

Japanese Wireless: A Okay in the USA?

Mark M. Lennon
Frostburg State University

In the paper we examine the concept of how one country's technological innovation (Japan's NTT DoCoMo wireless web i-Mode) is being translated/implemented into another country (US AT&T Wireless' mMode). We first present a factual overview of the technology, comparing the differing features and dynamics in each country, citing various relevant literatures. In the course of this discussion, we make a series of propositions about the implementation these strategies. Next we discuss further technological transfer between the firms and their strategic significance. We conclude with directions for future research.

INTRODUCTION

In November of 2000, NTT DoCoMo, the Japanese mobile telephone giant, invested approximately \$9.8 billion and thereby took a 16% stake in the second largest American mobile telecommunications company, AT&T Wireless (ComputerWire, 2003). The strategic plan was to rapidly advance the technological level of AT&T Wireless by licensing the highly successful Japanese wireless internet technology known as i-Mode, and create a US version called mMode (Murphy, 2002a; Steinbock, 2003).

Both companies thought of this as a strong mutual alliance that would enable AT&T Wireless to gain strategic advantage by engaging in *technological leapfrogging* (M. Lennon, 2010; Schilling, 2003) over its competitors by accelerating its efforts to develop a 3G (third generation) mobile telecommunications system. AT&T Wireless would achieve this through licensing of the NTT DoCoMo i-mode technology and build upon and modify the i- Mode platform to create its own mMode platform for new technologies and services.

Both companies were extremely optimistic, as evidenced by statements made by their top corporate officers, who were quite confident that this *relation based strategy* (Li, 2001) would be successful. As identified in earlier research by Daellenbach et al (1999), this optimism was hoped to play a crucial role in the success of the venture. This optimism and commitment to innovation can be captured by two quotes from the firms' top management:

"This alliance allows AT&T Wireless to realize its vision of creating a high performing mobile Internet more quickly than we anticipated..." John D. Zeglis, chairman and CEO of AT&T Wireless.

"AT&T Wireless and NTT DoCoMo expect to bring communications to a new level by combining our experience and prominent expertise in leading-edge wireless data

applications and services.” Dr. Tachikawa, president and CEO of NTT DoCoMo.
Source: AT&T November 2000 press release

Besides AT&T Wireless’s ability to access i-Mode technologies, NTT DoCoMo also hoped to gain advantages by instantly gaining access to the huge American market for mobile communications. In essence they hoped to achieve the symbiotic relation of “co-opetition” as developed by Brandenburger and Nalebuff (1997) in which firms who may ostensibly be competitors can also successfully cooperate. AT&T Wireless was an ideal partner due to its millions of high-end use customers (see Table 1), as measured by the number of subscribers and ARPU (Average Revenue Per User per month) and its corresponding large market share, which has been identified researchers as key to long term profitability (Buzzell, 1975).

TABLE 1
MARKET SHARE OF MOBILE CARRIERS

| Market Share and ARPU (Average Revenue Per User) of US mobile carriers | | |
|--|----------------------------------|------|
| Company Name | Number of Subscribers (millions) | ARPU |
| AT&T Wireless | 21.8 | \$61 |
| Sprint PCS | 15.5 | \$63 |
| Nextel | 4.3 | \$71 |
| Virgin | 3.6 | \$50 |
| Cingular | 23.4 | \$51 |
| T-Mobile | 12.1 | \$54 |

Source: Authors’ Research

Because of the high level of ARPU for AT&T Wireless customers (\$61), it was thought that these customers were likely candidates for using the soon to be implemented mMode platform wireless web with all its new features and benefits (Dano, 2003; Murphy, 2002a). Additionally, both companies believed that through alliances with equipment manufacturers (e.g. handsets) economies of scale could be had .

