

FACTORS THAT AFFECT SUCCESSFUL MOBILE COMMERCE

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ABSTRACT

This paper deals with what factors facilitate development of m-commerce. The government support on building mobile infrastructure is proposed as the major factor to facilitate m-commerce success. Scholars agree that the productivity gain and industry competitiveness can be influenced by the characteristics of government IT spending. Could government-initiated infrastructure investment on mobile infrastructure increase mobile commerce industry output and competitiveness? There exist numerous theoretical and empirical supports for the positive role of national infrastructure on industry competitiveness. As for the question of the impact of government support on m-commerce, we posit that national IT infrastructure investment should foster e-commerce industry. In this paper, this proposition will be explored by a case study

Keywords: M-commerce, mobile infrastructure, government IT investment, success factors

INTRODUCTION

Wireless technology is starting to play an essential role in the telecommunications infrastructure. 3G ('third generation' wireless infrastructure) and GPRS (General Packet Radio Service) standards for wireless communications, more than 10 times faster than current systems let the development of mobile commerce advance. Mobile commerce or m-commerce is one of the newest and most used words in business today. What is mobile commerce or m-commerce? Mobile commerce is a kind of monetary data transaction conducted with a mobile device and mobile network. Today it offers a wide range of services for its customers. Mobile commerce services let consumers order, buy and deliver goods such as books, CDs, movies, music, tickets via their mobile phones. M-commerce is conducted by many key participants such as network providers, device manufacturers, Wireless Application Service (WAS) providers, equipment infrastructure vendors, financial service providers, and application developers. But, those key players are regulated by the government authorities and standardization groups. Currently, there are number of different mobile application environments in the world. Following are descriptions on these mobile application environments. First, The Wireless Application Protocol (WAP) is used as a standard for the presentation and delivery of wireless information and telephony services on different mobile phones and wireless terminals (18). It also supports several mobile networks and different bearers. The Wireless Application Layer – which is one out of five layers

in WAP - includes a micro browser environment based on the Wireless Markup Language (WML). This environment is popular in Europe. Second, the i-mode service is very popular in Japan. With these phones it is possible to download java applets (called i-appli) from servers, for instance games, agent type services or other applications. The i-mode system is a proprietary system developed by NTT DoCoMo in Japan (15). I-mode pages have to be defined in a markup language called compact HTML (cHTML). Lastly, in the USA several different approaches concerning wireless access to the Internet have been implemented, depending on the mobile devices being used. For mobile phones WAP and its precedent phone.com's Handheld Device Markup Language dominate (16). In addition Japanese i-mode is widely spreading in this area too. For Research-In-Motion pagers, GoAmerica's offer the GoWeb Internet access service (5). Lastly in Korea which has one of the highest penetration of mobile phones and subscribers Wideband CDMA (W-CDMA) has been a dominant mobile infrastructure. Today mobile commerce is developing fast. Through this system we achieved many benefits in business, such as improvement of cash flow, secure credit and debit card authorizations, and ability to conduct business where phone line connections don't exist (10). Telecommunication and cellular companies are making good business too. Nowadays, it is one of the main profitable businesses in Asia (especially South Korea). In this paper we would like to explore the cause of success of Korean mobile commerce. Weil and Vitale (19) proposed the relationship between Internet infrastructure and success of e-businesses. They proposed that there was a direct relationship between Internet infrastructure and the success of e-businesses. In this paper we posit that national IT infrastructure which includes national Internet infrastructure should play a critical role in fostering the success of e-businesses including mobile commerce. We examine empirically this proposition by presenting the example of success of mobile commerce in Korea where national IT infrastructure is well advanced to support and foster all kinds of e-businesses including mobile commerce.

