ex. BBS)	-Mail and files sending - Java™ Applications: 3D characters, games and standby screens. - Web: on-line contents - Global Net: International content service - Station: Notice and news from J-Phone - @Sha-mail: Mail to other mobile phones or PCs. - @Sha-mail Album[42]

Source: Own Research from websites of NTT DoCoMo, KDDI, J-Phone

[40] Source: NTT DoCoMo's slide show for business activities http://www.nttdocomo.com 2001. Out of total number of hits to iMenu sites, 35% was ringtones/screens and 18% was games/horoscope at Mar. 2001.
[41] ez-plus is a download service includes a variety of entertainment and e-commerce JAVA applications.
[42] @Sha-mail Album service is storing mails on the J-SKY server and create mail albums which can be viewed from J-Phone handsets and other Internet-capable mobile phones or PCs.

FOMA is the 3G service based on WCDMA technology. It offers more advanced services including high quality voice communication, TV phone (videophone), 64K digital communications, multi-access (simultaneous packet transmission while talking over the phone), and diverse multimedia content. *FOMA* users can also subscribe to *i-mode* service and get *i-mode* content with fast speed access at up to 384Kbps for downlink.

Based on CDMA20001X, KDDI's *au* service can provide Internet access up to 144Kbps.Using the au service, users can send movie and photo mail, watch streaming video, download ringtones, pictures and Java applications, use location services, communicate in group discussion community and access the Internet through its portal website: *ez-web*.

J-Phone's *J-Sky* is the other 3G service in Japan besides *FOMA*. It offers mail and sending attached files, Java contents like 3D games and animations, web content and mail storing. One of its characteristic services is Global Net: international content service. Not only does it offer global information, but it also provides multilingual content including English, French, German, Spanish, Dutch, Portuguese and Tagalog.

D. Mobile Data Tariff

The basic charging model of *i-mode*, *FOMA*, *au* and *J-Sky*'s is a monthly bundled plan. Operators provide a couple of price plans for subscribers' choices. Subscribers pick up a plan according their usage, pay a basic monthly fee, and have some amount of communication allowance for the packets they transmit. For example, *FOMA* has plan 39, 49, 67, 100, 150 and Data Plan22 (see Table 4.4). If subscribers choose plan 49, they pay ¥4,900 ($43.75) monthly and have free communication allowance of ¥2,050 ($18.3), which is worth 10,250 packets. Besides *FOMA* Plan, NTT DoCoMo also offers *Packet*

Pack for the subscribers. The subscribers can add one *Packet Pack* (see Table 4.5) on their *FOMA* Plan and they will have more communication allowance and lower cost per packet, but they cannot subscribe to *Packet Pack* without *FOMA* Plan.

Table 4.4: FOMA Price Plans

Price Plan	Basic Monthly Fee	Communication Allowance	*Packet fee without Packet Pack: ¥0.2 /packet *One packet = 128 bytes *Voice and digital communication fees vary depending on the price plans subscribed to. *There will be other discounts applied on the basic monthly fee and communications fee
FOMA Plan 39	¥3,900 ($34.82)	¥750 ($6.70)	
FOMA Plan 49	¥4,900 ($43.75)	¥2,050 ($18.30)	
FOMA Plan 67	¥6,700 ($59.82)	¥4,050 ($36.16)	
FOMA Plan 100	¥10,000 ($89.29)	¥7,350 ($65.63)	
FOMA Plan 150	¥15,000 ($133.93)	¥11,650($104.02)	
FOMA Data Plan 22	¥2,200 ($19.64)	¥0	

Source: NTT DoCoMo, Sep. 2003

Table 4.5: FOMA Packet Pack

Packet Pack	Monthly Fee	Communication Allowance	Packet Fee (Over Bundled Free Packet)
Packet Pack 20	¥2,000 ($17.86)	¥2,000	¥0.1/packet
Packet Pack 40	¥4,000 ($35.71)	¥4,000	¥0.05/packet
Packet Pack 80	¥8,000 ($71.43)	¥8,000	¥0.02/packet

Source: NTT DoCoMo, Sep. 2003

A variety of charge discounts distinguish Japanese operators' tariff strategy (see Table 4.6). Some discount services seem to be a reward for subscribers' loyalty to the operators, such as Yearly Discounts, Long-Term Discounts and Family Discounts. On the other hand, they are also helpful to reduce the churn rate. Therefore, those discount services are provided and highly recommended by every company. Some discount services are

designed for the specific target groups, such as business users and students. These groups usually are the heavy users and contribute handsome profit to the operators, so the operators offer special plans to attract them. Some discount services are intended to improve the business image of the service providers, such as NTT DoCoMo's Hearty Discount. Japanese mobile users have to spend some time understanding the rules because many discount services are provided. If subscribers want to get the best deal, they need to know which discount service is applicable to them, whether they have to pay extra fee for being eligible for the service, and if the discount service can be combined with others.

Table 4.6 Discount Plans Provided by the Japanese Operators

Carrier	NTT DoCoMo	KDDI	J-Phone
Discount Plans	- Ichinen Discount (Yearly Discount) - Long-Term Discount - Family Discount - e-billing Discount - Volume Discount - Yu Yu Call Discount (Designated Numbers Discount) - FOMA Packet Pack Discount - Business Discount - Bulk Line Discount - Ikkatsu Discount[43] - Hearty Discount[44]	-Yearly & Long-Term Discount - Family Discount - Designated Numbers Discount - Student Discount - E-mail and Ez-web services - Calling Home Discount	-Yearly Discount - Long-Term Discount - Automatic Carry Over - Designated Numbers Discount - Family Discount - Corporate Discount on Multiple Lines - Volume Discount

Source: Own Research from websites of NTT DoCoMo, KDDI, J-Phone, Sep. 2003

[43] The Ikkatsu Discount is given on communications charge for two or more DoCoMo mobile phone lines on a single bill.

[44] The Hearty Discount is provided to the physically and mentally challenged.

Chapter 5

Industry Structures and Business Strategies: the U.K. and the U.S.

I. The Mobile Data Market in the U.K.

The U.K. mobile data market became one of the pioneers for the next-generation mobile data services when Hutchison 3G UK launched 3G services in the first quarter of 2003. The U.K. mobile market was highly developed. There were nearly 50 million cellular subscribers in 2002.[45] Among European countries, only Germany (59 million) and Italy (52 million) had more subscribers. In 2002, its mobile penetration rate was 84%, which was much higher than the European average (50%)[46] and the average global penetration (19%).[47] Since the U.K. had a large base of cellular subscribers, experts expected that the U.K. would have great potential for success in the mobile data market.

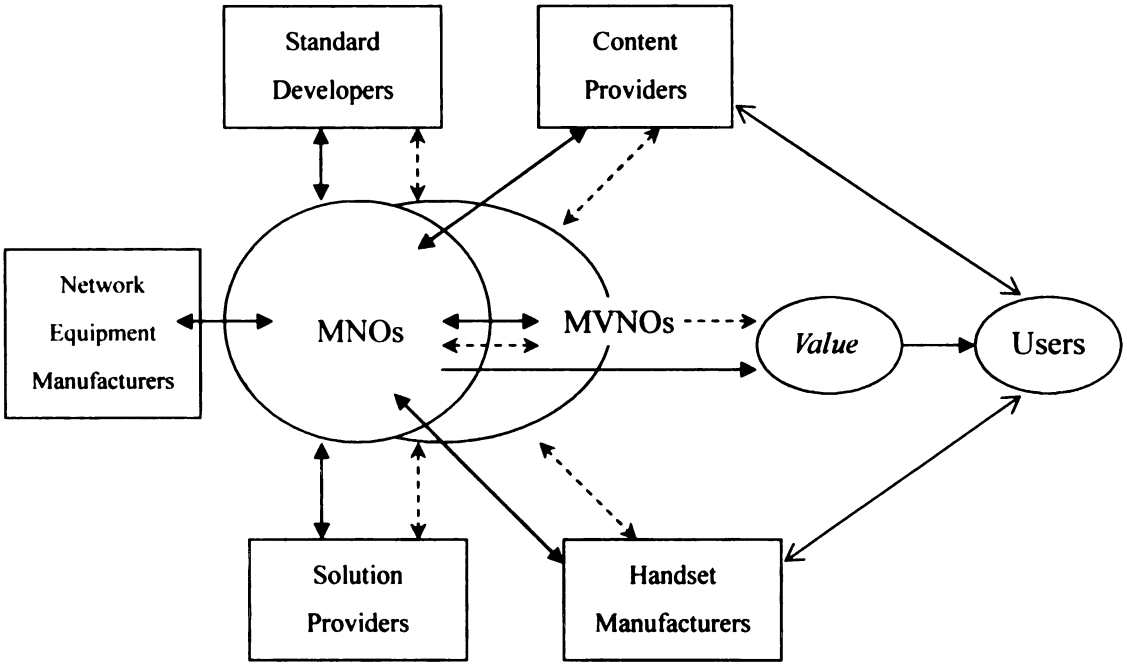
There used to be four mobile operators in the U.K.: Vodafone, BT Cellnet, Orange and One2One. Vodafone had the biggest market share among them (28%), but the difference between operators' market share was small. In March 2001, their market shares were almost equal (Olla and Patel, 2002).[48] However, there were some changes during 2002 and 2003. BT Cellnet merged with the mmO2 and the company's name changed to O2 UK. One2One was annexed by T-Mobile and provided services under the brand name of T-Mobile. Besides, new entrants came into the mobile market. Hutchison 3G UK acquired one of the five 3G spectrum licenses and started its business. It is the only network operator who completely concentrates on 3G services. Beside these five MNOs,

---

[45] Source: ITU http://www.itu.int/ITU-D/ict/statistics/at_glance/cellular02.pdf , 2002
There were 49,921 thousands subscribers in the UK in the end of 2002.
[46] There were 44 European countries taken into account.
[47] Source: ITU. http://www.itu.int/ITU-D/ict/statistics/at_glance/cellular02.pdf, 2002
There were 196 countries taken into account.
[48] Vodafone: 28%; BTCellnet: 26%; One2One: 21%; Orange: 25%.

a MVNO, Virgin Mobile, also participates in this market. Virgin Mobile is a half-half joint venture between Virgin Group and One2One.[49] Without its own network, Virgin Mobile uses infrastructure owned by One2One, but established a new brand for providing mobile services.

