

# How New Network Markets Emerge: A Comparative Analysis of the Mobile Internet in Japan and Europe

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## Abstract

*Although markets for network goods and services such as video games, DVD-players, or PC hard- and software have since long become a standard topic of economic research and textbooks, our understanding of their emergence is less well advanced. The extent literature is particularly 'blind' with regard to cases in which the compelling content that eventually drives demand for innovative hardware is not yet known.*

*In such cases not the availability of a large content variety as such but the discovery of the 'right' content is crucial for the emergence of a new market. This paper shows that firms which plan to launch a new network product but do not yet know how compelling content for this product will look like are well advised to ensure that a) experimentation processes inevitable for making latent customer needs explicit are not hampered and b) results of the experiments can be monitored, e.g. a billing infrastructure is in place that allows to individually track which content offering is demanded by customers and which is not.*

## 1. Introduction

Although markets for network goods and services such as video games, DVD-players, or PC hard- and software have since long become a standard topic of economic research and textbooks (e.g. [1]), our understanding of their emergence is less well advanced. The extent literature is particularly 'blind' with regard to cases in which the 'killer applications' that drive demand for innovative hardware are not yet known.

One of the main characteristics of network goods and services is that they are subject to a "hardware-software paradigm" [2], i.e. a network product is made out of an enabling technology (e.g. the game console,

the DVD player) and applications (e.g. the game software, the movie on the DVD). Without compelling content or killer applications, the enabling technology itself is of no value to the end users [3].

Yet, the fairly large body of literature that analyses the hard-/software interdependence and its implication on the emergence of a new market has primarily drawn upon cases in which the enabling technology was new but the compelling content was very well known. OHASHI [4], for example, demonstrated that demand for pre-recorded tapes from rental video shops significantly increased with the increased variety of rental video tapes. GANDAL et al. [5] examined sales of CD-players finding that a 10% increase of CD title variety has the same positive effect on demand as a 5% drop in player prices. Previous research also observed that the number of consumers purchasing a DVD player increased after major motion picture companies increased releases of movie titles on DVD format [6].

CD players certainly offered a new and more convenient way to replay music, but music as such did not represent a new kind of content. The same reasoning can be applied to the case of video tape recorders and DVDs. Video tapes and DVDs significantly changed the way how movies were recorded and sold, but they did not change the criteria of what makes a good movie. The main innovational challenge for firms perceived by this body of literature is consequently the problem of a) how to ensure that a large variety of content is available when the new enabling technology is launched and b) how to price soft- and hardware adequately.

This paper, however, argues that there are cases in which the compelling content is not yet known and that in these cases not the availability of a large content variety as such but the *discovery of the 'right' content is crucial for the emergence of a new market*. This paper further shows that the way how suppliers of the enabling technology and content providers cooperate

<sup>1</sup> The opinions expressed in this paper are those of the author and do not necessarily represent the views of THERON Business Consulting.

and the availability of sophisticated billing and CRM systems significantly influence the odds of discovering killer applications. To demonstrate these points the paper draws upon a comparative case study of the embryonic markets (1999-2000) for mobile Internet services in Japan and Europe. Mobile Internet services are a case in point, as all market development activities both of Japanese and European players had been grounded on assumptions about ‘killer applications’ that proved—with hindsight—to be utterly wrong: The applications which eventually emerged as killer applications had been discovered in the course of market experiments rather than been foreseen by industry players. The paper finally demonstrates the analytical generalizability of the case study by applying its insights to the case of the mobile TV market in Germany, which is on the brink of emergence.

The paper is structured as follows: The next section briefly describes the approach and the theoretical foundations of the research in greater detail. The third section then provides qualitative evidence of how the markets in Japan and Europe emerged, what kind of content the players expected to become killer applications, and how the approaches of industry players towards creation of content supply differed. The fourth section analyses the implications of the observed differences. The final section concludes the paper by summarizing the key findings and tests the analytical generalizability of the findings by highlighting their implications for the mobile TV market in Germany.

## **2. Research Approach and Theoretical Foundations**

### **2.1. Research Design**

The empirical evidence reported in this paper is drawn from a comparative case study that was conducted between January 2003 and December 2004. The study analyzed the development and market introduction of three proprietary Japanese mobile Internet platforms and one standardized European technology in the years 1999 to 2000. The Japanese services were marketed under different brand names (i-mode, J-Sky, EZ-web) whereas the European offerings were commonly known by the name of the underlying platform standard, namely WAP (Wireless Application Protocol).

### **2.2. Theoretical Foundations**

Compliant with the methodological recommendations of EISENHARDT [7] and YIN [8], the case study was linked to the extant literature and thus guided by a preliminary theory:

Research on the diffusion of innovations shows that the speed at which an innovative product is accepted by customers and thus the speed at which a market for it

develops is significantly dependent on its perceived value and the ease of which evidence of this value can be observed by the customers [9-11]. The large body of economic literature on indirect network externalities qualifies the insights from diffusion theory by providing ample empirical evidence on the peculiarity of network goods with regard to their perceived value: as mentioned in the introduction, network goods, firstly, consist out of an enabling or platform component and at least one application component and both components create customer value only as bundle. Secondly, the higher the variety of available applications, the higher customers value the enabling component [4-6, 12-16]. Integrating the views of diffusion research and the economic literature on indirect network externalities suggests that a) a vast variety of applications and b) strong evidence on the efficacy of these applications are key to successful development of a market for network goods.