NATIONAL IT INFRASTRUCTURE

There are studies conducted on IT infrastructure including national IT infrastructure. IT infrastructure of an organization or corporate IT infrastructure can be defined as following: physical components such as hardware, software and network facility plus human components such as human expertise, manuals, and corporate IS culture constitute IT infrastructure of an organization (3). Jeong et al. (6) defined national IT infrastructure with the similar principle that Broadbent and Weil have used for the definition of corporate IT infrastructure as following: physical components such as computers, peripheral equipments, telecommunication networks, software, and other relevant electronic goods in the nation plus human components such as IT educational level of countrymen and degree of development of IT-relevant industry. Based on

this definition, Lee (7) infers that development of national IT infrastructure is critical for the success of e-commerce since e-commerce requires adequate telecommunication networks plus high usage of computers and the Internet as well as people's skill and willingness to use the Internet in their everyday lives. In Lee's case study (8), it was suggested that the reason that the Korean e-commerce firm failed as a business was largely due to lack of advanced national IT infrastructure in Korea in those years. But Lee (9) also pointed out that Korean government was determined to invest in building national IT infrastructure as a long-term project, which has been actualized currently in 2002. The resolve of Korean government which spent billions of dollars to create high-speed wide-bandwidth such as ADSL networks for all homes in the country paid off handsomely by flourishing IT industry where many so-called dot-com companies have become very profitable ventures in recent years.

NATIONAL IT INFRASTRUCTURE OF KOREA AND MOBILE COMMERCE

The success of implementing advanced national IT infrastructure is well documented by a Korean government publication such as the IT white paper of Korea (13). According to the white paper, 97% of all households in Korea have some way of connecting to the Internet and 60% of all households in Korea access the Internet through ADSL. Not to mention all the businesses regardless of size that are connected to the Internet through T1/2/3 lines, it is simply remarkable that Korea has achieved the highest saturation rate of high speed Internet in the world exceeding the US. In terms of ownership of computers at home also reaches 97%. The Korean government also invested heavily on IT education to eradicate computer illiteracy and to educate highly skilled professionals. Thus we can posit that physical and human components of national IT infrastructure are well advanced in Korea. This environment produced a boom in e-commerce industry starting in the year of 2000 and many companies not only earned large revenue but also high profits too. Here we propose a novel theory on the relationship between national IT infrastructure and e-commerce. The focus here is on mobile commerce or m-commerce which is a subset of e-commerce that uses mobile telecommunication networks and equipments to conduct business over the Internet. Our proposition is as following:

Proposition: National IT infrastructure in support of mobile Internet fosters m-commerce.

We present a case study of an m-commerce firm as the evidence to support this proposition. The national IT infrastructure in support of mobile Internet means wide-spread use of cellular phones which use Internet protocols. The phenomenal growth of ownership of cellular phones in Korea was not a government initiative, rather a private industry-driven one. Due to highly efficient electronics industry which was able to manufacture low-cost/high-capacity cellular phones, Korean public quickly adopted the use of cellular phones in their everyday lives. The white paper tells that close to 90% of all adults now own a cellular phone, which makes Korea as the country

with highest ownership of cellular phones country in the world. This is another side-effect of the advanced national IT infrastructure which includes development of IT-related industry. Thus we can posit that Korea has the national IT infrastructure that fully supports mobile Internet; the mobile telecommunication networks plus almost entire population with cell phones. This infrastructure surely fosters the growth and success of m-commerce.

CHARACTERISTICS OF MOBILE PAYMENT SYSTEM

While using a mobile phone, a new payment was conceived by Korean researchers, which is to use the mobile phone itself as the payment device instead of using a credit card. There are many instances where using a credit card is not appropriate or unaccepted. For example, very small amount payment (say, less than 10 dollar) inhibits people to use a credit card and at the same time, credit companies might refuse processing of the very small amount payment. In addition, in some cultures, using credit cards on the Internet is still regarded risky. Korean researchers at the companies like Mobilianz, Inc. devised a system where the mobile phone users make purchases on the Internet and the bill will be accrued with the mobile phone fee, thus the user will pay for the product or service when the next mobile phone bill is due. This form of payment simply revolutionized the Korean m-commerce by allowing customers to purchase many products and services using their mobile phones, which, in fact, led to quick expansion and rising revenue for the companies which provide products and services. Most of these companies which benefited by the new payment scheme are content-providers such as providers of online game and movies, which were priced at the very small amount per usage. Thus a lot of people didn't bother to write down their credit card details to purchase these services and for them, using the mobile phone as the payment system was a very convenient way of paying for these contents.