What Is i-Mode?

i-Mode is a wireless telecommunications (mobile phone) service launched in Japan in 1997 by the company NTT DoCoMo, a subsidiary of NTT (Nippon Telephone and Telegraph). The i-Mode network carries not just voice, but also gives access to the wireless internet. “DoCoMo” is an acronym that refers to “Do Communications Over the Mobile Internet”. Docomo is also the Japanese word for anywhere. The “i” stands for Internet and, also given the Japanese liking for puns, “i” also sounds like the word for love “ai” (Anwar, 2002; Kodama, 2001, 2002, 2003a; Lindmark, Bohlin, & Andersson, 2004; Steinbock, 2003)

The i-Mode service is accessed by a wireless data packet network, which was a leftover from NTT’s attempts at creating a mobile pager network. The network is considered to be 2G (second generation) as it has a limited bandwidth of 9.6 kbps, intended to carry voice and short messaging (Kodama 2002)(Ratliff, 2002).

What is unique about the use of this network is that NTT DoCoMo was able to create a ‘wireless web’ by not billing itself as the graphic rich internet, but instead a convenient system for accessing wireless content (Anwar, 2002; Ratliff, 2002). To access the wireless internet, i- Mode consumers’

mobile phone handsets have a screen with a menu feature. By selecting menu choices, users can access the wireless internet to purchase goods and services. These range from stock quotes, to games and ring tones, and even images of cartoon characters. In 2000, more than half (55%) of the i-Mode access was for entertainment related areas (Anwar, 2002; Lindmark, et al., 2004).

For this information i-Mode customers are billed a nominal charge. Because it is on a digital network, i-Mode handsets are “always on” (e.g. connected to the internet), similar to cable modems and DSL connections. Therefore, the response time is almost instantaneous (M. M. Lennon, 2011; Ratliff, 2002).

From the start, there was an explosion of users and available content for i-Mode. Within two months of its inception, over 20,000 websites were available. This jumped to over 70,000 by 2003. In order to have as much content available for the i-Mode as fast as possible, thereby encouraging both the user base and usage of i-Mode, a simple technology to build wireless websites was needed. Therefore, unlike other technologies available to create mobile phone accessible websites, such as the European developed WAP (Wireless Application Protocol), c-HTML (compact hypertext markup language) was chosen. With c-HTML, is quite easy to convert an existing HTML based website into a wireless capable one by using the HTML subset of compact commands. This ease of programming in c-HTML (a subset of HTML) encouraged droves of webmasters to make their existing HTML based websites i-Mode accessible (Abrahams, 1998; Ratliff, 2002).

With this massive amount of available content, the number of NTT DoCoMo consumers exploded from fewer than 11 million in 1997 to over 36 million by 2001, giving NTT DoCoMo a 60% market share of mobile phone users in Japan (Abrahams, 1998; Steinbock, 2003) . Unlike the voice minutes-per-month mobile phone contracts used in the US, i-Mode customers are charged a nominal monthly fee of \$2.50 and then charged by the amount of data packets uploaded and downloaded by the user. Unlike US plans where voice minutes are billed, the i-mode network uses the same data packets to transmit voice and is thus charged accordingly.

Premium content (such as stock quotations, games, etc.) can be downloaded onto the handset, at which point the connection is severed, and the user can view the data “off line”, without incurring additional charges for data packets(Steinbock, 2003). The unusual billing method for this system is described later in this paper.

Rather than business people, NTT DoCoMo’s strategy was to target affluent teenagers and twenty-something’s by creating a system that was cheap to join and had growing amounts of wireless content. Following Schumpeter’s (1936) directives, rather than fulfilling an expressed desire by the consumer, it was the producer (e.g., NTT DoCoMo) that created the new product i-Mode and then educated the consumer for its purchase and use

To keep content fresh, NTT DoCoMo gives great encouragement and assistance to developers. Even from its home page (www.nttdocomo.com), in both English and Japanese, there are easy step-by-step instructions on how to use c-HTML to create more i-Mode sites. This resulted in profits not just for NTT DoCoMo but also the site creators (Rao, 2000; Wieland, 2005). This leads us to our first proposition:

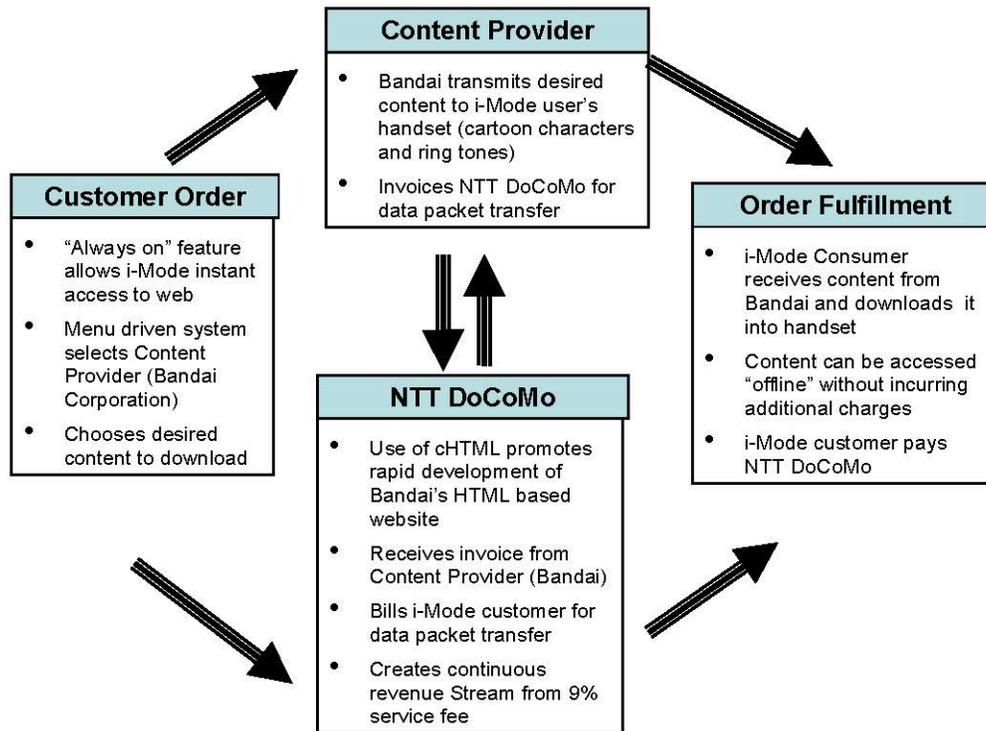
Proposition 1: in networked communication and content-based markets, to gain market share quickly, a simple technology should be chosen as the development platform in order to promote the rapid creation of content.

By leveraging one of NTT DoCoMo’s core competencies (Prahalad, 1990), its high level of trust by the Japanese consumer, NTT DoCoMo was able to create a unique strategic billing and revenue sharing system. Instead of each site tracking customer usage (e.g. data packet downloads) and then sending a bill to the i-Mode customer directly, the wireless website firms instead invoice NTT DoCoMo which then in turn includes these charges on the consumer’s monthly bill.

This is convenient in several respects, as the consumer has only one bill to pay, nascent websites need not have supporting accounting and billing departments, and best of all, NTT DoCoMo gains a

healthy revenue stream by charging a hefty 9% (Baldi & Thaug, 2002) for facilitating these transactions. Figure 1 illustrates this process by using the company Bandai as an example, a provider of cartoon characters for i-Mode users.

FIGURE 1
NTT DOCOMO REVENUE SOURCE: HANDLING OF INVOICING AND BILLING



This leads us to our next two propositions:

Proposition 2: When offering new, varied and growing set of services to the consumer over a unique and new networked technological platform, a simple billing system would lead to faster diffusion of the platform and the associated services compared to complex one.

and

Proposition 3: To encourage development of new, varied and growing set of services based on a unique and new networked technological platform, the platform creator- manager should employ a simple revenue sharing system.

Having reviewed NTT DoCoMo's inception and operations, let us now turn to AT&T Wireless' implementation and adaptation of the i-Mode technology.

What Is mMode?

Like its i-Mode counterpart, mMode is the American version, AT&T Wireless' implementation of a menu driven internet connected mobile service, with handsets that carry both voice and data, and that enable the purchase of goods and services from wireless accessible websites. By licensing from NTT

DoCoMo, AT&T increased its absorptive capacity (Cohen, Levinthal, & Martin, 1990; Teece, 1994; Zahara, 2002) and was able to develop its own mMode product relatively quickly.

As outlined in Table 2, and described in the succeeding sections of this paper, however, there are significant differences in the implementation of AT&T Wireless mMode compared to the original i-Mode. First, the technology of the network carrying the mMode signals differs from Japan.