The economic literature further demonstrated both theoretically and empirically that the emergence of a vast application variety and thus the speed of market growth depends on the willingness of application providers to enter a new network market [12, 16]. The strategic management literature on “business webs” or “value networks”, in turn, informs on how platform-supplying firms best manage to gain support from application providers (e.g. [17-19]). Yet, both research streams have one limitation in common: both bodies of literature have not analysed situations in which the value of applications for customers is not or not yet evident. In such cases the key to market growth is not a large variety of applications as such, but the discovery of so-called ‘killer applications’, i.e. applications which customers perceive to be valuable.

Research on innovation management has since long recognized that in the case of radically new products such as ‘high technology’ goods customers are at first not able to perceive the new products’ value. Customers, consequently, are also not able to make their latent needs with regard to the new product explicit and thus ‘traditional’ market surveys are of limited help to discover valuable applications [20]. Rather than being able to tell suppliers what they want, customers will need to learn the value of the new product (e.g. [20, 21], see also [10]). Since VON HIPPEL’s [20] seminal contribution a considerable large body of literature has emerged which offers ways of integrating customers in the product development process in order to speed up elicitation of their needs (e.g. [22-24]). Common to all these approaches of using “customers as innovators” is an element of experimentation: customers are allowed to experience the value of a new product by experimenting with it.

Yet, these works only provide limited insights concerning emergence of markets as they are focussing on the individual firm level. The discovery of killer appli-

cations, however, must be understood as a collective market experiment, because all potential application suppliers face a “search space” [25] in which the valuable applications are hidden. As UTTERBACK [21] argued, an embryonic market will, consequently, see many alternative designs of a new product and the collective experiment will take the form of an evolutionary process: those alternatives not fit to survive, i.e. not being able to attract buyers, disappear from the market. The customers’ needs thus eventually manifest themselves in a “dominant design” of a new product. The emergence of dominant designs also initializes the start of mass markets, as they do not optimize on the demands of a few lead users but satisfy the needs of many different kinds of users [21, 26]. In this perspective, the discovery of killer applications might be similar to the process of discovering dominant application designs.

The insights of research on dominant designs, however, apply to cases (airplanes, cars, typewriters) in which the search space was rather limited. Industry players experimented in order to improve features of a product, which in principle had already been perceived as valuable. THOMKE’s [25] work suggests that in cases of a vast search space of potentially valuable applications, uncoordinated market tests would only slowly lead to the discovery of dominant designs. For example, it will not be efficient if all potential application providers start their search, i.e. joint experiments with customers, at the same point of the search space. Killer applications are discovered faster, if the application providers explore different parts of the search space in parallel. This, however, requires coordination of the experimental activities. Of course, in order to prevent inefficiencies through repetition of experiments that failed, application suppliers are also required to share the results of their individual market tests. In the light of these arguments it can be hypothesized that the speed of which a market for a network good develops is dependent on the efficient organisation of the collective search for killer applications.

Guided by this literature review, the data collection process of the case study was focussed on answering the following questions: a) to what extent were customer needs concerning mobile content latent, b) how was content supply organised, and c) to what extent did the discovery of killer applications affect market growth?

### **2.3. Data Sources**

The data gathering for the case study relied on two sources: (i) written sources (including existing research literature but also data provided by trade journals, press releases, etc.) and (ii) semi-structured interviews.

In total, the author conducted 30 interviews with employees of 22 firms and institutions (see Table 1 in

the appendix for details). In selecting interview partners, two issues were carefully considered: Firstly, interviews were conducted with at least one firm of every interest group (operators, handset suppliers etc.) that were involved in developing of mobile Internet services. Secondly, as far as possible, employees who had directly participated in the innovation processes were interviewed. Each interview took on average one hour. The majority of interview partners rejected recording of the conversation and therefore only field notes were taken. Of the interviews, 26 were conducted face-to-face and 4 were by telephone. All interviews were conducted in the native language of the interviewee. Occasionally personal e-mail contact and questionnaires supplemented the interviews. All interview partners had been provided with protocols of the conversation allowing them to check for misunderstandings.

## **3. Emergence of the markets for mobile Internet services in Japan and Europe**

### **3.1. The principal dilemma of selecting the right content**

Empirical evidence provided by the case study clearly indicated that consumers’ needs with respect to mobile Internet content were almost completely latent. Both Japanese and European industry players, consequently, faced the challenge of discovering the so-called killer applications: What kind of web services would consumers love to view on the tiny screens of their mobile phones? The comment of an interviewee vividly expresses the uncertainty that the players felt: *To speak about ‘good’ content. Nobody actually knew what good content was.*

In those early days of the mobile Internet mobile operators played a decisive role in the search of killer applications, because new services were primarily accessible via mobile portal sites controlled by the operators. By exerting their right to select which content offerings were listed on their portals, mobile operators de facto determined the composition of the initial content supply. In the light of the uncertainty in demand, mobile operators used wired Internet services as yardstick for mobile applications. Content selection was thus primarily directed at what had proven to be successful in the wired domain, e.g. information and news related offerings. Only the Japanese operator NTT DoCoMo deviated to some extent from this mainstream vision by focusing content acquisition on mobile banking applications [27-29].

### **3.2. Securing Content Supply in Japan**

At the time of the market introduction of mobile Internet services three alliances of operators had been active in the Japanese market: NTT DoCoMo, the IDO-

DDI-alliance and the J-Phone group. Neither of the three had competencies in the production of media content and thus they relied on cooperation with independent content providers. The cross-case analysis revealed that DoCoMo's approach towards content supply was characterized by pro-active support of independent content providers. To put it differently, despite its vision of mobile banking being a killer application, DoCoMo remained open to any kind of content and encouraged content providers to participate in the search of killer applications. Because DoCoMo was the first to move into the new market, it was able to 'set the rules' of how content providers and operators cooperated. In fact, DoCoMo's very attractive terms and conditions pressurized the two followers, the IDO-DDI-alliance and the J-Phone group, to eventually adopt DoCoMo's approach [30, 31].