Figure5.1 : Value Network of the UK Mobile Data Market



Source: Own Research

The structure of the U.K. mobile data market can be roughly represented in the Figure 5.1. Vodafone, O2, Orange, T-Mobile and Hutchison 3G UK are the network operators as well as the mobile Internet service providers. As network operators, these five companies establish technological cooperation with the standard developers and with network equipment manufacturers. As mobile Internet service providers, these five companies

[49] Source: Virgin Mobile http://www.virginmobile.com/mobile/media_centre/media_tenthings.jsp, Sep. 2003.

work with the content providers, solution providers and handset manufacturers for delivering mobile Internet services to users. Virgin Mobile is the MVNO in this structure. Instead of acquiring a spectrum license and deploying the mobile network by itself, it just delivers services over another operator's network. The MVNO strategy simplifies coordination with the standard developers and network equipment manufacturers. Virgin Mobile can concentrate on negotiating with content providers, solution providers and handset manufacturers.

A. Network Operators vs. Mobile Virtual Network Operators

For Vodafone, O2, Orange and Hutchison 3G, Virgin Mobile is a competitor in the same industry. For T-Mobile, Virgin Mobile is both a competitor and a big client. Virgin Mobile rents the network and buys bulk airtime from T-Mobile for delivering the mobile services under the brand name of Virgin Mobile. Virgin Mobile highly benefits from this partnership. It quickly started launching services since it did not have to build up the network, and also provides the services with lower cost due to the saving from the spectrum license and the network-deploying fee. With lower expenses, Virgin Mobile is more competitive. For example, Virgin Mobile lowered the text message price to 3 pence (5 ¢)per message while other operators charged average10 pence (17 ¢) per message[50].

T-Mobile is the beneficiary in the MVNO model, too. The rental fee from Virgin Mobile brings T-Mobile extra revenue and can slightly relieve the financial burden due to a huge amount of money on the spectrum license. However, Virgin Mobile will become dependent on T-Mobile since it needs T-Mobile's network for providing services. In the

[50] Source: http://www.totaltele.com, April 30, 2003. Virgin Mobile offered SMS at 3 pence per message when sent to another Virgin Mobile phone within the UK from May 1st.

U.K., there is no regulation that requires the operator to open the network. The U.K. regulatory institution just positively encourages some forms of infrastructure sharing. Therefore, T-Mobile could decide to stop sharing its network with Virgin Mobile if the contract expires and it has a strong position in deciding the rental price. Since they are competitors and Virgin Mobile's success will influence T-Mobile's market share, T-Mobile may have mixed incentives with repaid by the pricing of access. It is complicated by the fact that T-Mobile is also a big shareholder of Virgin Mobile. This is why Virgin Mobile did not rent the network from other network operators. Overall, since T-Mobile shares 50% of Virgin Mobile's revenue, it can be expected that T-Mobile will offer the network at a reasonable charge.

B. Network Operators vs. Content Providers

The U.K. operators tend to actively partner with the content providers, especially with established and recognized media companies. Operators usually establish reciprocal partnerships with those media companies instead of being a content gatekeeper or controller. Hutchison 3G has a partnership team. One of its duties is to look for the content partners who can deliver quality and consistent services for its users. Its present key content partners are BBC Technology, The F.A. Premier League and Emap.[51] BBC Technology converts the audio and visual formats for Hutchison 3G's services. The F.A. Premier League provides football clips. Emap provides music and entertainment news. Hutchison 3G also offers a register approach on the "official" website for those who are interested in becoming the content partner with it and it is open to everyone. However, the website does not explain the selecting criteria. Vodafone UK Content Services, a

[51] Source: http://www.hutchison3g.com, Sep. 2003

division of the Vodafone Group, is a central content broker seeking mobile entertainment and information content for Vodafone users.[52] Vodafone UK Content Services signed up several major content partners for Vodafone. Digital Bridges is one of those partners. It is a U.K. mobile entertainment firm[53] and distributs mobile game content for Vodafone's mobile Internet service: Vodafone Lives!. Another example is T-Mobile. T-Mobile wanted to gain the strength in providing multimedia services when it launched t-zones mobile Internet service, so it acquired some major brands as content partners, like MTV, Sony, and Universal Music for delivering music download and special ringtones.

C. Network Operators vs. Handset Manufacturers

In the U.K., the mobile operators tend to take an open attitude toward handset manufacturers. They do not establish a close partnership with some specific handset makers like Korean and Japanese operators. Their service plans are compatible with a variety of handset brands and models. When customers subscribe to mobile services, they have a variety of choices of service plans and handsets whether they shop at operators' retailers, independent dealers or online. This benefits the handset makers since their products can be purchased by every consumer no matter who their service providers are. One drawback is that operators cannot ask handset makers to develop phones with a unique appearance for their services.

The fact that operators lack for close relations with handset makers caused a shortage of handsets initially when Hutchison 3G launched the first 3G service in Britain. Hutchison 3G was the only operator providing 3G services. As other operators provided

---

[52] Source: http://www.vodafone.co.uk, Sep. 2003
[53] Source: http://www.totaltele.com, Feb. 27, 2003

services based on GSM or GPRS networks and those services were still popular, handset manufacturers tended to focus on producing 2G or 2.5 G handsets. Besides, Hutchison 3G could not provide a guarantee sales volume to the handset makers. Therefore, handset makers hesitated to invest money in the high-risk 3G market and delayed handset production.

The U.K. mobile market is very competitive. To acquire more subscribers, each operator has its own special offers for service plans and handsets. Those special offers can increase the sale of some specific service plans as well as handsets. It is a cooperative strategy good for both of the operators and handset makers. Moreover, the mobile operators pay handset manufacturers or retailers 30% to 100% of the handset price. As long as customers sign a 12-month service contract, they get a handset at a discount or even for free. Generally speaking, the handset price is dependent on the tariff chosen. The higher tariff customers choose, the lower price they pay for a handset. Besides, operators have different subsidization policies for the same handsets. Take the Nokia 7250 as an example. If customers purchase a Nokia 7250 at a 3G Newsroom online store[54], they get it for free or pay up to £339.99 ($576.25)according to the service plan they choose (see table 5.1). Orange subsidizes the Nokia 7250 model most among all of the operators. Its subscribers get the Nokia 7250 for free if they sign a contract for more than £50 ($84.75) monthly line rental. If consumers subscribe to mobile services from Virgin Mobile, they pay £339.99 ($576.25) for a handset since Virgin Mobile does not subsidize the handsets.

[54] http://3gnewsroom.mobiles.co.uk, Sep. 2003.

Table 5.1: Comparison for Handset Subsidies Provided by the UK Operators (Taking Nokia 7250 as an Example)

Service plan	SIM-Free[55]	O2	Orange	T-Mobile	Vodafone
Handset price	£339.99 ($576.25)	£79.99 ~ £219.99 ($135.58~$372.86)	£0.00 ~ £199.99 ($0~$338.97)	£19.99 ~ £249.99 ($33.88~$423.71)	£99.99 ~ £229.99 ($169.47~$389.81)
Subsidy	N/A	£120~£260 ($203.39~$440.68)	£140~£339.99 ($237.29~$576.25)	£90 ~ £320 ($152.54~$542.37)	£110 ~£240 ($186.44~$406.78)

Source: own research, Oct. 2003

D. Mobile Data Services

Five of six British mobile operators provide 2G and 2.5G services: Vodafone, O2, Orange, T-Mobile, and Virgin Mobile. In general, the service items they provide are very similar. They all offer services such as text and picture messaging, WAP content, E-mail, ringtone and wallpaper downloads, and games (see Table 5.2). Hutchison 3G's "3" is the only 3G service in the U.K. (2003). It offers customers more services than the others through its 3G network. For instance, it provides the first and the only 2-way mobile video calling in the U.K.[56] and a wider variety of games, VOD, and MOD than other operators.

[55] SIM free mobile phones can be used on any network.
[56] By Oct. 2003, Hutchison 3G is the only provider of the video calling service.

Table 5.2: Mobile Data Service Plans in the UK

Service Provider	Service Brand	Service Items	Network
Vodafone	Vodafone Live!	-Picture, sound, and text messaging -Mobile Internet access -WAP content -Polyphonic ringtones -Games -Vodaphone live! menu: News, download..... -E-mail -Vodaphone messenger	GSM/GPRS
O2	O2 Active	-Mobile Video -myWAP: the mobile web and WAP community -E-mail -Media messaging -Games -Ringtones and Wallpapers Downloads -Entertainment and sport news	GSM/GPRS
Orange	N/A	-Text and Voice media service -Ringtones and Pictures Downloads -Games -E-mail & text messaging -Photo messaging -WAP websites and information	GSM/GPRS
T-Mobile	t-zones	-Messaging: Text, picture, video messaging -E-mail -Downloads: Ringtone, picture, Video download -t-games: Text and JAVA Games -t-movies: star photo and movie theme download -t-music: music news and special ringtone download -t-sports: sport news -WAP services	GSM/GPRS
Virgin Mobile	Virgin Xtras	- Sport: Latest sports news - Music: Music information - Going out: Living information - Staying in: TV guide, buy DVD/Video, rent games - Travel: Travel news - Shopping: m-commerce - Organiser: e-mail and personal calendar - Fun: Ringtones, graphics, horoscopes, lotto... - News: UK news, music and sports news..... - Text messaging - Text games	GSM/GPRS
Hutchison 3G	3	-Text, video, and photo messages -Video calls -Online Content -Download & Keep Content -Games Content -E-mail	W-CDMA

Source: These operators' service websites, Oct. 2003

Several strategies are adopted to make the services look special and distinct from competitors' services. Some of them brand their services with a simple name which also contains their companies' images such as Vodafone Live!, O2 Active, t-zones, VirginXtras, and 3. Some of them highlight the specialties of the services. For example, Vodafone distinguishes its "Polyphonic Ringtones" from other ringtones. O2 differentiates its "myWAP community" from other WAP content. T-Mobile names its services as t-games, t-movies, t-music, and t-sports to imply they may have some unique content. Virgin Mobile uses another strategy. Its services and content are very entertainment-oriented. It stresses what kinds of amusements it has rather than the services for communicating between people.