TABLE 2
ATT WIRELESS'S MMODE & JAPAN'S NTT IMODE COMPARED

| | United States | Japan |
|-----------------------|---|---|
| Network | 2.5G GSM/GPRS | 'Inherited' 9.6kps data packet |
| Monthly Costs | Yearly Contractual agreement for prepaid number of monthly voice minutes (\$30 - \$75 per month) PLUS additional charges for data packets (\$2.50-\$20 per month) | Low (\$2.50) standard monthly connection fee, with 10% reduction in data packet costs if signup for optional yearly contract. No need for separate voice agreement as voice is carried via data packets |
| Internet Connectivity | Like broadband, mMode button connects user instantly to the net | Like broadband, i-Mode and other services provide "always-on" connectivity |
| Voice Fees | Per minute voice charge, with high per-minute costs for exceeding the contractual minutes | User charged by data packets transferred only |
| Data Fees | User charged only for the amount data packets transferred; content storable on handset for offline viewing | User charged only for the amount data packets transferred; content storable on handset for offline viewing |
| Website Technology | Only WAP (Wireless Application Protocol) website viewable; requires extensive website customization and programming sophistication | cHTML (compact Hypertext Markup Language) allows quick adaptation of existing and creation of HTML based wireless websites |
| Billing System | Small ticket, AT&T Wireless direct; big ticket credit card tied "e-wallet" | NTT DoCoMo 9% Centralized Billing |

Since it was starting from scratch, AT&T Wireless chose to build out a network using the well-tested, modern 2.5 G (Generation) GSM/GPRS technology. This would enable future growth and create a "technical barrier to entry" (Levin, 1978) that would hinder potential competitors from entering the market.

This 2.5G technology was chosen not just because it was reliable, but also because it would facilitate transition to the next 3G (third generation) network technology. By managing the process of its strategic innovation, AT&T Wireless sought to manage its innovation by controlling both "current and future profits" (Afuah, 1998). This choice of GSM/GPRS has influenced the technological and economic implementation of mMode.

GSM (Global System for Communications) is a European developed mobile cellular standard that is used throughout Europe and Asia. There are competing technologies, including CDMA, a standard developed by the US company Qualcomm, and used by US mobile carrier SprintPCS. GSM carries

voice transmissions, where as for data GPRS (General Packet Radio Service) is an enhancement to GSM (Steinbock, 2003).

GPRS accommodates packet-switched data, such as data from wireless capable websites. To build out this GSM/GPRS network to enable mMode, AT&T Wireless spent approximately \$5 billion in 2001, \$4.9 billion in 2002, and \$3.1 billion in 2003. This dual aspect of the network has led to the difference in pricing mechanisms in i-Mode versus mMode. Unlike i-Mode the mMode AT&T Wireless bills consumer separately for voice and data usage. For data transmissions (e.g. accessing the internet), the GPRS component of the network is used. Like i-Mode, this constant connection to the wireless internet enables the “always on” feature and near instantaneous response. Further, just like i-Mode, consumers are charged by the amount of data measured in kilobytes transferred.

But unlike i-Mode, where voice is also carried and billed by data packets, with AT&T Wireless, it is the GSM portion of the network that carries the voice traffic. Therefore, since data packets do not measure the amount of voice usage, the numbers of minutes used are tracked instead. This leads to AT&T Wireless requiring (just like other American carriers) an annual contract for a number of monthly voice minutes. The low subscription-fee advantage of i-Mode is lost in this dual billing system.

Another critical difference between i-Mode and mMode is the choice of technology employed for developing wireless websites. Unlike the easy c-HTML, AT&T Wireless chose the more cutting edge WAP (Wireless Application Protocol), which is technically superior (e.g. richer graphics, more features). WAP, however, requires higher levels of programming sophistication than c-HTML, so it does not encourage rapid conversion of existing websites, as does c-HTML. One reason WAP was chosen was to create a “mobility barrier” (Caves & Porter, 1977) , in which these wireless sites would have to be viewed through the mMode network. Unlike the 70,000 i-Mode sites in Japan, by 2003, AT&T Wireless network managed to inspire only 250 or so WAP enabled sites. This leads to the following proposition:

Proposition 4: In dynamic and networked technological settings, strategic decisions by the network platform leader to be at the cutting edge could present barriers to the efforts of firms attempting to develop services for that platform.

