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Abstract

In this paper, we analyze the relationship between management performance and mobile banking strategy using the Japanese mobile phone subscribers as the number of mobile banking users. As the result, we found the following facts. Mobile banking contributed to reduce the number of bank branches by providing convenient remote delivery channel through cell phones. Cost reduction by reducing the number of branches has been superior to raised labor cost and operating cost so that both gross and net operating profits have been raised significantly through mobile banking.

Keywords: Mobile Banking, Statistical Analysis

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1. Introduction

The mobile phone with the Internet connectivity as the new communication infrastructure has transformed the banking delivery channels in Japan.

The mobile phone is the most popular electronic communication device in Japan. 74% of Japanese¹ possessed cell phones² and that 87% of them are connected to the Internet via Internet-capable mobile phones as of November 2006.

This information service for mobile phones provides Web browsing, e-mail, electronic money (ex. Edy, Suica), credit card (ex. DCMX, id, Quick pay) or game and grew quickly after its introduction in 1999 in Japan.

NTT DoCoMo, the Japanese largest mobile phone company, announced that more than 90% of new cell phone subscribers are contracting for the Internet access service costing only 150-300 yen (USD 1.25-2.5) as a monthly additional charge. This cell phone company has become the largest Japanese Internet Service Provider (ISP) by providing wireless Internet connection services for 45.6 million³ customers as of January 2006. Thus, mobile phones have become commodities of Japanese daily life and mobile Internet access is available at very low cost in Japan.

¹ The Japanese population is 127.7 million, according to the population census by the ministry of Internal Affairs and Communications as of October 2005.
<http://www.stat.go.jp/data/kokusei/2005/youkei/01.htm>

² These data are largely obtained from Telecommunications Carriers Association (TCA), Japan. <http://www.tca.or.jp/eng/database/daisu/index.html>

³
http://guinnessworldrecords.com/records/science_and_technology/internet/largest_wireless_internet_provider.aspx

Internet connection services by mobile phone companies⁴

Mobile Phone Operator(Parent)	Data Service name	Application language	Max receiving speed (Mbps)	Data subscribers* (Million)	Ref. Total subscribers
NTT DoCoMo (NTT)	i-mode	cHTML	3.6	47.1	52.1
au /Tu-ka (KDDI)	EZweb (WAP ⁵)	WML ⁶	3.1	22.1	26.9
Softbank Mobile (Softbank)	Yahoo! keitai	MNL ⁷	3.6	12.8	15.3

As of November 2006

As of 2006, all Japanese nationwide and regional banks provide internet banking and most of them also provide mobile banking which we can access through Internet capable cell phones. By operating cell phone browser, 24h a day, 365 days a year, mobile banking users can easily execute, for example, balance inquiry, transaction inquiry, funds transfer, account transfer, time deposit, foreign currency time deposit, tax and public utility charge payment, interest rate inquiry. Cost for mobile banking users is very low, because almost all banks claims no additional recurrent charges and communication fee maybe a couple of yen (some US cents) for one time.

This purpose of paper is examining the relationship between management performance and mobile banking strategy. By examining the relationship, we

⁴ <http://www.tca.or.jp/japan/database/daisu/yymm/0611matu.html>

⁵ Wireless Application Protocol: A standard for providing cellular phones, pagers, and other handheld devices with secure access to e-mail and Web pages.

⁶ Wireless Markup Language: A tag-based language used in the Wireless Application Protocol (WAP).

⁷ Mobile Markup Language: A subset of HTML 4.0 for cell phones.

give some suggestion to mobile banking strategy of each bank⁸.

2. Data and Models

In this paper, we analyze the relationship between management performance and mobile banking strategy. That is, we want to know which or not mobile banking strategy contributes to management performance. Unfortunately, we cannot gain the individual data on mobile banking strategy each bank carries out. However, we gain the Japanese mobile phone subscribers. Then, we use the data in our paper as proxy variable. The assumption has some problems, but may be valid. Because rate of cell phone subscribers use mobile banking remains almost constant in the period 1999-2003. In line with this assumption, the number of mobile banking users is in proportion to the number of cell phone subscribers. The number of Japanese mobile phone users has been matured recently. For example, the increase rate of Japanese mobile phone subscribers is 0.5% in December 2006.⁹

We choose explanatory variables from official financial report of Japanese banks from 1999 to 2003 and divided into eight Japanese local regions. In order to remove the influence of big banks and big cities, we chose median of the data. Our data consist of eight regions by five years so that we could analyze 40 data, which is pooled data.