INFRASTRUCTURE AND INDUSTRY COMPETITIVENESS

In the past, the positive role of IT investment on productivity (4) has been challenged by negative empirical evidences (12), thus creating productivity paradox. However, the productivity paradox seems to be resolved by recent researches. Using both more recent data to compensate for the longer learning curves associated with the implementation of new IT technologies and higher resolution research designs that permitted the detection of firm-level effects, recent studies successfully linked IT spending to increased output.

However, there still remain many unanswered questions with this important premise. For example, it is still unclear whether the productivity gain and industry competitiveness can be influenced by the characteristics of IT spending. Could government initiated infrastructure investment increase industry output and competitiveness? In business strategy literature, there

exist numerous theoretical and empirical supports for the positive role of national infrastructure on industry competitiveness (17). Porter emphasized the importance of national infrastructure by treating it as important as factor conditions such as land, labor and capital. Although it may be possible for a few firms to overcome unfavorable infrastructure conditions by utilizing valuable and firm-specific resources and capabilities (2), it is almost impossible for a whole industry to gain competitive advantages without prior investments on infrastructure. As an empirical evidence, we present a case study of a Korean firm which became the facilitating component of the national IT infrastructure that fostered e-commerce industry. The subject firm, Mobilianz, Inc. is a Korean firm that processes cell phone-based payment on the Internet (11). This firm has become very successful in terms of generating revenue in just two years. The quick growth of this firm is due to the fact that people in Korea who now had access to the high-speed and wide-bandwidth Internet at home as well as at work wanted to see movies and to play games but didn't want to pay with a credit card mostly because the small amount of payment discouraged the use of the credit card. Unlike the US where ADSL lines still not completely replaced old coaxial cable lines, Korean public could use ADSL service at a very cheap rate thanks to government effort to foster the Internet usage which resulted in the action by the government-owned monopoly, Korean Telecom's installation and provision of such service at the cheap rate. Thus Korean public were ready to watch movies in flawlessly moving images and play games in realistic sound and images even at home without worrying telecommunication bills. However the usual payment methods that excluded the use of credit cards largely due to security concern as well as lack of availability of credit cards in general were cumbersome. For example, wiring money to the web site owner company's bank account was most widely used. E-cash was used as an alternative to the wiring. However this form of payment also initially requires wiring money through the bank to purchase the e-cash. Therefore when people realized that they could pay the small amount of money for a movie on the web site through their cell phones, it was just matter of time that everybody jumped on the wagon and started to use cell phones as the payment method to pay for everything from movies/flower delivery/game playing/sending cards instead of all existing alternative payment methods. In other words, Mobilianz, Inc. is a part of national IT infrastructure where its software fills the gap between the mobile telecommunication networks and cell phones. Now that the national IT infrastructure for mobile Internet was ready, the growth of Internet content providers happened. One of clients of Mobilianz is NHN corporation where games are provided over the web sites which can be displayed on the cell phone. The firm reported phenomenal growth in revenue after they introduce the cell phone payment method amongst other options. Nowadays most of transactions are paid through cell phone method using Mobilianz' system (14).