E. Mobile Data Tariff

The two most common service plans in the U.K. are "Pay monthly service plans" and "Pay as you go". "Pay monthly service plans" are provided by every operator except Virgin Mobile. Operators provide several service plans for different patterns of mobile phone usage (see examples in Table 5.3). Not only do they differentiate the plans by the quantity of usage, but also by the timing of usage (e.g. anytime, daytime, or weekend & evening), and the network of usage (e.g. transmitting within the same network or to other U.K. networks). If customers subscribe to a monthly service plan, they can choose a plan which fits their needs the best. By paying a fixed amount for monthly line rental, they have certain free allowances for making voice calls, sending text /media messages, or downloading content. Once this allowance is used up, they pay extra money for the

excess part. If there is a surplus allowance, some operators allow it to be carried over.[57] However, these service plans are mainly designed for making voice calls. The allowance for the mobile data is usually limited. Some operators provide extra service packs for the customers who use mobile data heavily. For example, Orange's customers can pay £4 ($6.78) per month for unlimited WAP browsing[58]. Vodafone's customers can add a "Half-price extras pack" on the plan they subscribe and pay £3 ($5.08) per month to receive £6 ($10.17) worth of text, picture messages, Internet, WAP, and Vodafone live! web browsing[59].

Table 5.3: Examples of Monthly Price Plans in the UK

Operator	Price Plan	Monthly Price Plans			
			Number of inclusive minutes	Cost per month	Picture messaging and data included
Vodafone	Perfect Fit	anytime	30	£15 ($25.42)	£2 ($3.39)
			Online 100	£15 ($25.42)	£8 ($13.56)
			200	£30 ($50.85)	£2 ($3.39)
			400	£50 ($84.75)	£2 ($3.39)
			1000	£75 ($127.12)	£2 ($3.39)
		daytime	100	£20 ($33.90)	£2 ($3.39)
			200	£25 ($25.42)	£2 ($3.39)
			400	£45 ($76.27)	£2 ($3.39)
			1000	£60 ($101.69)	£2 ($3.39)
		weekend & evening	300	£17.50 ($29.66)	£2 ($3.39)

[57] In Vodafone's price plan, any unused minutes can be carried over and used in the next month. Source: http://www.vodafone.co.uk

[58] Source: http://www.orange.co.uk , Oct. 2003

[59] Source: http://www.vodafone.co.uk ,Oct. 2003
"Half-price extras pack" also offers plans for paying £9 to get £18 worth and paying £18 to get £36 worth.

Table 5.3 (cont'd)

O2	Online Tariff		Free Minutes	Free Text/Media Messages	O2 Mobiles/Fixed	Non-02 Mobiles	Monthly Line Rental
		Online OffPeak 500	500 off peak/50 anytime	500/ N/A	30p/ 2p (¢ 51/ ¢ 3)	45p/ 30p (¢ 76/ ¢ 51)	£20.00 ($33.90)
		Online OffPeak 750	750 off peak/ 35 anytime	500/ 125	30p/ 2p (¢ 51/ ¢ 3)	45p/ 30p (¢ 76/ ¢ 51)	£25.00 ($42.37)
		Online 50	50 anytime	500/ N/A	15p (¢ 25)	40p (¢ 68)	£20.00 ($33.90)
		Online 100	100 anytime	500/ 125	15p (¢ 25)	40p (¢ 68)	£25.00 ($42.37)
		Online 200	200 anytime	500/ 125	15p (¢ 25)	40p (¢ 68)	£30.00 ($50.85)

Source: Vodafone http://www.vodafone.co.uk ,2003 ; O2 http://www.o2.co.uk , Sep. 2003

Every UK operator provides a "Pay as you go" plan. If subscribers choose "Pay as you go," they do not pay for the monthly line rental. They just pay for the exact amount they use. For Virgin Mobile's customers, "Pay as you go" is the only choice.

Service providers rely on different metrics to measure use, not only different from service to service, but also different from network to network. The same services may have different pricing units when data are transmitted over GSM, GPRS, or W-CDMA networks. For example, WAP content and E-mail over GSM are charged by the length of connecting time (per minute), but charged by the number of data packs (per Kb or per Mb) while they are over GPRS. Hutchison 3G adopts a different way of charging for its W-CDMA services. It sets up nine price bands and categorizes all the services into a suitable price band according to its service rules. The higher the level the service is in, the

more expensive its price unit is. For example, reading small e-mail belongs to price band A, reading medium/large e-mail and sending small/medium e-mail belong to price band C, and sending large e-mail belongs to price band D.[60] The price of a unit in band A is 5p (¢ 8) while band C is 25p (¢ 42) and band D is 50p (¢ 85). Except for "calls", every service is charged on per "event" basis (see Table 5.4).

Table 5.4 Hutchison 3G's Service Prices

Price Band	Price	Calls (per minute)	Messaging (per event)	Email (per event)	Online (per event)	Download and Keep (per event)
A	5p (¢ 8)	-Voice calls to other 3 customer -Voice calls to Voicemail		Read small email	-Football scores -Game tips -Latest news -Lotto results etc.	
B	10p (¢ 17)	-Voice calls to UK landlines	-Lotto Alert -Text message -Text football -Score alert		-Individual Maps -Info. directory -Market news -Football table etc.	
C	25p (¢ 42)	-Voice calls to other UK mobile	-Football news alert -Message Fun -Multimedia message -Photo message	Read medium/large email, Send small/medium email	-A to B Map -Online Game -Football live text commentary -Restaurant Guide -UEFA Match report etc.	-Comedy animation video -Comedy stand up video -Horoscope -Weather video
D	50p (¢ 85)	-3 to 3 UK Video Calls -Voice calls to Directory Services	-FunMail picture message -Video message	Send large email		-Celebrity interviews -Preview Video -MTV video etc.
E	70p ($1.19)					-Best of MTV, -Premier league half time highlight
F	£1.00 ($1.69)		-FunMail video message			-General entertainment, -Slideshow -Premier league full time highlight
G	£1.50 ($2.54)					-General entertainment, -Slideshow
H	£2.00 ($3.39)					-Ringtune/Theme, -Wallpaper
£2.50 ($4.24)						-General entertainment -Video (Top shelf) -MTV live lounge

Source: Hutchison 3G, Oct. 2003

[60] Source: http://www.hutchison3g.com, Sep. 2003.
Small e-mail is less than 10Kb. Medium e-mail is between 10Kb to 100Kb. Large e-mail is over 100Kb.

II. The Mobile Data Market in the U.S.

Although the U.S. has the world's second largest mobile market,[61] it lags behind some West-European and Asian countries in the development of mobile data. First, it has a lower mobile data penetration rate. At the end of 2002, the U.S. merely had 8% mobile data penetration rate[62] while Japan had 75%[63]. Second, none of the mobile carriers had launched a nationwide 3G service yet and the two 3G services were only offered in the very limited areas. Both of them are based on CDMA2000 1XEV-DO. One was launched by a regional carrier, Monet Mobile, in some cities of the central states at Oct. 2002.[64] The other one was launched by Verizon in San Diego and Washington D.C. in Oct. 2003 and mainly targeted the business users.

There are six nationwide mobile operators and more than a hundred regional operators in the U.S., but only the nationwide operators are discussed here. Verizon Wireless, a joint venture of Verizon Communication Inc. and Vodafone Group PLC,[65] is the biggest U.S. mobile operator. Its market share is an estimated around 23%.[66] Ranked by the mobile market share, the next five operators are Cingular Wireless (15.4% market share), AT&T Wireless (14.7% market share), Sprint PCS (10.4% market share), Nextel (7.5% market share) and T-Mobile (7.0% market share).[67] Strictly speaking, there is no

---

[61] Source: ITU http://www.itu.int , Oct. 2003

[62] Source: FCC CMRS Eighth Competition Reports http://www.fcc.gov, July 2003
There were 11.9 million mobile telephone users who subscribed to some type of mobile data service at the end the 2002 and there were around 141 million mobile telephone users in 2002.

[63] Source: ICS http://www.souma.go.jp, Oct. 2003
There were 59.5 million mobile telephone users who subscribed to mobile data service at Dec. 2002.

[64] Source: 3G Today http://www.3gtoday.com ,Oct. 2003
Monet's CDMA2000 1XEV-DO services offered in Sioux Falls (South Dakota), Fargo (North Dakota), Grand Forks (North Dakota), Bismarck (North Dakota), Eau Claire (Wisconsin), Superior (Wisconsin), Duluth (Minnesota) and Moorhead (Minnesota).

[65] Source: Verizon Wireless http://www.verizonwireless.com, Oct. 2003

[66] Source: FCC CMRS Eighth Competition Reports http://www.fcc.gov, 2003
Out of 141.8 million total subscribers in the U.S., Verizon had 43.49 million subscribers in the end of 2002.