We utilized simple regression to analyze the relationship between mobile banking and managerial index of Japanese banks.

The followings are our hypotheses:

⁸ See Nagaoka, Ukai and Takemura (2005a, 2005b) about current of mobile banking in Japan.

⁹ <http://www.tca.or.jp/japan/database/daisu/yymm/0612matu.html>

1. Mobile banking has effected on the number of Japanese bank branches because certain parts of transactions at bank branches could be replaced by mobile banking.
2. Mobile banking has influenced significantly on the reduction of Japanese bank's labor cost, because a certain part of bank tellers at branches or information centers could be replaced by mobile banking system.
3. Mobile banking has influenced significantly on the operating cost, because of less paper work and efficient transactions by mobile banking system.
4. Through the diminished labor cost, operating cost, and/or the number of branches, operating profit and/or ordinary profit could be gained.

3. Statistical Analysis

According to our simple regression analysis, we estimate the parameters in each equation. We use ordinary least square (OLS) estimation as econometric method.

1. Mobile banking (MB) has influenced on the number of bank branches and its correlation is negative.

$$\text{Number of branches} = -6.6867 \cdot 10^{-7} \cdot \text{MB} + 104.8502$$

$$t \text{ values} = -2.11159$$

$$p \text{ values} = 0.041354$$

$$\text{Adjusted R-square} = 0.08146$$

2. Mobile banking has influenced on labor cost and its correlation is positive.

Labor cost = $25760.4226 + 0.00120 * MB$

t values= 6.196093

p values= $3.07 * 10^{-7}$

Adjusted R-square= 0.48947

3. Mobile banking has influenced on operating cost and its correlation is positive.

Operating cost = $25760.4226 + 0.00120 * MB$

t values= 6.196093

p values= $3.07 * 10^{-7}$

Adjusted R-square= 0.48947

4. Mobile banking has influenced on both gross and net operating profits of banks and their correlations are positive.

Gross operating profit = $37155.6097 + 0.002092 * MB$

t values=5.944805

p values= $6.78 * 10^{-7}$

Adjusted R-square=0.468235

Net operating profit = $9230.421 + 0.000952 * MB$

t values= 6.176508

p values= $3.260476 * 10^{-7}$

Adjusted R-square= 0.487848

We interpret our statistical analysis as follows.

(a) Mobile banking contributed to reduce the number of bank branches by providing convenient remote delivery channel through

cell phones.

(b) However, both labor cost and operating cost have been raised by mobile banking because of attractive and easy-to-access banking services which lead to additional costs, such as marketing activities (ex. web design, time campaign, public relation, or give-away) and related necessary human resources.

(c) In total, cost reduction by reducing the number of branches has been superior to raised labor cost and operating cost so that both gross and net operating profits have been raised significantly through mobile banking.

In addition to the above estimations, we also analyzed statistically following relationships which might lead to other studies.

1. Mobile banking has influenced on the number of temporary employee of Japanese banks and its correlation is positive.

Number of temporary employee =
297.000841769835+5.48012*10⁶MB
t values= 2.133745
p values= 0.039379
Adjusted R-square= 0.083493026

We assume that the number of temporary employee is in proportion to the amount of transactions which are brought by business operations. However, from another aspect, temporary employees replace existing regular employees. In this paper, we could not determine which impact is superior to the other and how much, it would be a subject to study by statistical analysis

2. No significant coloration is found between mobile banking and bank's hardware investment.

Hardware investment = $1715.171 + 2.18092 \cdot 10^{-5} \cdot MB$

t values= 1.292313

p values= 0.204052

Adjusted R-square= 0.01689114

We assume that mobile banking system costs much less than transaction processing system (accounting system) or other computer systems of banks, no significant relationship was found. In other words, mobile banking system could be one of the most cost-efficient delivery channels for banks¹⁰ so that it would be possible theme to study how much efficient it is furthermore.

4. Concluding Remarks

We found the following facts. Mobile banking contributed to reduce the number of bank branches by providing convenient remote delivery channel through cell phones. Cost reduction by reducing the number of branches has been superior to raised labor cost and operating cost so that both gross and net operating profits have been raised significantly through mobile banking.

Finally we show the future work. In this paper, we may find the difference among eight Japanese regions by multiple regressions. For example, region A may perform better than Japan because of regional unique efforts or geographical advantage.

¹⁰ <http://www.rri.co.jp/chousa/pdfreport/20011030.pdf> For banks, one time transaction cost of mobile banking is almost 1% of the one by bank teller, 2% by telephone operator.

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