There is also a major difference between the centralized i-Mode billing system and AT&T Wireless. Unlike i-Mode, mMode offers a choice of two billing options, one similar to NTT DoCoMo and another unique to AT&T Wireless.

For simple value added services, such as downloadable music, ring tones, games, etc., the mMode users incur charges on their monthly-itemized AT&T Wireless bills. It is for larger ticket items that the two systems differ. When purchasing from other websites, for example E-Bay, the mMode handset has a credit card number stored in the device, known as “e-Wallet”, which is used to make the transaction. This affords the mMode user all the advantages of using a credit card in the US, not the least of which is the protection of consumer laws. This leads us to our next proposition:

Proposition 5: Prevalent consumer practices and entrenched billing practices may slow the transition to a unique, new networked technological platform that requires new consumer behaviors and billing modes.

DISCUSSION

Whether AT&T Wireless’ mMode service will be as successful as NTT DoCoMo’s i- Mode is difficult to say. AT&T Wireless is seeking features beyond those available in i- Mode, such as its recent agreement with the Loudeye company for fully downloadable music tunes, transforming a handset into a portable music player. However, there are several factors that AT&T Wireless mMode

usage faces that i-Mode does not. These include the following: Americans are used to graphic rich access to the internet and may not settle for a simple text-based menu-driven structure for navigation.

Culturally, American students and workers have far less spare free time to kill compared to the Japanese, whose average daily commute of 1.5 hours affords considerable scope for playing with i-Mode. In the United States, consumers are used to free information from the internet, and therefore may not be willing to pay, even minimal charges, for information such as stock quotes and sports scores.

Unlike Japan, where 70% of internet access is through wireless devices, most Americans access the internet via PCs and are therefore not conditioned to use small mobile phones as a method for internet access (Ishii, 2004). In a sense, the American 'love affair with the PC' has held Americans back in the race for wireless achievement (Mossberg, 2000). Because the websites are being programmed in WAP, there may not be as much content as readily available for mMode as there is for i-Mode. Compared to i-Mode with its 60% or greater market share, there are far fewer mMode-capable mobile devices (e.g. handsets) available in the more fragmented American market, thereby limiting consumer choices and perhaps increasing their reluctance to adopt the "bleeding edge" mMode technology. Given that there are six major US mobile carriers in the US versus three in Japan, AT&T Wireless may find itself competing against other mMode like systems.

Even with these potential difficulties however, the strategic intent of NTT DoCoMo was not just to create an American i-Mode. The agreement does not just stop at the transfer of i-Mode technology. The strategic investment and partnership called for achieving performance excellence through an integrated strategy of radical innovation and continuous improvement (Kodama, 2003b; Rindova, 2001; Terziowski, 2002). This dedication to radical innovation is best exemplified by NTT DoCoMo and AT&T Wireless' commitment to the development and implementation of the cutting edge 3G (third generation) networks, which could enable a host of future applications.

In fall 2001, NTT DoCoMo launched FOMA (Freedom of Multimedia Access), the pioneering 3G platform worldwide. This network was to augment the existing lower band i-Mode network. Instead of i-Mode speeds of 9.6 kbps, lightning fast speeds of 384 kbps, equal to those of ISDN lines, are available with FOMA. This enabled features like streaming video and audio, and opened the gateway for the development of other multimedia applications. There were snags in the implementation though, caused by problems, including battery life, with the new 3G handsets. AT&T Wireless has benefited from this as part of their GSM/GPRS network they have implemented EDGE, the successor of GPRS, thereby avoiding technological lockout (Schilling, 1998).

The EDGE technology shares the same high-speed bandwidth as FOMA. Interestingly though, these two similar technologies are being targeted at totally separate demographic consumers in the two countries. In Japan, FOMA is targeted towards the same group as the original i-Mode users: young, affluent, urban Japanese teenagers and twenty-somethings who would enjoy such features as live video feeds from built in cameras in their handsets, enabling them to not just talk but also see who they are calling.