[67] Source: FCC CMRS Eighth Competition Reports http://www.fcc.gov, 2003

dominant player in the U.S. mobile market since none of them greatly gets ahead of the followers. This situation makes the U.S. mobile market very competitive and brings on a fierce price war between operators and more advertisement campaigns. Due to the difficulty on increasing the number of subscribers, the mobile operators intend to put more efforts on "undeveloped" mobile data service for increasing ARPU. They continue upgrading their mobile networks with the advanced network technologies for delivering mobile data with high speed and initiate the promotion for mobile data service. In 2002, mobile data contributed to only 1.7% of the mobile operators' total ARPU and revenue.[68] However, it is predicted that the U.S. mobile data market will grow fast. The mobile data penetration will rise from 2% in 2000 to 60% by 2007 and the size of the market will rise from 5 million subscribers in 2000 to 172 million by 2007.[69]

In addition to the six mobile operators, there is one new entrant in the market. Virgin Mobile USA is a joint venture of Virgin Group and Sprint PCS. Without its own mobile network, its service is delivered through Sprint PCS's network and it is positioned as a MVNO for reselling the airtime. Although it only had 0.25% market share by the end of 2002, it still seems to have a bright future. First, its number of subscribers is rapidly growing. It acquired 350,000 customers within the first 6 months since its initial rollout at July 2002[70] and had 500,000 subscribers at April 2003[71]. Second, its mobile data usage rate is much higher than the others'. While 20% of the U.S. cellular subscribers sent or received SMS in 2002, there were more than 50% of the Virgin Mobile's subscribers used

---

[68] Source: FCC CMRS Eighth Competition Reports http://www.fcc.gov, 2003

[69] Source: The Strategies Group http://www.strategisgroup.com ,news was issued in 2001 but retrieved in Oct. 2003

[70] Source: Virgin Mobile USA http://www.virginmobileusa.com, Oct. 2003

[71] Source: TotalTelecom http://www.totaltele.com, April 22, 2003

SMS[72].

The value network of the U.S. mobile data market is similar to the U.K. (see Figure 5.1). The U.S. also has a MVNO (Virgin Mobile USA) besides network operators (Verizon Wireless, Cingular Wireless, AT&T Wireless, Sprint PCS, Nextel and T-Mobile).

A. Network Operators vs. Content Providers

The information about how the U.S. mobile operators select their content providers and their business models is not easy to obtain. However, from the list of content providers on those operators' service websites, it seems that they prefer branded media companies. For example, at least five of them offer content from ESPN, Amazon, and The Weather Channel; three of them offer content from e-Bay, CNN, ABC and Sabre; five of them offer AOL Instant Messenger. Those content providers are usually familiar to the general public. They could attract the customers to subscribe operators' mobile data service. On the other hand, the operators do not restrict the content providers to provide their content to others, so the content providers want to offer their content widely.

However, some content providers have partnership with only one network operator. For example, Verizon Wireless cooperates with MSN to offer MSN Messenger and mobile Internet portal (vzw.msn.com) to its customers. MSN is Verizon Wireless's exclusive content provider and does not offer the same content to the other operators. Virgin Mobile USA also has an exclusive content provider. It provides unique content since its target market is the young generation and needs market distinction from other operators, so it has a multi-year strategic partnership with MTV networks and offers

[72] Source: Virgin Mobile USA http://www.virginmobileusa.com, Oct. 2003

music and entertainment content from MTV and VH1.[73]

B. Network Operators vs. Handset Manufacturers

Basically, the U.S. mobile operators are big resellers of handset manufacturers. After they order handsets from handset manufacturers, they market the handsets to the customers with their mobile services. They could decide how to sell a handset: Which service plan should it go with? How much does it cost? Is there a rebate discount offered? They could purchase handsets from any makers as long as the handsets support their network technologies and mobile service. If they have special mobile services or adopt unique network technologies, they tend to partner with some specific handset makers and participate more during the process of R&D and product testing to make sure the handsets can work well on their networks or carry their mobile services without a hitch. For example, Nextel is the only operator who adopted the iDEN network technology developed by Motorola in the U.S. It mainly partners with Motorola to produce suitable handsets. Virgin Mobile USA partners with Kyocera and Audiovox instead of the other major brands creating exclusive handsets that could be compatible with its unique mobile services.

C. Mobile Data Services

Compared with other countries which have launched 3G service, the U.S. mobile operators mostly offer the basic mobile data services like text messaging, IM (Instant Messaging), ringtones and graphics, E-mail, information alerts, games, and web browsing for the text-based content (Oct, 2003). None of them provide video telephone. Five of

---

[73] Source: Virgin Mobile USA http://www.virginmobileusa.com, Oct. 2003

them (except Nextel and Virgin Mobile) provide MMS, but only in the regions where there are the advanced-technology networks. MOD and VOD are also limited (see Table 5.4).

Table 5.5: Mobile Data Services in the US

Service Provider	General Data Service	Special Service Brand	Network
Verizon Wireless	**Get It Now** - Messaging *Text Messaging *Instant Messaging (MSN, AOL, TXT Community) *E-Mail - Fun & Games *Games *Ringtones *Living Information Searching - Info *Alerts *Mobile Web Browsing - Flix & Pix *Video Clips Viewing *Picture Messaging	Brand Name: **Express Network** -High-speed Wireless Internet Access	CDMA/ CDMA2000 1X (CDMA20001X is for Express Network)
Cingular Wireless	-Text Messaging - Instant Messaging *Yahoo Messenger *AOL Instant Messenger - Multimedia Messaging - Games - Ring Tones & Graphics - Wireless Internet	N/A	GSM/GPRS EDGE (limited)
AT&T	-Text Messaging - Instant Messaging *Yahoo Messenger *AOL Instant Messenger - Multimedia Messaging - Games - UPOC Community Chat -Ring Tones & Graphics	Brand Name : **mMode** -E-mail -Instant Messaging -Text Messaging -Office Online -Match Mobile -Web Search -News and Information -Games -Music	GSM/GPRS EDGE (limited)
Sprint PCS	N/A	Brand Name: **PCS Vision** - Picture Mail - Messaging - Games - Ringers - Screen Savers - Web Access - PCS Business Connection	CDMA/ CDMA2000 1X

Table 5.4 (cont'd)

Service Provider	General Data Service	Special Service Brand	Network
Nextel	-Wireless Web Access -Email Services - Mobile Messaging *Two-Way *Text and Numeric *AOL Instant Messenger - Java applications/ Ring Tones	N/A	iDEN
T-Mobile	- Picture & Video Messaging - MegaTones - Text Messaging - AOL Instant Messenger - E-mail - Wallpapers and Screensavers - Games - Alerts	Brand Name: **t-zone** - Picture & Video Messaging - MegaTones - Text Messaging - AOL Instant Messenger - E-mail - Wallpapers and Screensavers - Games - Alerts - t-zones Mobile Web	GSM/ GPRS
Virgin Mobile USA	- Text Messaging - Ringtones	Brand Name: **VirginXtras** - Ringtones - MTV - Daily Dose - vh1 2 go - Music	CDMA/ CDMA2000 1X

Source: Own Research from the websites of the listed operators, Oct. 2003

Due to the different market targets and the limitation of network bandwidth, some operators have different services from others. Sprint PCS's main target users is business users, so it offers PCS Business Connection especially designed for them. Virgin Mobile USA's main target users are the teenagers and young adults. Focusing on their demand on music, movies and fun, Virgin Mobile USA targets entertaining content. As for Nextel, it only provides basic services because of the limitation of transmission speed.

Some operators bundle data services and create a brand name for the combination. Customers have a variety of mobile data services included in one plan, such as AT&T's mMode, Sprint PCS's PCS Vision, T-Mobile's t-zone, and Virgin Mobile USA's VirginXtras. It would be easier to advertise and market the service product. Among those

service brands, Verizon Wireless's Get It Now is an exception. Even though it gave a brand name for the collection of the services, customers do not have to get them all and can subscribe to the services individually just like other general data services in Table5.4.

D. Mobile Data Tariff

Three common ways are adopted for charging mobile data services. Some mobile data services could be offered individually and paid on a per-use basis as long as users subscribe to the monthly voice service. Text messaging is the most common service which is charged in this way. With the exception of Sprint PCS, the other six operators allow customers to use text messaging without subscribing other mobile data services and pay every time they send or receive messages (see Table5.6).

Table 5.6: Text Messaging Price in the US

Provider	Per-Message	
	Send	Receive
Verizon Wireless	10 ¢	2 ¢
Cingular Wireless	10 ¢	10 ¢
AT&T	10 ¢	Free
Sprint PCS	N/A	N/A
Nextel	10 ¢	10 ¢
T-Mobile	5 ¢	5 ¢
Virgin Mobile	10 ¢	Free

Sources: FCC CMRS Eighth Competition Report and Virgin Mobile, http://www.virginmobileusa.com Oct. 2003.

The second way for charging mobile data services is selling certain service packages. Like the first alternative, users can choose the services they want. Sometimes a service package includes more than two services and users pay a monthly fee instead of the usage fee. For example, the Verizon Wireless's customers can pay $4.99 per month for

unlimited mobile web browsing, E-mail and instant messaging.[74] They also can pay $2.99 per month for monthly allowance of 100 text messages, $3.99 per month for monthly allowance of 200 text messages, or $4.99 per month for monthly allowance of 20 picture messages and 100 text messages.

The third option is to offer a plan that contains a set of services. Some operators offer mobile service plans which include most of their mobile data services. Those who subscribe to these plans pay a monthly or daily fee. They cannot just choose and pay for what they want. Verizon Wireless's *Express Network*, AT&T's *mMode*, Sprint PCS's *PCS Vision*, T-Mobile's *t-zone*, and Virgin Mobile USA's *VirginXtras* belong to this category (see Table 5.7 in the next page).

[74] Source: Verizon Wireless http://www.verizonwireless.com, Oct. 2003

Table 5.7: Mobile Data Service Plans in the U.S.