As long as DoCoMo's quality standard and code of conduct (e.g. no pornography etc.) were met, every content offering had the chance of being accepted as official site. Official sites were divided into free and pay sites and listed on the operators' portal site. Access to pay sites was charged on a monthly subscription basis (in the case of DoCoMo ranging approx. between 1-3 €). DoCoMo collected these charges on behalf of the content provider via the monthly telephone bill. In other words, there was a direct commercial relationship between content provider and subscriber. Whether a specific content offering was prominently listed in the i-mode menu depended on the number of monthly subscriptions the offering achieved. The higher a given content was in demand, the higher it was on the list provided by the i-mode menu, i.e. a user saw the most popular services first and had to scroll down the menu pages to reach less popular ones. Consequently, the end customer and not DoCoMo 'decided upon the fate' of a content provider. The operator merely served as provider of navigation and micro-payment services. In exchange for these services DoCoMo kept 9% of content charges as a handling fee and transferred the remaining 91% to its content partners. Offerings that had not been accepted as official sites were still accessible via direct input of the site's URL, but there was no support in terms of provision of co-marketing or micro-payment services. It has to be stressed that the prerequisite for DoCoMo's approach was a sophisticated billing system that could track which subscriber used which content. Such a kind of billing system is now standard with all operators but in 1999 it represented a major innovation.

### 3.3. Organizing Content Supply in Europe

Just like their Japanese counterparts, European operators were also dependent on independent content providers. However, the way European content providers and operators worked together significantly differed

from the Japanese way. The European approach resembled a closed model in which content providers were rather hindered than encouraged to participate in the search for killer applications: European operators purchased applications upfront from content providers and then resold the applications via their portal sites. The investments in content supply were refinanced by charging for access to the mobile Internet on a per minute basis, but not by applying specific charges for content usage.

Firms that wished to engage in the mobile content business, but were not among the selected suppliers, had to pay for being listed on the portal site. Despite charging for listing content providers on the portal, mobile carriers did not provide co-marketing or micro-payment services. In fact, European carriers were not able to offer micro-payment services as their billing systems had not yet been updated and were not capable to handle subscription based charging. Just like in Japan, most operators allowed access to independent sites via direct input of the specific URL.

### 3.4. Unforeseen Killer Content in Japan

The data gathered during the case study provides strong evidence that in Japan a) applications which a majority of industry players had not envisioned as being valuable were most favorably received by customers and b) the discovery of these killer applications contributed significantly to the growth of the mobile content market.

In fact, DoCoMo's vision of mobile banking as the killer application proved to be utterly wrong: among the sites listed on the i-mode menu the few entertainment-related services and not the overwhelming number of mobile banking applications fuelled the growth of mobile content usage. Bandai's picture service that had started operations in June 1999 attracted about 400.000 early i-mode subscribers by October 1999 (roughly 20% of all subscribers). Among the new entrants that became official i-mode partners after August 1999 was a company called Giga Networks. It had started to offer ring-tone codes in September 1999. Since the phones could not directly incorporate downloaded ring-tones, users had to program the music scores manually. Despite the uncomfortable handling, Giga Networks' codes became a huge success; by October 1999, 100,000 (about 5%) i-mode subscribers had also subscribed to Giga Networks' service [32]. A further successful content offering, also related to entertainment, was Index's fortune telling service "renai no kami-sama" (God of Love), which attracted about 8% of the early i-mode subscribers [33].

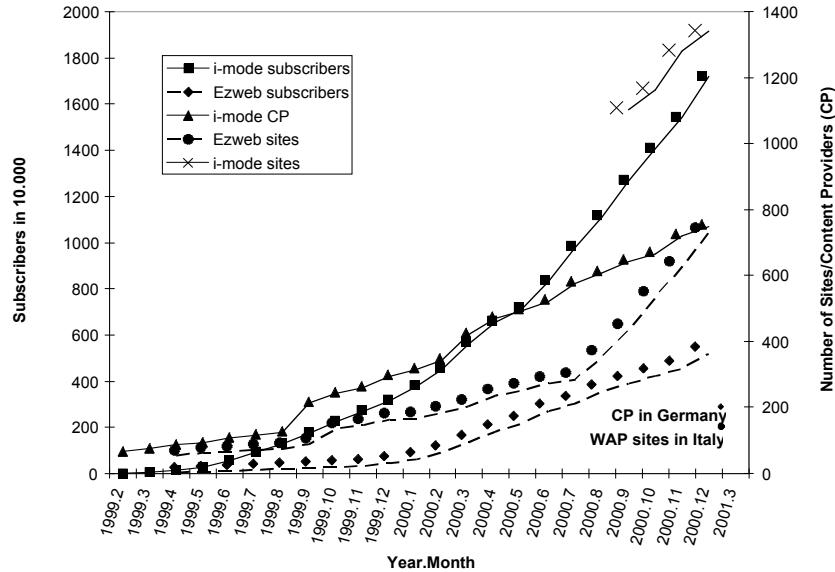
The arrival of handsets with improved ring-tone and screen-saver functionalities perfectly matched these booming killer applications. The new handset models allowed users to seamlessly download and use ring-

tones provided in simple MIDI format. Additionally, a large number of the new phone models fully supported Bandai's picture service, i.e. seamless download of picture files and application as screen savers. Furthermore, the usage of simple MIDI files enabled a new breed of content providers to enter the market, which significantly expanded the supply of ring-tones. Existing online karaoke providers such as Xing Inc. or Daiichi Kōshō owned a vast variety of songs in MIDI format that could be easily transformed into MIDI ring-tones [32]. The introduction of MIDI sound files and improved ring-tone functionalities sparked an explosive growth of subscriptions to chargeable content sites: In September 2000, over 50%, i.e. six out of twelve million i-mode users, had subscribed to a ring-tone service. The growth of subscriptions to ring-tone services also laid the foundation for the emergence of a mobile content industry. A total of 665 content providers had enlisted with DoCoMo by October 2000. Among them were over 20 competing ring-tone providers.