In contrast, in the United States, EDGE is being sold as a business technology, an imperative tool for fast changing high-tech industries (C. M. Christensen & Raynor, 2003; C. M. S. Christensen, Fernando F. Utterback, James M., 1998; Funk, 2004). For \$80 per month, business users will get unlimited access (e.g. data transfer) to EDGE technology. Applications such as videophones are available, but are geared as tools for video conferencing. With the higher download speeds, other applications for businesspersons are being developed. These include rapid messaging (e.g. email and short instant messaging), access to and rapid download of information from company servers, and the sharing of data amongst other EDGE users.

While other US carriers are attempting to keep pace, as part of their agreement with NTT DoCoMo, by the end of 2004 AT&T Wireless will be required to have EDGE implemented in at least four US cities, including San Francisco and Seattle. Like most new technological debuts, AT&T Wireless faced the "innovators dilemma" (Arrow, 1962) they will have to do this without any existing end user feedback to enhance their implementations.

CONCLUSIONS AND DIRECTIONS FOR FUTURE RESEARCH

In this paper we have examined the strategic decision of a foreign firm to invest into another to share its technological expertise in order to gain market share. We have studied the specifics of two such firms, NTT DoCoMo and AT&T Wireless, and their corresponding technologies of i-Mode and mMode. In the process we have made a series of propositions regarding such strategic initiatives. Through a longitudinal study tracking the progress of these firms, the validity of these propositions can be tested. Further research could also include examining other similar strategic international decisions pertaining to dynamic and networked technologies.

REFERENCES

- Abrahams, P. (1998). DoCoMo will set world record Japanese Mobile Telecoms operator will raise up to \$19BN from share issue, *Financial Times*, p. 25.
- Afuah, A. (1998). *Innovation Management: Strategies, Implementation, and Profits*. New York, Oxford: Oxford University Press.
- Anwar, S. T. (2002). NTT DoCoMo and M-Commerce: A Case Study in Market Expansion and Global Strategy. *Thunderbird International Business Review* (Vol. 44, pp. 139): Jossey-Bass, A Registered Trademark of Wiley Periodicals, Inc., A Wiley Company.
- Arrow, K. J. (1962). Economic Welfare and the Allocation of Resources for Invention. In R. R. Nelson (Ed.), *The Rate and Direction of Inventive Activity*. Princeton: Princeton University Press.
- 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* (Vol. 12, pp. 6-13): Routledge, Ltd.
- Brandenburger, A. M., & Nalebuff, B. J. (1997). Co-opetition: Competitive and cooperative business strategies for the digital economy. *Strategy & Leadership*, 6, 22-28.
- Buzzell, R. D. G., Bradley T. (1975). Market share--a key to profitability. *Harvard Business Review*, 53(1), 97.
- Caves, R. E., & Porter, M. E. (1977). From Barriers to Mobility Barriers: Conjectural decisions and Contrived Deterrence to New Competition. *Quarterly Journal of Economics*.
- Christensen, C. M., & Raynor, M. E. (2003). *The Innovator's Solution: Creating and Sustaining Successful Growth*. Boston, MA: Harvard Business School Press.
- Christensen, C. M. S., Fernando F. Utterback, James M. (1998). Strategies for Survival in Fast-Changing Industries. *Management Science* (Vol. 44, pp. S207): INFORMS: Institute for Operations Research.
- Cohen, W. M., Levinthal, D. A., & Martin, J. (1990). *Absorptive Capacity: A New Perspective on Learning and Innovation*. Cornell: Cornell University Press.
- ComputerWire. (2003, 2003/03/24/). AT&T and DoCoMo Plan US 3G Launch Next Year. *Computergram Weekly*, 7.
- Daellenbach, U. S. M., Anne M. (1999). Commitment to innovation: The impact of top management team characteristics. *R & D Management* (Vol. 29, pp. 199): Blackwell Publishing Limited.