Provider	Service Brand Name	Price Plans
Verizon Wireless	Express Network	Express Network Calling Plan -$35 for 150 min -$55 for 400 min -$75 for 600min -$100 for 900min -$150 for 1500min -$200 for 2000min -$300 for 3000min
		Unlimited Express Network Calling Plan - $79.99
		Express Network Megabyte Calling Plan - $39.99 for 20 MB -$59.99 for 60 MB
AT&T	mMode	mMode MINI - $2.99 plus ¢ 2 per kilobyte mMode MEGA - $7.99 plus ¢ 1per kilobyte over 1MB mMode MAX - $12.99 plus ¢ 0.8per kilobyte over 4MB mMode MEGA - $19.99 plus ¢ 0.6per kilobyte over 8MB
Sprint PCS	PCS Vision	Unlimited PCS Vision services -$15 if subscribing voice service under $80 -Free if subscribing voice service more than $100
T-Mobile	t-zone	t-zones service - $2.99 plus $3 per MB over 1MB unlimited t-zones pro - $ 9.99 for unlimited data transfer
Virgin Mobile	VirginXtras	10 cents per day

Source: Own Research from these operators' websites, Oct. 2003

Chapter 6

Analysis, Conclusions, and Suggestions for Future Studies

Four mobile data markets were discussed in this study: Korea, Japan, the U.K., and the U.S. These four cases have some similarities. First, they all have a vision of 3G as the next generation mobile service. Korea, Japan, and the U.K. have already launched commercial 3G service. Although the U.S. is currently falling behind, it may catch up in the near future. On Oct. 16th, 2003, later than the other nations, the Federal Communications Commission (FCC) adopted Third Generation rules which include provisions for application procedures, licensing, technical operations, and competitive bidding;[75] however, U.S. mobile service providers were allowed to use 2G spectrum allocations to deploy 3G services. Second, all four countries have advanced mobile markets and have high mobile phone penetration. Third, they are relatively affluent and highly-developed countries.

These similarities did not make their markets all develop in the same way. On the contrary, they exhibit diverse market structures and performances. While Korea and Japan have highly integrated market structures and a high mobile data penetration, the U.K. and the U.S. seem to be the opposite. To find out the reasons, a discussion about their differences is necessary. Since this study attempts to use the value network model to analyze each market, the discussion of the differences will be based on this model. I will also explain how these differences influence the markets. In the conclusion, some suggestions for future studies will be proposed.

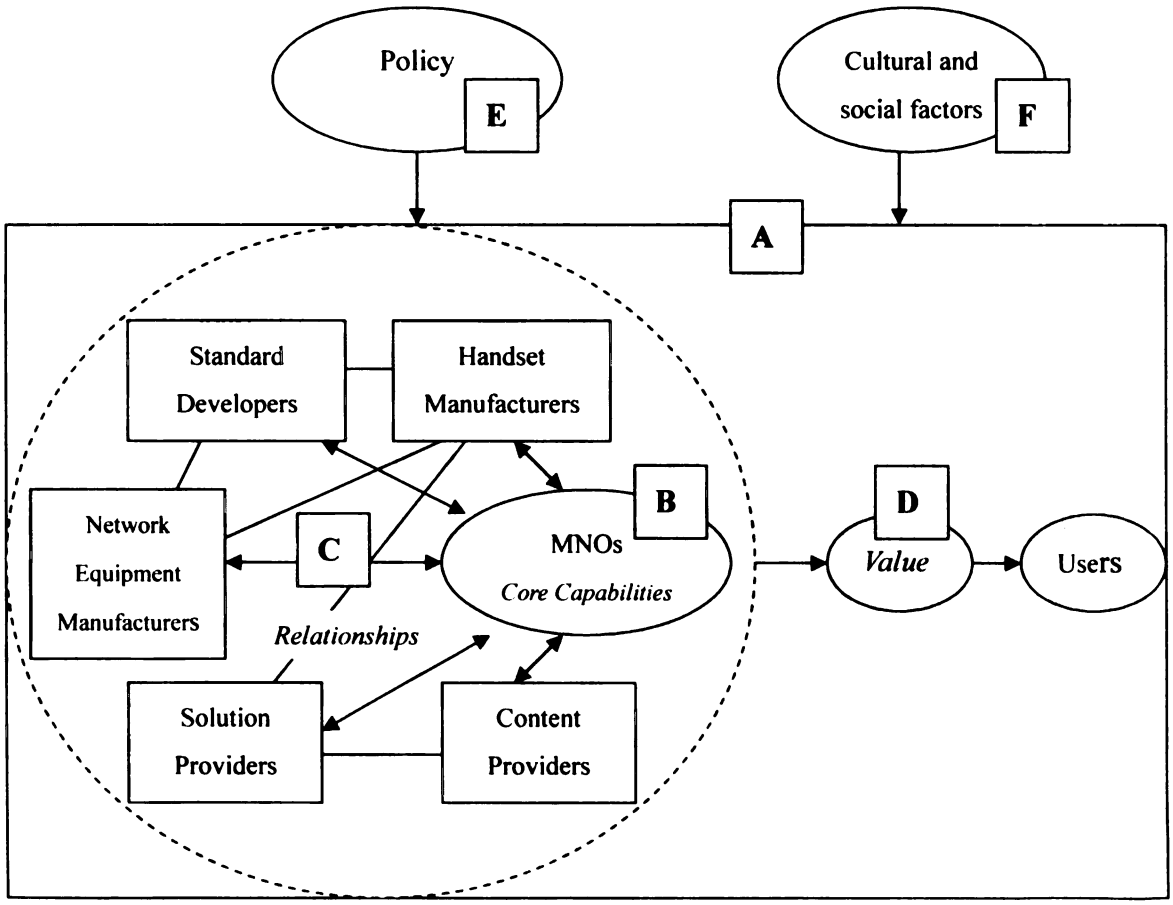
---

[75] Source: http://www.fcc.gov, 2003

I. Differences among the Four Cases and Their Influences

Several differences among the mobile data markets of Korea, Japan, the U.K. and the U.S. are revealed in this study. Figure 6.1 shows where those differences are in the value network. "A" is the overall model of the value network. "B" includes the structure and organization number of market, and MNOs' various strategies. "C" refers to the relations between operators and other players. "D" stands for the value created in the market. "E" represents the policy framework, which influences corporate decisions. "F" represents the cultural and social factors that influence the market. Those differences will be articulated in this section.

Figure 6.1: Locus of Differences among the Four Cases in the Value Network



Source: Partially adapted from ITU Internet Reports (2002) and Own Research

A. Model of value network

Simplified model of value networks in the four cases were depicted in Chapters 4 and 5[76]. The first difference among these network models is that in the UK and the US a MVNO takes part in the mobile data market but in Korea and Japan there are none. Virgin Mobile has entered both the UK and US markets. Even though it provides services to the users in the same way as mobile network operators, it has a simpler business connection with standard developers and network equipment manufacturers than regular operators because it does not own the mobile network. However, it has to be dependent on operators and pay for the use of the network. The second difference among the network models is the link between operators and handset manufacturers. Due to the ban on handset subsidies, Korean operators cannot establish a financial link with handset manufacturers. They need a "third party" to place an order of handsets from handset makers and sell the handsets to the resellers. If users need a new handset, they have to go to the retailers; they cannot buy it from the operators. In Japan, the U.S., and the U.K., the situation is different. Their operators have a financial link with handset makers and can purchase handsets from handset makers. Operators resell handsets to users and can subsidize handsets makers or retailers to lower the price of the handsets. The third difference is the relations between players and users. Operators' strategies in organizing the market influence other players' relations with users. In Korean and Japanese models, content providers have fewer connections with customers since operators control the service portals and billing systems. In the U.K. and U.S., content providers have more connections with customers since they have to market their content and gather the content

[76] Figure 4.1 represented the model of Korean market. Figure 4.4 is the model of Japanese market. Figure 5.1 is the model of British market as well as American market.

fees by themselves. Handset manufacturers also have more connections with customers in the U.K. and the U.S. For example, Nokia is the biggest handset providers in the U.K. It actively established a direct link with its British mobile phone owners by providing the "Club Nokia!" service[77]. Nokia and Motorola are the two top handset makers in the U.S. market. They both offer download services to their mobile phone owners. Besides, it is common that handset makers try to boost handset sales by rebating portion of the handset price to customers in the U.S. Comparatively, the major Korean or Japanese handset makers have fewer connections with their handset owners.

B. Market share and core capabilities of operators

i) Number and market share of operators

The number of mobile network operators is different among these four markets (see Table 6.1). Both Japan and Korea have three operators, the U.S. has seven, and the U.K. has six. In Japan and Korea, the largest operator has more than a half of the market share and the second one has around a quarter of the market share. In the U.S., none of the operators has more than a quarter of the total market. For the larger operators, market shares vary from 7% to 23 %, and the smallest one has merely 0.25%. In the U.K., the four largest operators each have similar market shares around 25%. The fifth and the sixth account for less than 6%. Based on the number of operators and the concentration ratios (CR)[78], Japan and Korea have a market structure of tight oligopoly. The U.K. has a market structure between tight and loose oligopoly. The U.S. mobile market can be

[77] "Club Nokia!" is provided in more than 30 countries worldwide in 2003, but not in Japan, Korea, and the US.

[78] Market structure can be categorized as follows---Monopoly: only one supplier,; CR(1) and CR(4) is 100%. Tight Oligopoly: 2~5 suppliers; CR(1) is below 50% and CR(4) is 60~100%. Loose Oligopoly: 2~5 suppliers; CR(4) is less than 60%. Competition: more than 5 suppliers; CR(4) is less than 60%.

characterized as a competitive market environment.