**Figure 1: Subscriber Growth and Content Supply in Japan**

Source: Author's arrangement based on [35, 39, 47, 48]

Notes: The number of i-mode sites was not counted prior to Sept. 2000. The number of content providers (CP) understates supply of content sites, as one content provider usually offered more than one site.



DoCoMo's content partners alone had created an industry with an estimated turnover of €220 million per year [29]. All other Japanese mobile carriers also quickly jumped on the bandwagon focusing their attention on ring-tone services [32].

Looking on the development of content supply and subscriber growth in general also provides a rather positive picture: The data points available for the i-mode case display slow user-uptake after market launch in February 1999, but gained momentum after May 1999. By Mid-May 185,000 users had subscribed to i-mode but in August already one million subscribers had signed up. In October 1999, two million and in February 2000, about one year after service launch, four million i-mode subscribers were counted [34]. The number of firms cooperating with DoCoMo providing i-mode compatible content likewise increased from the

initial 67 companies in February 1999 to 124 by August 1999. In September 1999, 88 more firms rushed into the market, thus increasing the number of content suppliers to 212. Until mid-October 1999, the number of content partners increased to 242 firms and in March 2000 it was 421 [35]. Unofficial sites also grew rapidly in numbers. In August, an independent search site counted 1,287 sites, 2,200 in October and 7,000 in March 2001 [36-38].

Data provided by KDDI<sup>2</sup> shows joint figures on EZweb (DDI) and EZaccess (IDO) subscribers as well as on the number of EZweb content sites<sup>3</sup>: Subscriptions to EZweb/ EZaccess amounted to 155,000 in the third month after service launch and content offerings had increased from initially 54 to 73 sites. After six months, 136 sites were accessible to 275,000 users. One year after the start of the services, subscribers had grown to 1.8 million enjoying a wider variety of content encompassing 236 offerings [39]. Figure 1 provides a graphical summary.<sup>4</sup>

These figures must be put into perspective as DoCoMo had a significantly larger installed base of voice subscribers; the larger number of i-mode subscribers does not necessarily imply that i-mode services

<sup>2</sup> Created through a merger of DDI, IDO and KDD

<sup>3</sup> The number of EZweb sites provides a good approximation for the number of EZaccess sites as both platforms were technically identical and thus suppliers could supply their offerings to both without adaptation costs.

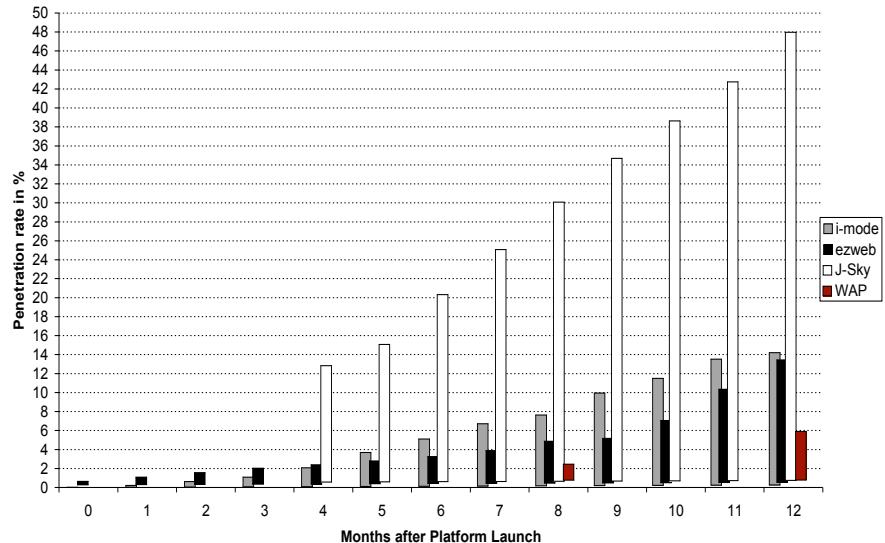
<sup>4</sup> DoCoMo and KDDI data are not directly comparable prior to September 2000. Before that date DoCoMO did not track how many sites its partner firms offered, whereas KDDI counted the number of sites and not the number of partners. The number of partner understates the content variety as content providers started to diversify their offerings already in the early days of the industry. The average ratio between number of content partners and number of i-mode sites was roughly 1:2 in the period from September, 2000 until August, 2001.

were relatively more attractive. Even if the EZweb services were more appealing to users than i-mode services, non-DDI or non-IDO subscribers would have faced rather high switching costs, because switching from i-mode to EZweb, for example, entails the inconvenience of having to cancel the voice subscription with DoCoMo, obtaining a new phone number and making the number available to all relevant contacts. Measuring subscriber growth in terms of the adoption rate within the installed subscriber base suggests that J-Sky has been even more successful than i-mode: four months after the start of the service, about 2% of DoCoMo's subscribers had also subscribed to i-mode. Four months after J-Sky was launched, 14% of J-Phone's customers already owned a J-Sky handset. However, J-Phone provided no information as to how many customers actually used the J-Sky functionality of their handset. The i-mode or EZweb figures present a better approximation as users have to subscribe explicitly to the mobile Internet services indicating at least their willingness to use the service (see Figure 2).