- Dano, M. (2003). mMode set for November comeback using WAP 2.0 browser. *RCR Wireless News* (Vol. 22, pp. 20): Crain Communications Inc. (MI).
- Funk, J. L. (2004). *Smart Phones, Dominant Designs, and the Evolution of the Mobile Intranet Applications in Japan*. Paper presented at the Austin Mobility Roundtable, Austin, TX.
- Ishii, K. (2004). Internet use via mobile phone in Japan. *Telecommunications Policy* (Vol. 28, pp. 43).
- Kodama, M. (2001). Innovation through Strategic Community Management: The Case of NTT DoCoMo and the Mobile Internet Revolution. (kodama@bus.nihon-u.ac.jp, Trans.) *Creativity & Innovation Management* (Vol. 10, pp. 75): Blackwell Publishing Limited.
- Kodama, M. (2002). The World's First 3G Mobile Phone Service: A Case Study of Innovation. [Article]. *Journal of General Management*, 28(2), 43.
- Kodama, M. (2003a). Strategic community-based theory of firms: Case study of NTT DoCoMo. *Journal of High Technology Management Research* 14, 307.
- Kodama, M. (2003b). Transforming an old-economy company into a new economy: the case study of a mobile multimedia business in Japan. *Technovation* (Vol. 23, pp. 239).
- Lennon, M. (2010). *Monetizing Mobile: Factors Influencing the Development of Mobile Commerce - Korea, China, Japan*. Saarbrücken, Germany: Lambert Academic Publishing AG & Co.
- Lennon, M. M. (2011). Competitive Forces in Japanese Mobile Telephony: the Case of NTT DoCoMo and KDDI. *International Journal of Management and Decision Making*, 11(3), 268-283. doi: 10.1504/ijmdm.2011.040703
- Levin, R. C. (1978). Technical Change, Barriers to Entry, and Market Structure. *Economica* (Vol. 45, pp. 347): Blackwell Publishing Limited.
- Li, H. A.-G., Kwaku. (2001). Product Innovation Strategy and the Performance of New Technology Ventures in China. *Academy of Management Journal*, 44(6), 1123.
- Lindmark, S., Bohlin, E., & Andersson, E. (2004). Japan's mobile internet success story -- facts, myths, lessons and implications. [Article]. *Info*, 6(6), 348-358.
- Mossberg, W. S. (2000, Aug 3, 2000). A Long Love Affair With the PC Might Be Holding Back the U.S., *Wall Street Journal*, p. B.1.
- Murphy, K. (2002a, 2002/05//). i-Mode Makes US debut with AT&T Wireless' m-Mode. *Computer Business Review*, 10, 14.
- Prahalad, H. (1990). The Core Competence of the Corporation. *HBS Review*, May-June 1990.
- Rao, M. (2000). Is the wireless Tsunami losing momentum? *Wireless Week*, 8, 32.
- Ratliff, J. M. (2002). NTT DoCoMo and Its i-mode Success: Origins and Implications. *California Management Review*, 44(3), 55.

- Rindova, V. P. K., Suresh. (2001). Continuous 'Morphing': Competing through Dynamic Capabilities, Form, and Function. *Academy of Management Journal*, 44(6), 1263.
- Schilling, M. A. (1998). Technological lockout: An integrative model of the economic and strategic factors driving... *Academy of Management Review* (Vol. 23, pp. 267): Academy of Management.
- Schilling, M. A. (2003). Technological Leapfrogging: Lessons from the US Video Game Console Industry. *California Management Review*, 45(3).
- Schumpeter, J. A. (1936). *The theory of economic development*. Cambridge, MA: Harvard University Press.
- Steinbock, D. (2003). *Wireless Horizon: Strategy and Competition in the Worldwide Mobile Marketplace*. New York: AMACOM.
- Teece, D. P., Gary. (1994). The Dynamic Capabilities of Firms: an Introduction. *Industrial & Corporate Change*, 3(3), 537.
- Terziovski, M. (2002). Achieving performance excellence through an integrated strategy of radical innovation and continuous improvement. *Measuring Business Excellence* (Vol. 6, pp. 5).
- Wieland, K. (2005, 2005/01//). NTT DoCoMo: services, services, services. *Telecommunications - International Edition*, 39, 12-14.
- Zahara, S. A. a. G., Gerard. (2002). Absorptive Capacity: A Review, Reconceptualizing, and Extension. *Academy of Management Review*, Vol. 27(No. 2), 182-203.