Table 6.1: Comparison for Quantity and Market Share of Operators

Market	Number of operators	Operators' market share
Japan	3	NTT DoCoMo: 59% KDDI: 25% Vodafone K.K.: 16%
Korea	3	SK Telecom:53.7% KT Freetel:31.6% LG Telecom:14.7%[79]
United States	7 (Including one MVNO)	Verizon: 23% Cingular: 15.4% AT&T: 14.7% Sprint PCS: 10.4% Nextel: 7.5% T-Mobile: 7.0% Virgin Mobile: 0.25%
United Kingdom	6 (Including one MVNO)	Orange: 26.4% T-Mobile:24.9% O2: 24.5% Vodafone:24.2% Virgin Mobile:5.8% Hutchison 3G: 0.3%[80]

Source: Own Research from these four markets

Based on the market structure, the principal operators in Japan and Korea seem to have a

[79] Source: SK Telecom, KT Freetel and LG Telecom, 2003

[80] Source: Oftel Market Information
http://www.oftel.gov.uk/publications/market_info/2003/mobile/q5mobile1003.pdf ,2003
This report does not include Hutchison 3G and Virgin Mobile. However, it mentioned that Hutchison 3G had around 155,000 UK subscribers in August 2003, representing 0.3% of all mobile users. Therefore, there were about 51.67 million UK subscribers in total.
In Virgin Mobile's website, http://www.virginmobile.com , it pointed out that it had 3 million subscribers in August 2003. So it had around 5.8% of 51.67 million UK mobile users.

higher market power than operators in the U.K. and the U.S. With more than 50% of market shares, NTT DoCoMo and SK Telecom could easily attract more business partners and have a higher bargain power than their competitors. Thus, they are in an advantageous position to provide quality services. Besides, they have the greatest influence on framing the market network and market development. Other operators are relatively powerless, so they tend to follow the leader's steps. Otherwise, they will need some special services or competitive price plan to lure customers. In the U.K. and the U.S., a larger number of service providers cause a more competitive market than other two countries. If the U.K. and U.S. service providers want to acquire more subscribers, they will need aggressive marketing and pricing strategies since they have numerous competitors.

Market share is also a strong factor that influences operators' role in the market. The high market share of the principal Korean and Japanese operators is conducive to their central role. Compared with Korean and Japanese operators, the U.K. and the U.S. operators have a low market share. Thus they may lack the market power required to establish a coordinating role in the market.

ii) Core capabilities

Every operator has its peculiar core capabilities. For example, LG Telecom and its handset maker: LG Electronics, both belong to LG Global, so it controls one more critical element of mobile data service, handsets. Virgin Mobile specializes in marketing and packaging the entertainment content. Vodafone K.K. is the leader in multimedia messaging (Vesa, 2003). Hutchison 3G is supported by the conglomerate with strong financial and management capabilities. It also has the largest amount of 3G spectrum in

the UK[81]. These core capabilities have a great influence on creating value, acquiring users and interacting with other players. I am not going to discuss each MNO's core capabilities, because most of those core capabilities mainly cause the variance within the same mobile data market, not the variance between the markets. Rather, the core capability that causes the different value network model will be discussed here; that is, the operators' business strategies in the market integration.

Because all the operators possess their unique management skill and market vision, they do not necessarily make the same strategy for the same industry. They have to cautiously examine their own capabilities and market environment before they make the business strategies that might be best suitable for them. Korean and Japanese operators adopt different business strategies from U.K. and U.S. operators. While Korean and Japanese operators choose the strategy of integrating each player in the market, U.K. and U.S. operators choose the strategy of not controlling or intervening with other players. The business strategy they adopted effects the operators' relations with other players and market roles. These will be discussed in the next section.

C. Relations between operators and other players

i) Relations with handset manufacturers

Compared with the American and British operators, the Japanese and Korean operators seem to have a closer relation with handset makers. They tend to actively participate in the development and production processes of handsets. To ensure the handsets can conform to their requests for the function, performance, exterior design, and size, they usually specify clearly what qualities they need for the handsets and provide support

[81] Source: http://www.hutchison3g.com, 2003

enthusiastically on product research, design, and test. Most of the American and British operators do not work with handset makers so intensively[82]. They tend to be more passive during the development and production processes. Instead of giving detailed requirements for the handsets, they give the handset makers more freedom. The handset makers in the U.S. and the U.K. will have more influences on the function and appearance of the handset. Moreover, while the US and UK operators work with various handset makers from different countries, the Japanese and Korean operators mostly cooperate with domestic handset makers. The latter also prefer developing stable and long-term relationships with specific companies. These are also the factors that facilitate better affiliations with handset makers.

The close relations between the operators and handset makers have three main advantages. First, the handsets and the services they provide can match up nicely. Second, operators can ask for special designs or function keys on the handset, such as their company's respective logos and hot keys that directly dial their service. Third, handset makers tend to highly cooperate with delivering a sufficient quantity of handsets in time when operators want to launch new services. However, it is not easy to maintain close relations with numerous handset makers. Korean and Japanese operators tend to have a few stable partners. This may reduce users' options of handset brands.

The companies who have loose relations have opposite advantages of those who have close relations. The operators can partner with more handset makers, and customers can have a wider choice of handsets. Moreover, one handset may be compatible with

---

[82] Nextel and Virgin Mobile USA are two exceptions. Nextel has a close relation with Motorola since the network technology it adopted was developed by Motorola. And Nextel is the only operator who has iDEN network in the US. Virgin Mobile USA has a close relation with Kyocera and Audiovox because it wants to offer phones with distinguished features (see Ch. 5, the US case study).

different operators' networks; therefore, users will not need new handsets if they switch to other service providers.

ii) Relations with content providers

In terms of the relation between content providers and network operators, the Japanese and Korean operators act like a "manager" in the higher position to govern its "official content providers" while the American and British operators act more like a "partner" in the parallel position to establish the business connection.

This can be discovered by two ways. First, consider the way the operators acquire the content providers. The Japanese and Korean operators control the power to establish the cooperation model as well as the content selection and portal arrangement. Content providers have to follow operators' rules to apply for being "official" content providers. Then the operators filter the content according the selection rules. Once the content has been approved, the operators will arrange its location of the portal website and may advertise it if they presume the content will be popular. On the contrary, the U.S. and U.K. operators do not put their content providers through a strict selection process. They tend to conduct business with major media companies and establish partnership with them.

Second, consider the billing scheme they adopted. Japanese and Korean operators are in charge of the content billing system. When the users subscribe to some "official" content from their portal website, they collect the content fees for the content providers by including the content fees on the phone bill. After the operators receive the money, they keep a certain percentage of the content fees as their commission on managing the bills and give the content providers the remaining sum. However, the U.S. and the U.K. operators do not handle the bills for the content providers. The content providers either

offer the content for free or ask the users to pay by credit card. The users' monthly bills do not include the content fee; rather, they pay the content providers directly.

The "manager" model that Korean and Japanese operators adopted have the following advantages. First, the content registration is open to everyone. Content providers can have easy access to the evaluation process. This is helpful to have abundant content. Besides quantity, the quality of content is guaranteed since the operators carefully evaluate if the content is qualified. Second, content providers can concentrate on content creation, because operators take care of billing systems as well as content solutions (operators also work with solution providers to ensure content can be smoothly transmitted to the users). Third, it is convenient for customers to pay the bills. Operators collect content fees for content providers, so customers do not have to pay content fees to each content provider. The simple payment approach may also increase customers' willingness of purchasing content. The biggest disadvantage is operators usually restrain their "official" content providers from providing same content to other operators. This may limit content's provision.

The "partner" model that the U.K. and the U.S. operators adopted has opposite advantages and disadvantages of the "manager" model. The partner model needs content providers to take care of billing systems and content testing. Customers have to pay by credit card each time they use content (which is not free). The advantage is the operators usually do not bind the content providers to provide content only for them (except some special content partner). Content providers can provide their content through every service provider. They also have more freedom to create content because they will not be put through the evaluation process. Moreover, they can receive all the content fees. They do not need to give service provider commission.

D. Services and pricing

i) Service level

The mobile data services of these four markets are based on different technologies. In Korea and Japan, the services are based on 2.5G and 3G technologies. In the U.K. and the U.S., mobile data are transmitted through 2G or 2.5G networks. Only Hutchison 3G offers 3G services in part of Britain. Due to the limitation of speed transmission, the services that 2G and 2.5G networks can carry are less than 3G networks. Therefore, Korean and Japanese customers have more choices of advanced services which require higher bandwidth and faster speed, such as VOD, MOD, and video telephone. By comparison, American and British customers have a narrower choice of services. Basic services like text messaging, ringtones and simple graphics, WAP content, and E-mail are commonly provided, but the advanced services like MMS, VOD, and MOD are limited.

ii) Service plan design

These four markets applied different service plan designs. Korean and the U.S. operators tend to separate the voice and data services. In general, their users subscribe to the voice service plans at first. If they also need the data service, they have to subscribe to the data service plans additionally. Mostly, their voice allowance cannot be interchangeable with the data allowance. Japanese operators usually combine voice and data service in the same plans. When customers subscribe to some service plan, they have a certain amount of communication allowance, which can be used for voice communication, packet transmissions, and SMS (content and information fees are usually excluded). Even though the allowance was originally designed for free call time, it still can be applied to packet communications charges. If subscribers use data transmission a lot, they can add

other packet packs on the service plan to receive a cheaper rate for data transmission and more data allowance. In the U.K., operators include some data allowance in the service plans yet not much. Most of the communication allowance is for voice minutes. Hutchison 3G and Virgin Mobile are exceptions. Hutchison 3G offers numerous service plans which include some free voice minutes plus free content allowance for the first month of subscribing[83]. After the first month, the service plans only include voice allowance. Data communication fees are charged additionally based on content's bands and usage. Virgin Mobile does not offer "service plans" in the U.K. and the U.S. Its subscribers just pay for what they use monthly.

iii) Methods of measuring use

While the metrics to measure the use of voice is always on an airtime basis and the use of text messaging is always on a per message basis, the use of data transmission can be put on either an airtime basis or on a bit basis. Japanese, Korean and U.S. operators measure the use of data transmission on a bit basis. The Japanese and Korean operators charge their users by the amount of "packets" they transmit. The ways they define one packet are different. For example, SK Telecom defines 512 bytes as one packet while NTT DoCoMo defines 128 bytes as one packet. As for the U.S. operators, some of them apply the unit of "per kilobyte" and some of them apply the unit of "per megabyte". The British operators measure data use on a bit basis as well as on a time basis. When data are transmitted over GSM network, they are charged based on the length of connecting airtime. When data are transmitted over GPRS network, they are charged based on the number of "Kb" or "Mb".

