Post-payment Smart Card System in Japan

Makoto Mizutani
Policy Research Institute for Land, Infrastructure and Transport
Ministry of Land, Infrastructure and Transport
Government of Japan
Contents of the Presentation

- Introduction of Smart Card System to Public Transport
- Post-payment Smart Card System
- Pilot Project on Post-payment Smart Card System
- Evaluation for the Pilot Project
- Lessons Learned
Introduction of Smart Card System to Public transport

Advantage of Smart Card with IC Chip

- No need to take the card out of your purse
- Contactless transaction through IC chip
- No need to refer to fare table
- No need to purchase a ticket
- To be used to multi-transport system
- To be used to other transactions
- To be used to other transactions

Railway

Bus

Card Loader

Taxi

Shopping
Introduction of Smart Card System to Public transport

Public Transport with Smart Card System

- Bus
- Railway
- Combination

**Surutto KANSAI** (Railway, Shopping) 2004

- **Skyrail service company** (Railway) 1998.9
- **Kitakyusyu City** (Bus) 2001.9
- **Nagasaki pref.** (Bus) 2002.1

- **Kagoshima pref.** (Bus) 2004
- **Miyazaki Kohtsu** (Bus) 2002.10

- **Takamatu-Kotohira Electric Railroad** (Railway, Bus) 2004
- **Iyo railway** (Railway, Bus) 2004
- **Ohmi Railway** (Bus) 2003.4

- **Hokuriku railroad** (Railway, Bus) 2003
- **Hokuriku railroad** (Post-payment: tbd)

- **Tokyo Monorail** (Railway) 2002.4
- **Toyota town** (Bus) 1997.10
- **Entetsu** (Bus) 2003.4

- **Skyrail service company** (Railway) 1998.9
- **Kitakyusyu City** (Bus) 2001.9

- **Fukushima Kotsu** (Bus) 2001.4
- **JR EAST** (Railway) 2001.11
- **Tokyo Rinkai Kosoku Railway** (Railway) 2002.12

- **Tokyu Transses** (Bus) 1998.7
- **Tokyo Transses** (Bus) 1999.11
- **Tokyo Transses** (Bus) 2000.2
- **Tokyo Transses** (Bus) 2001.11
- **Tokyo Monorail** (Railway) 2002.4

- **JR EAST** (Railway, Shopping) 2001.11
- **JR WEST** (Railway) 2003.11
- **Tokyo Monorail** (Railway) 2002.4
- **Tokyo Monorail** (Railway) 2003.11
- **Tokyo Monorail** (Railway) 2004

- **Ohmi Railway** (Bus) 2003.4
- **Toyoko Kotsu** (Bus) 2000.2
- **Toyoko Kotsu** (Bus) 2001.9
- **Toyoko Kotsu** (Bus) 2002.1

- **Tokyu corporation** (Railway) 2002.7
- **Tokyu corporation** (Railway) 2002.8
- **Tokyu corporation** (Railway) 2003.3
- **Tokyu corporation** (Railway) 2003.10

- **Hokkaido Kitami Bus** (Bus) 2003.3
- **Sapporo Information Network** (Subway, Shopping) 1999.11 (Post-payment: tbd)
- **Dohoku Bus** (Bus) 1999.11
- **Yamanashi Kotsu** (Bus) 2000.2

- **JR EAST** (Railway) 2001.11
- **JR EAST** (Railway) 2003.3

- **Tokyo Rinkai Kosoku Railway** (Railway) 2002.4
- **Tokyo Rinkai Kosoku Railway** (Railway) 2003.3
- **Tokyo Rinkai Kosoku Railway** (Railway) 2003.10
- **Tokyo Rinkai Kosoku Railway** (Railway) 2004
## Introduction of Smart Card System to Public transport

<table>
<thead>
<tr>
<th>Smart Card Type</th>
<th>Bus</th>
<th>Railway</th>
<th>Combination</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Pre-paid</em></td>
<td>11</td>
<td>9</td>
<td>0</td>
<td>20 (5)</td>
</tr>
<tr>
<td></td>
<td>(1)</td>
<td>(0)</td>
<td>(4)</td>
<td></td>
</tr>
<tr>
<td><em>Post-payment</em></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0 (2)</td>
</tr>
<tr>
<td></td>
<td>(0)</td>
<td>(2)</td>
<td>(0)</td>
<td></td>
</tr>
</tbody>
</table>

( ) : planned

As of November 2003
Transport fare to be paid by the user is accumulated in the system and charged monthly to the user’s bank account/credit card.

- **Charged to Credit Card:** Monthly balance charged to designated credit card
- **Charged to Bank Account:** Monthly balance charged to designated bank account

Electronic value is automatically loaded to the card when the value on the card comes below a certain level. The additional value loaded is charged to the user’s bank account/credit card.
Post-payment Smart Card System

Advantages of Post-Payment Smart Card
- To the User -

“Convenience”
- No need to prepare cash to charge electronic value onto the card
- No need to care how much value is remaining

“Economic Benefit”
- Obtaining discounted fare based on the actual trips
Advantages of Post-Payment Smart Card
- To the Transport Industry -

“Efficiency”
- No need to install value-loading machines
- No need to handle cash

“Flexible Marketing”
- Introduction of multi-fare system based on the actual trips
- Provision of various enhanced customer services
Pilot Project on Post-payment Smart Card System

*Purpose:*

To evaluate post-payment smart card system under which discounted fare is applied through:

- transport record
- interviews to the users
Pilot Project on Post-payment Smart Card System