**Figure 2: Development of Mobile Internet Penetration Rates in Japan and Germany**

Source: Author's calculation based on [35, 39, 40, 49, 50]

Notes: J-Sky data is based on the number of J-Sky enabled handsets. i-mode and EZweb data is based on subscriptions. WAP data is estimated.



The early success of the Japanese mobile Internet platforms and associated content providers was not a short-lived fad but evolved into a major industry. By the end of 2004, the three mobile Internet platforms had amassed 71.5 million subscribers altogether. This equals 86% of the mobile phone subscriber population. The mobile Internet related business grew—estimated by the Mobile Content Forum (MCF)—into an industry with a turnover of €2.9 billion in the fiscal year 2003. The “Mobile Content” segment (ring-tones, games, screensavers etc.) reached a market size of €1.7 billion. Ring-tones amounted to 68% and games to 26.8% of total turnover within the content segment [41].

### 3.5. Lack of Attractive Content in Europe

Mobile Internet services dubbed WAP services had their debut in Europe as showcases during the CEBIT 1999. Network operators presented limited trial services to demonstrate what the mobile future had in store. The Finnish carrier Sonera launched its WAP services in August 1999 although WAP compatible phones had not yet appeared on the market [42, 43]. Nokia was the first handset vendor to finally ship WAP phones in September 1999, almost one month after Sonera had opened its WAP platform. Mobile Telenor (Norway) waited until Nokia handsets were available and started commercial offerings in mid-October 1999 [44]. The German carriers D2 (now Vodafone), E-Plus, and T-Mobile finally opened their WAP portals in November with Viag Interkom (now o2) following in December 1999.

The development of content supply in Europe is hard to validate but the scarce evidence suggests that content supply developed sluggishly: BAGER and

BLEICH [45] provide a list of 103 independent WAP sites that operated in the German market of April 2000. The majority of the sites listed were primarily related to information services, but only three provided entertainment and none offered ring-tones. The first portals of the German carriers also did not provide ring-tones or screen savers [46]. In February 2001, CW [47] reported that 174 content providers were operating in the German mobile content market. The only—to the best of this writer's knowledge—scientific endeavor to explore mobile content supply is a study of the Italian market. RANGONE et al. [48] counted 603 WAP-sites available through all Italian operators in March 2001—the first year after the launch of WAP-services. Among these were only 116 sites that the authors considered significant. These were sites that offered a specific application to the user and thus went beyond hob-

byist or pure address information sites. Only two of the 116 significant sites provided ring-tones and screensavers [48] (see also Figure 1).

The miserable development of the variety in WAP content is mirrored by slow user growth: In mid-2000, T-Mobile was the only German network operator that dared to publish subscriber numbers: only 250,000 of its 13 million subscribers had acquired a WAP-phone (equaling a 1.92% penetration rate). Actual usage was even worse: Only 70% (175,000) of these WAP-phone owners accessed WAP content on average 1.4 times per week. The German Regulatory Authority for Telecommunications and Posts published a figure of 400,000 subscribers at the end of June 2000 expecting 3.5 million users by the end of 2000 [49]. In REGTP's annual report [50] it was stated that subscriber growth had not met expectations. According to estimates, only 2.5 million users had signed up. If REGTP's estimation is correct, the penetration rate would have increased to 5.2% (calculation by the author based on REGTP). It is noteworthy that the report for the year 2000 was the last RegTP report that ever mentioned the acronym WAP. This suggests that RegTP dismissed the WAP phenomenon as being too marginal to deserve any further scrutiny (see also Figure 2).

It has to be stressed that one cannot argue that European users were not interested in text messaging services, ring-tones and screen savers. These applications became—just as in Japan—the most demanded mobile content. European users, however, relied on short message services (SMS) to get access to ring-tones, games and screen savers. The amount of SMS sent by European mobile subscribers grew explosively after 1999. In that year, about 5 billion short messages were sent via the networks of the four German mobile network operators. In 2000, T-Mobile alone transported 5.5 billion SMS and D2 (now Vodafone) subscribers sent over 7 billion messages. The GSM Association expected 200 billion SMS to be sent worldwide in 2001 [51]. In the light of the rising SMS numbers, mobile network operators and third-party suppliers increasingly launched SMS based content services [52]. Ring-tones, screen savers and games, besides all kinds of information services, quickly emerged as the most popular SMS-based contents. In 2004 the market volume of ring tones in Germany was estimated to amount to €150 million [53].

#### **4. Key Implications from the Empirical Evidence**

The first and rather straightforward implication from this case study is a) that UTTERBACK's [21] observation of early markets having to pass through a state of experimentation applies also to new network markets and b) the efficient organization of the collective experimentation processes, i.e. the collective search for

killer applications is, as hypothesized, key to successful market development (see 2.2).

The more subtle implications from this insight is that industry players wishing to launch a new network product must be prepared for a painstaking trial-and-error process. In other words, innovators must design their business models in a way that fosters market competition between innovative services. Particularly players in key positions such as mobile network operators controlling the access to content offerings must allow for experimentation by opening their customer bases to independent content providers at encouraging terms (see [54, 55] for a more detailed discussion of how market entry of content providers can be spurred). The beauty of DoCoMo's business model lies precisely in its positive effects on market entry of independent content providers. Rather than deterring independent parties from entering the market DoCoMo encouraged them to put their offerings to a market test. DoCoMo thus fuelled competition and sped up the experimentation processes.