---

[83] Source: http://www.hutchison3g.com , 2003. These special plans are for customers registering between 10/01/2003 and 12/31/2003.

Hutchison 3G adopted another special strategy. Its data services are charged on an "event" basis. How much per event cost depends on which price band this service belongs to (see more details in Ch5 I.E.).

iv) Special pricing strategy

A great variety of discount plans is Japanese operators' special pricing strategy. While other operators do not have so many discount plans, Japanese operators design discount plans for students, family, long-term subscription and so forth (see more details in Ch.5 II D). Not only do Japanese operators want to attract more subscribers by these discount plans, but also they express a spirit that they tend to win customers' loyalty and establish long-term relations.

E. Policy

i) Ban on handset subsidy

Korea is the only country that has banned having subsidies on handset. This rule forced Korean operators to alter their cooperative model with handset makers and retailers, and made them adopt different strategies for handset ordering and delivering from other operators. While Japanese, American, and British operators can take more control of handset wholesaling and pricing, Korean operators need another broker to deal with these matters. The biggest influence of the ban on handset subsidies is the retail price of handsets. Korean customers have to spend more money in buying handsets than other customers.

ii) Spectrum licensing method

Korea and Japan adopted beauty contests for assigning spectrum licenses while the UK and US adopted auctions. The different design of spectrum licensing method affects the license fees. In terms of 3G licenses, the total license fee in Korea was $2,886 million, in Japan it was "free", and in Britain it was $35,400 million[84]. On a per head of population (pop) basis, $61 per pop in Korea was still far less than $590 per pop in the UK[85]. It seems that the auction design tends to cost the operators more in license fees than the beauty contest design. This may also partially explain the different 3G developments in these three countries. U.K. operators presented a heavier financial burden than the Korean and Japanese operators, so they had difficulties in initial investment and delayed the date for launching the 3G services.

iii) Interoperability

Compared with Korea, Japan, and the U.K., the U.S. has a lower degree of interoperability in mobile services. The low degree of interoperability in the U.S. may have hindered the diffusion of early data services. For example, U.S. operators did not offer inter-operator SMS until 2002. Mobile users could only exchange messages with subscribers of the same operator before 2002. While European and Asian operators had provided inter-operator SMS for years and generated significant revenue from it (McKenna, 2002), the U.S. had a slow SMS diffusion due to the lack of interoperability. The lack of interoperability was partially caused by the diverse network technologies

---

[84] Source: ITU Internet Reports—Internet for a Mobile Generation, 2002
There is no information about the US since its 3G rules have just adopted on Oct. 16th, 2003.

[85] The total population of Korea in 2001 was 47,343,000. The total population of the UK in 2001 was 60,012,000. Source: OECD Communications Outlook, 2003

used by the U.S. operators. Before users could exchange SMS smoothly with users of other operators, some operators had to solve the problem of incompatibility between their SMS systems and other network technologies (Loftus, 2002).

F. Social and cultural environment

Besides the above-mentioned, some social and cultural phenomena in these four countries also have influenced on mobile data markets. First, how they commute influences users' need for mobile Internet. Compared with the U.S. and the U.K., Korea and Japan are very crowded. A higher percentage of commuters take bus or rapid transit system to work or to school in Japan and Korea, while a higher percentage of commuters go to work or school by cars in America and Britain. Therefore, Japanese and Korean mobile users may have a higher need to use their mobile phone access Internet since they spend one or two hours waiting and sitting on the bus or train per day. American and British mobile users may have lower need for mobile Internet since it is not convenient to operate the handsets while they are driving. Second, the low Internet penetration in Japan may also increase the users' need for mobile Internet and cause the faster development of mobile data than the US and UK. However, Korea has a high Internet penetration as well as a high mobile data penetration. It seems that mobile Internet and fixed Internet are replacements to each other in Japan, Britain, and America while they are complements to each other in Korea. Someone argued that the factor of timing should be considered. Korea had rapid growth of fixed Internet in recent years. When the first mobile Internet services were launched in 1999, the fixed Internet penetration was low. Therefore, the initial development of mobile Internet was not influenced by the later growth of the fixed Internet.

Table 6.2: Summary of Study's Findings

Topic	Key findings
Model	- MVNO takes part in the UK and US markets but there are none in Korea and Japan. - A third party is needed for handset order and distribute from handset makers to users in Korean but not in other countries. - Content providers and handset makers have more connections with users in Britain and America than in Korea and Japan.
MNOs	- Number and market share of operators caused different market structure Korea and Japan: tight oligopoly The UK: between tight and loose oligopoly The US: competitive - Management skills Korea and Japan: integrating every player in the market The UK and the US: not controlling other players in the market
Relations	- Relations with handset manufacturers Korea and Japan: Operators have close relations with handset makers. The UK and the US: Operators have loose relations with handset makers. - Relations with content providers Korea and Japan: Operators act like a manager. The UK and the US: Operators act like a partner.
Services and pricing	- Service level Korea and Japan: more advanced mobile data services The UK and the US: more basic mobile data services - Service plan design Korea and the US: Voice and data services are in different plans. Voice and data allowance cannot be interchangeable. Japan: Voice and data services are combined in the same plans. Voice and data allowance can be interchangeable. The UK: Data allowance is included in voice service plans but not much. - Methods of measuring data use Korea, Japan, and the US: on a bit basis (Korea and Japan: packet; the US: KB or MB) The UK: on an airtime basis (GSM network) and on a bit basis (GPRS network) Exception: Hutchison 3G--on an event basis

Table 6.2 (cont'd)

Services and pricing	- Special pricing strategy: Japan has a variety of discount plans.
Policy	- Ban on the handset subsidies: only in Korea - Spectrum licensing method Korea and Japan: beauty content The UK and the US: auction -Interoperability Korea, Japan, and the U.K.: higher degree of interoperability The U.S.: lower degree of interoperability
Social and cultural factors	- Commuting patterns Korea and Japan: A higher percentage of commuters take bus or rapid transit system and have more need for the mobile Internet The UK and the US: A higher percentage of commuters drive a car and have less need for the mobile Internet - Internet penetration Japan: a lower Internet penetration and higher need for mobile Internet The UK and the US: a higher Internet penetration and lower need for mobile Internet Korea: a high fixed Internet penetration and a high mobile Internet penetration--the timing factor

II. Suggestions for Future Studies

This study attempted to use the value network model as research framework to analyze the mobile data markets in Korea, Japan, the U.K., and the U.S. The study goal is to find out the significant differences among these four markets and how these differences influence the market development. The study's findings have been presented in the previous section and summarized in Table 6.2. One question might be asked about those findings: which model or strategy is the best among these study cases? The answer is: there is no "absolute" best model or strategy, which is suitable for every market. It seems

evident that Korea and Japan have good business models for mobile data since their markets are successful. However, their models do not necessarily work out in other countries because other countries may have different market environments, business ecosystem, and consumer behavior. This is why the i-mode model was not as successful in other countries (e.g. slow diffusion in the Netherlands) and why many European and American operators did not imitate the i-mode model after i-mode's successful story had been broadly studied.

Even though it is difficult to accurately predict the future development of mobile data, it is for sure that mobile data can bring people great convenience in communicating, information acquiring, and entertaining as long as all the technical and managerial problems are solved. To find out how to solve these problems and the good ways of utilizing mobile data, more studies of the mobile data market are essential since this study is insufficient to achieve these goals. In the following, some suggestions for future studies are proposed to overcome this study's limitations.

First, more interviews with experts from companies should be conducted. It is not easy to get the details of companies' business strategies and their cooperative models from public available source. This study only did interviews on Korean case, so it has a limitation of knowing some particulars of the player interactions in other cases. Second, the focus should be broadened to every player. This study mainly focused on operators' strategies. It did not collect information from other players and study the interactions between other players. Since other players also have an influence on the value creation, studies that consider from other players' point of view besides operators are needed. Users' opinions are also valuable to the market studies. Interviewing or surveying representatives of the mobile Internet users is suggested, too. Third, it is necessary to look

into the variance of business models in the same market. This study considered the general situations in each market when comparing the differences among the four markets. However, some differences among companies in the same market do exist. To have a more precise insight into each market, some studies can just go deep into one market and analyze each company's characteristics. Fourth, it is essential to track the latest status of the mobile data markets. This study was based on the situation before Oct. 2003. Since the mobile data market is constantly changing, the research findings may not be consistent with the latest development.

APPENDIX

Interview Questions

The interviewer will conduct the interview by asking the following questions:

1. What kinds of mobile Internet services and content does [Company Name] provide? How to select and decide which services to provide?

2. Who are involved in the process of offering services to customers? What are these players' roles in the market? Does [Company Name] also play other roles besides the network operator and the mobile service provider at the same time?

3. How does [Company Name] cooperate with its business partners (ex. content providers, ASPs, handset manufacturers) for service creation and providing? Who got the power during negotiation for the deal? (ex. [Company Name] vs. content providers; [Company Name] vs. handset manufacturers) What is [Company Name]'s profit sharing strategy? Dose [Company Name] have the handset subsidizing policy for the customers?