CONCLUSION

Koreans in general do not trust the security aspect of Internet transactions, thus mobile phone payment system looked secure since payment will be done after the service is rendered. Thus the proposition that national IT infrastructure drives the development of m-commerce is confirmed here. The mobile phone payment system plus mobile phones plus high-speed/wide-bandwidth Internet which comprise the national IT infrastructure for m-commerce were developed well enough to support the rapid growth of mobile commerce in Korea. This development of all the necessary components of national IT infrastructure for m-commerce in Korea is truly unique since no other country was able to achieve this. Other countries including early leader in e-commerce such as the US are lagging behind since not all the components for m-commerce are ready. For example, still the number of mobile phone users is 1/3 of the entire adult population of the US while in Korea nearly 99% of all adults have mobile phones. Thus the US does not meet the first component requirement for m-commerce-supporting-national IT infrastructure. Furthermore, the high-speed/wide-bandwidth Internet is not yet widely used at many homes in America since the implementation was done by private companies which often demanded high installation fees as well as usage fees. In Korea, thanks to the government initiative to install and provide high-speed/wide-bandwidth Internet such as ADSL to every home in the country, it is now estimated that close to 80% of all Korean households have ADSL connections; this was possible since the nationwide network connection was constructed by a government-owned company, Korean Telecom which was able to install and operate the high-speed/wide-bandwidth network at a very cheap rate. Not only most households in Korea now have the access to the realistic movie streams as well as vibrant game animations, but also they pay very little for the usage of the infrastructure. As a conclusion we can present the factors for m-commerce success as following:

The success of m-commerce is dependent on

- 1) High-speed/wide-bandwidth Internet connection available to most citizens of the nation at an affordable rate
- 2) Saturated mobile phone ownership and extremely frequent usage of mobile phones throughout the entire citizenry of the nation
- 3) Payment system that connects the utility of the mobile phone and the Internet together for the whole nation

REFERENCES

1. Anonymous, Yankee Group Report, 2002.
2. Barney, J. B., "Firm resources and sustainable competitive advantage", Journal of Management, vol. 17, no. 1, pp. 155-171, 1991.

3. Broadbent, M. & Weil, P., *Leveraging the New Infrastructure: How market leaders capitalize on Information Technology*, Harvard Business School Press, 1998.
4. DeLong, J. B. & Summers L. H., "Equipment investment and economic growth", *Quarterly Journal of Economics*, vol. 106, pp. 445-502, 1991.
5. Goamerica, <http://www.goamerica.com>, 2003.
6. Jeong, K.H. & King, J., "National Information Infrastructure Initiatives in Korea: Vision and Policy Issues", *Information Infrastructure and Policy*, vol. 5, no. 2, pp. 81-93, 1996.
7. Lee, O., "A Direct E-Mail Advertising Firm's Failure: Lessons for Conducting E-commerce in Developing Countries", *International Journal of Failure and Lessons Learned in Information Technology Management*, vol. 3, no. 1, pp. 23-28, 1999.
8. Lee, O., "ENI Company", *Annals of Cases on Information Technology Applications and Management in Organizations*, vol. 1, no. 1, pp. 149-158, 1999.
9. Lee, O., "An Action Research Report on the Korean national digital library", *Information & Management*, vol. 39, no. 4, pp. 255-260, 2001.
10. Merchantseek, <http://www.merchantseek.com>, 2003.
11. Mobilianz, www.mobilianz.co.kr, 2003.
12. Morrison, C. and Berndt, E., "Assessing the productivity of information technology equipment in US manufacturing industries", NBER Working Paper No. 3582, National Bureau of Economic Research, Washington, DC, 1991.
13. NCA(National Computerization Agency of Korea), *The White Report on Informatization of 2002*, www.nca.or.kr, 2002.
14. NHN, www.NHN.co.kr, 2003.
15. NTT, <http://www.nttdocomo.com>, 2003.
16. Phone.com, <http://www.phone.com>, 2003.
17. Porter, M. E., *Competitive advantage of nations*, Free Press. 1990.
18. WAP, <http://www.wapforum.org>, 2003.
19. Weil, P. & Vitale, M., *Place to Space: Migrating to E-business Models*, Harvard Business Press, 2001.