In line with THOMKE's [25] argument, key to a breakthrough via experimentation is not only the conduction of numerous experiments but also the diligent recording and analysis of each experiment's outcome. Motivating a large number of application providers to put their offerings to the market test is only the first prerequisite for speeding up the discovery of compelling content. Application providers also need quick and sharp feedback from the market in order to fine-tune the content offerings to the emerging customer needs. Therefore, the billing infrastructure and the subscription based charging model that DoCoMo deployed must be seen as a further success factor. DoCoMo's micro-payment services provided sharp and instant feedback about which content offerings were accepted, to what extent and by what kind of subscribers.

DoCoMo did not only enable the collection of the necessary market feedback, its practice to always place the most popular offering on top of the i-mode menu also fuelled the diffusion of this feedback: Potential new market entrants could check what kind of services were at the top of the list and hence could get a glimpse of what 'good' content should look like. Of course, content providers already listed in the portal could also monitor whether competitors are doing better or catching up. This argument also applies to the customer perspective: Being on top of the list implies that a content offering can be accessed without the effort of scrolling or searching through a long list of entries. Customers who were insecure about which services provided value to them were thus 'naturally' directed to those which most other users had perceived valuable. To put it differently, the probability that an inexperienced user quickly finds a usable application is increased. These observations ultimately imply that due to the information provided by micro-payment

services, *all* actual and potential market participants can oversee the market as a whole and observe market trends in a timely manner.

A European operator that lacked the micro-payment infrastructure, in contrast, could only observe the customer reception of its content portfolio as a whole, but was not able to clearly specify which content was performing exceptionally badly and should be replaced by a new content proposal. This further implies that WAP content providers did not receive feedback from the market and thus eventually lacked the necessary information to improve their offerings. Furthermore, as there was no direct relationship between customer and content provider, the latter also lacked the incentives to do better. Content providers were happy as long as operators continued to pay for their content development services. From the customers' perspective, these observations imply that a) the probability of encountering dissatisfactory content was generally higher than in Japan and b) users lacked a yardstick for quickly identifying valuable content. Of course, the problem of insufficient market feedback could be overcome by conducting surveys among the subscribers in order to find out to what extent particular services satisfy consumer needs. Nevertheless, the time span until this information is gathered and analyzed takes much longer than the real-time monitoring that micro-payment services offer. In the light of these insights, it is no coincidence that in Europe the discovery of ring-tones as killer application occurred in the SMS and not in the mobile Internet realm. In the SMS business of that time European carriers and content providers cooperated in a way that was similar to DoCoMo's approach: Revenues were shared making market entry attractive and each delivery of content was charged individually.

The case of the mobile Internet also provides implications for CRM activities in general: Firstly, firms should not only capture knowledge from customers during the product development stage but firms should design their products in a way that enables the product to collect usage information after it has been introduced to the market. Secondly, firms should establish right from the point of market introduction a process that allows both capturing knowledge from customers but also providing knowledge to customers. Knowledge capturing and provisioning activities should focus on how the product is actually used by the customers and how the observed functionality of the product can be improved. The importance of the latter part of such a process has long been recognized and already comprises best CRM practice [56]. Yet, firms should also keep an eye on how their customers actually put the new products to use. This knowledge capturing activity might reveal product functions which have neither been intended nor foreseen by the product's developers but were discovered by the customers (see also [22, 23]). In any case, knowledge about usage patterns should be fed

into a marketing campaign, which proactively informs potential or inexperienced customers about the product's value. This way, customers are supported in their learning process on how to best put the new product to use and development of the new market is fostered.

## 5. Conclusion and Outlook on Mobile TV

This paper showed that there is a clear implication from the empirical evidence on the emergence of the market for mobile Internet services in Japan and Europe: Firms that plan to launch a new enabling technology but do not yet know how compelling content for this technology will look like are well advised to:

- a) Ensure that experimentation processes inevitable for making latent customer needs explicit are not hampered;
- b) Ensure that results of the experiments can be monitored, e.g. a billing infrastructure is in place that allows to individually track which content offering is demanded by customers and which is not.

To demonstrate the analytical generalizability of these insights and to conclude this paper the remaining paragraphs will briefly provide an outlook on the recent debate pertaining to the introduction of mobile TV via DVB-H (Digital Video Broadcasting – Handheld): The acronym DVB-H represents one of the recent buzzwords of the mobile telecommunications industry and stands for the possibility to receive digital TV signals with mobile phones. Particularly in Germany—due to the strong position of public TV stations—the question of whether the TV signals should be encrypted or openly transmitted is subject to a heated debate. Mobile operators favor encryption of signals in order to charge their subscribers for receiving the signals, i.e. charging for the provision of decoder applications. The public broadcasters oppose scrambling as this contradicts their mission to provide everyone with the possibility to receive TV programs [57].

In the light of insights of this paper all industry players are well advised to introduce encoding of the TV signals. Industry experts expect that consumption of TV with small mobile devices will take place in a different context than in the case of watching TV with stationary TV sets. The experts consequently argue that new program formats differing from the incumbent formats will be required in order to spur demand for mobile TV. How the new formats should look, however, is not yet clear [57]. These observations indicate that key to successfully developing mobile TV markets will also be the discovery of the right content.

Encryption should, consequently, be introduced because if the TV signal can be received freely, there are no technical ways of monitoring which of the new programs subscribers actually watch. The process of discovering compelling content will be slowed down, as

the crucial market feedback cannot be obtained. Even with encryption in place, industry players should take care that access to each content offering can be monitored individually. This would also allow to meet the requirements of the public broadcasters as decoders for public programs could be provided free of charge. It has to be stressed that is not necessary nor advised to monitor the usage patterns of individual subscribers. Important is that one can track to what extent a particular content is demanded by customers. The same arguments apply to mobile TV via UMTS streaming. Without a billing infrastructure that allows tracking which programs have actually been used, operators will not be able to speed up the discovery of compelling content.