4. How does [Company Name] charge and bill the mobile Internet services? (the pricing strategy & the billing system)

5. What is [Company Name]'s strategy for mobile portal access?
(Open in, open out, or walled garden?)

6. What are [Company Name]'s strengths and weaknesses when comparing to other competitors? What are [Company Name]'s opportunities and threats in the mobile data industry?

7. How many subscribers does [Company Name] have? ARPU (Average Revenue Per User) for all the services (including voice and data) and only for the mobile data services? The percentage of market share in South Korea?

BIBLIOGRAPHY

3GNewsroom.com. (2003). Retrieved Sep., 2003, from http://3gnewsroom.mobiles.co.uk

AT&T. (2003). *Company Website*. Retrieved Oct., 2003, from http://www.attwireless.com/

Baldi, S., & Thaung, H. P.-P. (2002). The Entertaining Way to M-Commerce: Japan's Approach to the Mobile Internet - A Model for Europe? *Electronic Markets, 12*(1), 6-13.

Bauer, J. M., Westerveld, R., & Maitland, C. F. (2001). *Advanced Wireless Communications Infrastructure: Technical, Economic and Regulatory Conditions of UMTS Network Deployment.*

Beck, J., & Wade, M. (2003). *DoCoMo: Japan's Wireless Tsunami*: New York: American Management Association.

CDMA Development Group. (2003). *CDMA Technology*. Retrieved June, 2003, from http://www.cdg.org/index.asp

Cingular Wireless. (2003). *Company Website*. Retrieved Oct., 2003, from http://www.cingular.com/

Comscore Networks. (2002). from http://www.comscore.com

Curwen, P. (2002). *The Future of Mobile Communications: Awaiting the Third Generation*. New York: Palgrave Macmillan.

EMC. (2003, May, 2003). *EMC World Cellular Database*. Retrieved June, 2003, from http://www.emc-database.com

Evans, J. R., & Berman, B. (2001). Conceptualizing and Operationalizing the Business-to-Business Value Chain. *Industrial Marketing Management*(30), 135-148.

FCC. (2003). *CMRS Eighth Competition Reports*. Washington, D.C.

Fransman, M. (2002). *Telecoms in the Internet Age: From Boom to Bust to...?* : New York: Oxford University Press.

Funk, J. L. The Mobile Internet Market: Lessons from Japan's i-mode System.

Gartner Dataquest. (2002). *Predicted Growth of WLAN Access Points: Worldwide*, from

http://www4.gartner.com/Init

GSM World. (2003). *GSM-The Wireless Evolution*. Retrieved June, 2003, from http://www.gsmworld.com/index.shtml

Hutchison 3G(UK). (2003). *Company Website*. Retrieved Sep., 2003, from http://www.kddi.com/english/index.html

ICS. (2003). 2003, from http://www.souma.go.jp

IIAS Newsletter. (2002). from http://www.iias.nl/iiasn/29/IIASNL29_55_Nielsen.pdf

Intven, H., & McCarthy Tetrault (Eds.). (2002). *Telecommunications Regulation Handbook, Module 2: Licensing Telecommunications Services*. Washington, D.C.: The World Bank.

ITU. (2002a). *About 3G Technology*. Retrieved July, 2002, from http://www.itu.int/osg/spu/ni/3G/technology/index.html

ITU. (2002b). *ITU Internet Reports: Internet for a Mobile Generation*. Geneva: International Telecommunication Union.

ITU. (2002c, 2002). *Mobile Cellular, Subscribers per 100 People*. Retrieved Oct., 2003, from http://www.itu.int/ITU-D/ict/statistics/at_glance/cellular02.pdf

KDDI. (2003). *Company Website*. Retrieved Sep., 2003, from http://www.kddi.com/english/index.html

Kothandaraman, P., & Wilson, D. T. (2001). The Future of Competition: Value-Creating Networks. *Industrial Marketing Management*(30), 379-389.

KTF. (2003). *Company Website*. Retrieved Sep., 2003, from http://www.pcs016.co.kr/

KTF: Portal Service Division. (2002). *KTF Wireless Data Service* (Presentation Slides).

LG Telecom. (2003). *Company Website*. Retrieved Sep., 2003, from http://www.lgtel.co.kr:8023/english/

Li, F., & Whalley, J. (2002). Deconstruction of the Telecommunications Industry: From Value Chains to Value Networks. *Telecommunications Policy, 26*(9-10), 451-472.

Lightman, A., & Rojas, W. (2002). *Brave New Unwired World: The Digital Big Bang and*

the Infinite Internet. New York: John Wiley & Sons, Inc.

Loftus, P. (2002, Mar. 13, 2002). U.S. Carriers to Improve Cellphone Text Messaging. *Wall Street Journal (Eastern edition)*, p. B.13.D.

Maitland, C. F., Bauer, J. M., & Westerveld, R. (2002). The European Market for Mobile Data: Evolving Value Chains and Industry Structures. *Telecommunications Policy, 26*(9-10), 485-504.

McKenna, T. (2002). SMS:Better late than never. *Telecommunications Americas, 36*(12), 19.

MIC. (2003). *2003 White Paper Internet Korea.*

MPHPT. (2003). *Number of Internet Users*, from http://www.soumu.go.jp/joho_tsusin/eng/index.html

Nokia Networks. (2000). *White Paper: Make Money with 3G Services.*

Nokia Networks. (2001). *A History of Third Generation Mobile.*

NTT DoCoMo. (2002). *DoCoMo in Action: Annual Report 2002.*

NTT DoCoMo. (2003a). *Company Website*. Retrieved Sep., 2003, from http://www.nttdocomo.com/

NTT DoCoMo. (2003b). *FOMA: Full Commercial Service Launch* (Presentation Slides).

NTT DoCoMo. (2003c). *NTT DoCoMo: IR Presentation* (Presentation Slides).

O2. (2003). *Company Website*. Retrieved Sep., 2003, from http://www.o2.co.uk/

OECD. (2003). *OECD Communications Outlook.*

Oftel. (2003, Oct. 2003). *Market Information: Mobile Update*. Retrieved Nov., 2003, from http://www.oftel.gov.uk/publications/market_info/2003/mobile/q5mobile1003.pdf

Olla, P., & Patel, N. V. (2002). A Value Chain Model for Mobile Data Service Providers. *Telecommunications Policy, 26*(9-10), 551-571.

Open Mobile Alliance. (2003). from http://www.wapforum.org/

Orange. (2003). *Company Website*. Retrieved Sep., 2003, from http://web.orange.co.uk/

PHS MoU Group. (2003). *Worldwide PHS Subscribers*. Retrieved June, 2003, from http://www.phsmou.org

Porter, M. E. (1985). *Competitive Advantage: Creating and Sustaining Superior Performance*: New York: The Free Press.

Porter, M. E. (2001). Strategy and Internet. *Harvard Business Review, 79*(3), 63-78.

Reed, D. P. (2002). *How Wireless Networks Scale: The Illusion of Spectrum scarcity*, from http://www.its.bldrdoc.gov/meetings/art/art02/slides02/ree/ree_slides.pdf

Sabat, H. K. (2002). The Evolving Mobile Wireless Value Chain and Market Structure. *Telecommunications Policy, 26*(9-10), 505-535.

Search Mobile Computing. (1999, Oct. 11, 1999). *D-AMPS*. Retrieved June, 2003, from http://searchmobilecomputing.techtarget.com/search/1,293876,sid40,00.html?query=D-AMPS

SK Telecom. (2001). *Wireless Internet Business*.

SK Telecom. (2003a). *Company Website*. Retrieved Sep., 2003, from http://www.sktelecom.com/en/index.html

SK Telecom. (2003b). *Leading the Digital Revolution: SK Telecom Annual Report 2002*.

Sprint PCS. (2003). *Company Website*. Retrieved Oct., 2003, from http://www.sprintpcs.com/

Steinbock, D. (2003). Globalization of Wireless Value System: From Geographic to Strategic Advantages. *Telecommunications Policy, 27*(3-4), 207-235.

The 3G Portal. (2003). *Daily News from June, 2003 to Sep. 2003*, from http://www.the3gportal.com

The Strategies Group. (2001). *Daily News*. Retrieved Oct., 2003, from http://www.strategisgroup.com/

THREE-G.NET. (2002). *3G Technology and 3G Standards*. Retrieved Oct., 2002, from http://www.three-g.net/

T-Mobile (UK). (2003). *Company Website*. Retrieved Sep., 2003, from http://www.one2one.co.uk/Dispatcher

T-Mobile (USA). (2003). *Company Website*. Retrieved Oct., 2003, from http://www.t-mobile.com/

TOTAL TELECOM. (2003). *Daily news from Jan. 2003 to Aug. 2003*, from http://www.totaltele.com

Ulset, S. (2002). Mobile Virtual Network Operators: a Strategic Transaction Cost Analysis of Preliminary Experiences. *Telecommunications Policy, 26*(9-10), 537-549.

Verizon Wireless. (2003). *Company Website*. Retrieved Oct., 2003, from http://www.verizonwireless.com/b2c/index.jsp

Vesa, J. (2003). The Impact of Industry Structure, Product Architecture, and Ecosystems on the Success of Mobile Data Services: A Comparison Between European and Japanese Markets, presented at E-ITS, Helsinki

Virgin Mobile (UK). (2003). *Company Website*. Retrieved Sep., 2003, from http://www.virginmobile.com/mobile/

Virgin Mobile (USA). (2003). *Company Website*. Retrieved Oct., 2003, from http://www.virginmobileusa.com/

Vodafone (UK). (2003). *Company Website*. Retrieved Sep., 2003, from http://www.vodafone.com/

Vodafone K.K. (2003). *Company Website*. Retrieved Sep., 2003, from http://www.vodafone.jp/scripts/english/top.jsp

Walters, D., & Lancaster, G. (1999). Value and Information - Concepts and Issues for Management. *Management Decision, 37*(8), 643.