**Period & Field:**

Period: 1 January 2003 – 31 March 2003 (3 months)
Field: Sapporo City Subways (3 Lines, 49 Stations)
(Pre-paid Smart Card system is already installed.)
Preparation:

Smart Cards

- Issued 700 post-payment smart cards

(The surface)

(The back)

Pilot Project on Post-payment Smart Card System
Pilot Project on Post-payment Smart Card System

Preparation:
Ticket/Smart Card Examination Machine

- Improved existing ticket/smart card examination machines at all stations to activate post-payment smart cards
Pilot Project on Post-payment Smart Card System

**Preparation:**

Backyard System

- Installed Discount Fare System in which discounted fare is calculated monthly from the travel record and applied to each user.
- Installed Information Box in the Sapporo Subway HP which provides to each user information on trips and the bill.
Pilot Project on Post-payment Smart Card System

Flow of Pilot Project:

- Registration
- Issue of the Card
- User's Account
- Use the card
- Card Record
- Transfer of Charge
- Examination for User
- Report of User's travel record
- Calculation of Discounted Fare
- Claim the Bill
- Transfer of Charge
- Discount Fare System
- Travel Record
- Bill
- Backyard System
- Fare Discount
- Sapporo Information Network Co., Ltd
- Sapporo City Transportation Bureau
- User
- Credit Card Company
- Automatic ticket gate
- Station Smart Card
- Account
- Smart Card
- Flow of Pilot Project:
### Discount Fare Menu:

<table>
<thead>
<tr>
<th>Menu</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. One Day Discount</td>
<td>Maximum one day fare is ¥800.</td>
</tr>
<tr>
<td>2. Specific Section Discount</td>
<td>Maximum one month fare is equivalent to the fare for 42 times ride to the designated specific section.</td>
</tr>
<tr>
<td>3. Daytime Ride Discount</td>
<td>20% discount to the daytime (10:00-16:00) use.</td>
</tr>
<tr>
<td>4. Frequent Ride Discount</td>
<td>9.1% discount for over 3 times ride, and 13% discount for over 39 times ride.</td>
</tr>
</tbody>
</table>

Most discounted monthly fare is calculated and charged to each user based on his/her travel record.
Pilot Project on Post-payment Smart Card System

WEB Access to Travel Record:

http://www.smap.sweb.co.jp/mobile/top.jsp

Internet

http://www.smap.sweb.co.jp/
Pilot Project on Post-payment Smart Card System

WEB Page of Travel Record for PCs:

Record of Trips

Monthly Record

Monthly Statement
**Evaluation for the Pilot Project**

**Monitors for the Pilot Project:**

<table>
<thead>
<tr>
<th>Type of Monitor</th>
<th>Number of Monitor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Monitor</td>
<td>542 persons</td>
</tr>
<tr>
<td>Family Monitor</td>
<td>142 persons (113 families)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>684 persons</strong></td>
</tr>
</tbody>
</table>

Monitors were provided:

- Post-payment Smart Cards during the Pilot Project.
- Pre-paid Smart Cards before and after the Pilot Project.
Evaluation for the Pilot Project

Attribute of Monitors:

(1) Sex

(2) Age

(3) Occupation
During the Pilot Project, the use of the subway per person increased 40% in monetary terms (¥5,266/month → ¥7,374/month). It returned to the former level after the Pilot Project.
During the Pilot Project, the frequency of use of the subway per person increased 25% (24 times/month → 30 times/month). It returned to the former level after the Pilot Project.
Monitors’ Evaluation:

Q: How convenient is the Post-payment Smart Card compared with Pre-paid Smart Card?

A:

97% of monitors answered that Post-Payment Smart Card System was more convenient.
Monitors’ Evaluation:

Q: Why is the Post-payment Smart Card more convenient?

A: Because

- I do not need to prepare cash.
- I do not need to charge electronic values onto my card.
- I do not need to care how much value is remaining.
- I can easily obtain my monthly travel record and debt to be charged to my bank account.

80% or more of monitors appreciated on no need to prepare cash, no need to charge electronic values onto the card, and no need to care how much value is remaining.
Monitors’ Evaluation

Q: How convenient is the fare discount system combined with the Post-payment system, compared with fixed discount system?

A:

87% of monitors answered that discount fares system combined with the Post-payment system was more convenient.
Monitors’ Evaluation:

Q: Why is the combined fare discount system more convenient?

A: Because

- I do not need to choose a discount fare from the discount menu.
- The biggest discount can be received based on the travel record.
- Even if I do not purchase a commuter pass, I can receive biggest discounted fare.

More than half monitors appreciated on no need to choose a discount fare by himself / herself.
Other suggestions from Monitors:

- Fare discount menu should be simpler.
- Travel record should be easily accessed.
- Registration of personal ID should be simplified.
- Travel record should be addressed on the bill.
- Card issue time should be shortened.
- The card system should be expanded to other transport system.
- The card system should be put into practical use.
- More card examination machines should be installed.
- Combined discounted fare with other transport system through Post-payment Smart Card should be introduced.
1. The Post-payment Smart Card was welcomed by the monitors.

2. Fare discount system combined with the Post-payment Smart Card was highly appreciated.

3. Transport demand would eventually increase through introducing Post-payment Smart Card System.

4. The simplification of various transactions and discount fare menu were required to improve the convenience of users.

5. The card system and combined discount fare system may be expanded to other transport system.
Thank You for Your Attention

Makoto Mizutani
E-mail : mizutani-m2pc@mlit.go.jp