## 6. Appendix

**Table 1: Distribution of Interview Partners**

Kind of Firm	Firms	Interviews
Network Operator		
Japan	3	7
Europe	3	3
Handset Supplier		
Japan	5	5
Europe	1	4
Browser Supplier		
Japan	1	2
Europe	1	1
Content Provider		
Japan	1	1
Europe	1	1
Industry Expert		
Japan	4	4
Europe	2	2
<b>Total</b>	<b>22</b>	<b>30</b>

## 7. References

- [1] Shy, O., *The economies of network industries*. Cambridge, New York, Oakley: Cambridge University Press, 2001.
- [2] Katz, M. L. and C. Shapiro, "Network Externalities, Competition and Compatibility," *The American Economic Review*, vol. 75, iss. 3, pp. 424-440, 1985.
- [3] Yoffie, D. B., "Competing in the Age of Digital Convergence." Boston (Mass.): Harvard Business School Press, 1997.
- [4] Ohashi, H., "The Role of Network Effects in the US VCR Market, 1978-1986," *Journal of Economics & Management Strategy*, vol. 12, iss. 4, pp. 447-494, 2003.
- [5] Gandal, N., M. Kende, and R. Rob, "The dynamics of technological adoption in hardware/software systems: the case of compact disc players," *The Rand Journal of Economics*, vol. 31, iss. 1, pp. 43-61, 2000.
- [6] Dranove, D. and N. Gandal, "The DVD-vs.-DIVX Standard War: Empirical Evidence of Network Effects and Preannouncement Effects," *Journal of Economics & Management Strategy*, vol. 12, iss. 3, pp. 363-386, 2003.
- [7] Eisenhardt, K. M., "Building Theories from Case Study Research," *Academy of Management Review*, vol. 14, iss. 4, pp. 532-550, 1989.
- [8] Yin, R. K., *Case Study Research: Design and Methods*, vol. 5. Beverly Hills, New Dehli, London: Sage Publications, 2003.
- [9] Rogers, E. M., *Diffusion of Innovations*, 5 ed. New York: Free Press, 2003.
- [10] Nelson, R. R., A. Peterhansl, and B. Sampat, "Why and How Innovations Get Adopted: A Tale of Four Models," *Industrial and Corporate Change*, vol. 13, iss. 5, pp. 679-699, 2004.
- [11] van der Panne, G., C. van Beers, and A. Kleinknecht, "Success and Failure of Innovation: A Literature Review," *International Journal of Innovation Management*, vol. 7, iss. 3, 2003.
- [12] Church, J. and N. Gandal, "Network Effects, Software Provision, and Standardization," *Journal of Industrial Economics*, vol. 40, iss. 1, pp. 85-103, 1992.
- [13] Clements, M. T. and H. Ohashi, "Indirect Network Effects and the Product Cycle: Video Games in the U.S., 1994-2002," *CIRJE Discussion Papers*, vol. 261, 2004.
- [14] Basu, A., T. Mazumdar, and S. P. Raj, "Indirect Network Externality Effects on Product Attributes," *Marketing Science*, vol. 22, iss. 2, pp. 209-221, 2003.
- [15] Gandal, N., S. Greenstein, and D. Salant, "Adoptions and Orphans in the Early Microcomputer Market," *The Journal of Industrial Economics*, vol. 47, iss. 1, pp. 87-105, 1999.
- [16] Shintaku, J., T. Tanaka, and N. Yanagawa, *gēmu sangyō no keizai bunseki [Economic Analysis of the Videogame Industry]*. Tōkyō: Tōyōkeizai-shinpōsha, 2003.
- [17] Gawer, A. and M. A. Cusumano, *Platform Leadership: How Intel, Microsoft, and Cisco Drive Industry Innovation*. Boston (Mass.): Harvard Business School Press, 2002.
- [18] Steiner, F., *Formation and Early Growth of Business Webs: Modular Product Systems in Network Markets*. Heidelberg: Physica, 2004.
- [19] Peppard, J. and A. Rylander, "From Value Chain to Value Network: Insights for Mobile Operators," *European Management Journal*, vol. 24, iss. 2-3, pp. 128-141, 2006.
- [20] Von Hippel, E., "Lead Users: A Source of Novel Product Concepts," *Management Science*, vol. 32, iss. 7, pp. 791-805, 1986.
- [21] Utterback, J. M., *Mastering the dynamics of innovation*. Boston: Harvard Business School Press, 1996.
- [22] Thomke, S. and E. Von Hippel, "Customers as Innovators, A New Way to Create Value," *Har-*

- vard Business Review, vol. April, pp. 74–81, 2002.
- [23] Von Hippel, E., "Perspective: User Toolkits for Innovation," *Journal of Product Innovation Management*, vol. 18, iss. 4, pp. 247–257, 2001.
- [24] Kristensson, P., A. Gustafsson, and T. Archer, "Harnessing the Creative Potential among Users," *Journal of Product Innovation Management*, vol. 21, pp. 4–14, 2004.
- [25] Thomke, S., E. Von Hippel, and R. Franke, "Modes of Experimentation: An Innovation Process—and Competitive—Variable," *Research Policy*, vol. 27, pp. 315–332, 1998.
- [26] Tushman, M. L. and J. P. Murmann, "Dominant Designs, Technological Cycles, and Organizational Outcomes," *Research in Organizational Behavior*, vol. 20, pp. 231–266, 1998.
- [27] J@pan Inc, "Takeshi Natsuno. The Incrementalist," *J@pan Inc*, vol. 20, iss. 2001.06.01, pp. 34–38, 74–75, 2001.
- [28] Personal Interview with Executive Engineer, Networks Division, Panasonic Mobile Communications Co., Ltd. Tôkyô, 2004.
- [29] Natsuno, T., *i-môdo sutoratejî: sekai ha naze oitsukanai ka* [Die i-mode Strategie: Warum der Rest der Welt nicht aufholen kann]. Tôkyô: Nikkei BP Kikaku, 2000.
- [30] Personal Interview with Manager, Head of Platform Business Section, Content Business Development Department, Content and Media Business Division, KDDI Corporation. Tôkyô, 2004.
- [31] Personal Interview with President, Gemini Mobile Technologies K.K. (former employ of J-Phone K.K.). Tôkyô, 2004.
- [32] Kikuchi, T. and T. Yoshio, "Ongaku ha Chakushin Merodi kara, Gêmu ha Kyarakuta kara, Dai 2 Bu Apurikêshon [Music begins with Ringing tones, Games begin with Characters, Part 2 Applications]," *Nikkei Electronics*, vol. 757, iss. 1999.11.15, pp. 116–123, 1999.
- [33] Funk, J. L., *The Emergence of Regional Capabilities in New Technologies: the Case of Mobile Internet*: Hitotsubashi University IIR, 2004.
- [34] Shirakura, M., "imôdo to yobareru mae (dai 12 kai) [Before it was called i-mode - Part XII]," in *Nikkei Electronics*, vol. 2003.2.17, 2003, pp. 163–167.
- [35] NTT Docomo, "Data provided through Public Relations Department." Tôkyô, 2004.
- [36] NTT Docomo, "The number of subscribers to "i-mode," a mobile communications service with Internet capabilities, exceeds 1 million," *Press Release*, 1999-08-10.
- [37] NTT Docomo, "i-môdo ga zenkoku de 200 man keiyaku ni [I-mode Reaches Nationwide 2 Million Subscription]," *Press Release*, 1999-10-19.
- [38] NTT Docomo, "i-môdo ga zenkoku de 500 man keiyaku ni [I-mode Reaches Nationwide 5 Million Subscription]," *Press Release*, 2000-03-17.
- [39] KDDI, "Data provided through interviewee." Tôkyô, 2004.
- [40] TCA, "keitai - PHS keiyakusû dêta, heisei 16 nen 9 gatsu [Data on Cellular Phone and PHS Subscriptions, September 2004]," *Website*, Without Date.
- [41] Impress, "inpuresu, keitai kontentsu no shijô dôkô chôsa repôto hatsubai [Impress Releases Report on Development of the Mobile Content Market]," *Press Release*, 2004-05-03.
- [42] WAP Forum, "SONERA THE FIRST OPERATOR IN THE WORLD TO LAUNCH WAP SERVICE (31 August 1999)," *Press Release*, 1999-09-01.
- [43] Hibberd, M., "How it all began," in *Mobile Communications International*, vol. December 2000 (electronic version), 2000, pp. 1–3.
- [44] WAP Forum, "Telenor Mobil introduces Internet access from your mobile phone (14 October 1999)," *Press Release*, 1999-10-14.
- [45] Bager, J. and H. Bleich, "WAP-Galerie, Die nützlichsten WAP-Sites," in *c't*, vol. 9/2000, 2000, pp. 200–211.
- [46] Zivadinovic, D., "Schmalband-Surfen. Der PC bleibt zu Hause: Erste WAP-Dienste für mobiles Internet," in *c't*, vol. 22/99, 1999, pp. 124–129.
- [47] CW, "WAP-Forum weist Kritik zurück – Schlechte Bedienbarkeit schreckt Anwender von der WAP-Nutzung ab," in *Computerwoche*, vol. 2, 2001, pp. 25.
- [48] Rangone, A., F. M. Renga, and B. Rafaello, "Mobile Internet: An Empirical Study of the Evolution of the Supply of B2C Mobile Internet Applications in Italy," *Online Resource*.
- [49] RegTP, *Halbjahresbericht 2000*. Bonn: RegTP, 2000.
- [50] RegTP, *Jahresbericht 2000*. Bonn: RegTP, 2000.
- [51] Heise, "2001 weltweit 200 Milliarden SMS-Botschaften erwartet," *Online News*, 2001-02-26.
- [52] Heise, "EU: Industrie ist Schuld am WAP-Fehlstart," *Online News*, 2000-12-14.
- [53] Fischer, O., "Justiz nimmt Klingelton-Anbieter ins Visier," in *Financial Times Deutschland*, 2004, pp. 17.
- [54] Haas, M. and F. Waldenberger, "Strategic Alliances and Innovative Performance in Network Industries: The Case of the Mobile Internet in Japan and Europe," in *Digital Economy and Social Design*, O. Sudoh, Ed. Tôkyô: Springer-Verlag, 2005.
- [55] Haas, M., *Management of Innovation in Network Industries: The Mobile Internet in Japan and Europe*. Wiesbaden: DUV, 2006.
- [56] Dous, M., L. Kolbe, H. Salomann, and W. Brenner, "Knowledge Management Capabilities in CRM: Making Knowledge For, From and About Customers Work," *Proceedings of the Eleventh Americas Conference on Information Systems*, Omaha, NE, USA, August 11th - 14th, pp. 167–178, 2005.
- [57] Schmid, M., N. Backhaus, M. Opitz, and S. Zimmermann, *TheronSightFachbeitrag: Perspektiven des mobilen Fernsehens via DVB-H*. Berlin, Cologne, Munich: THERON, 2006.