

# **IC Cards Spur Innovative Changes in Financial Institutions**

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In recent years, rapid moves have taken place to shift from the use of magnetic stripe cash cards to IC (integrated circuit) cards as accelerated by an increasing number of forgeries and thefts involving bank cash cards. While a number of IC card types are available, how to make the best use of two principal features, i.e., "high security" and "multiple applications (usage purposes)," in the financial fields will be a decisive factor.

IC cards first started to be used as credit cards and electronic money in Japan. However, because the use of bank cash cards is estimated to exceed that of credit cards, a substantial economic impact will be caused by the shift to IC cash cards. The biggest bottleneck is the cost of making the switch. Estimates indicate a cost of approximately 5 to 9 billion yen for each of the major city banks and several billion yen for each of the regional banks.

The introduction of IC cards will revolutionize the management of financial institutions. One means of cutting costs will be to reduce the amount of cash stored in ATMs (automatic teller machines), which is estimated at about 4 trillion yen. Efforts will begin to advance retail sales by strengthening activities to collect and analyze customer information. In particular, a strengthened approach will be taken toward the integration of cash card and credit card functions, the identification of customer needs through scientific analyses of customer information and product cross selling.

It is also likely that financial institutions might share loyalty programs with different types of businesses and might strengthen activities to sell consumer loans with the accumulation of credit information. As venues to provide financial services using IC cards, POS (point of sales) registers installed at retail stores will become effective candidates in addition to ATMs.

# I Introduction of IC Cards in the Financial Field

## 1 Transition in the Use of IC Cards

Today, the number of incidents where people have been victimized by forgery or theft of bank cash cards has been increasing rapidly, and such increase is becoming a major social problem. As a measure to cope with this situation, accelerated moves are being taken in Japan to shift from conventional magnetic stripe cards to IC (integrated circuit) cards.

According to a survey by the Japanese Bankers Association (JBA), as shown in Figure 1, the amount of loss caused by card forgery reached 460 million yen in the first half of 2004 alone, which no doubt represents an amount that cannot be ignored. Furthermore, an adverse climate has started to emerge regarding banks that have so far assumed no responsibility if the prescribed requirements under their deposit stipulations were satisfied, such as lawsuits that are being filed for compensation for losses caused by forgery, etc.

When we look back to the start of the use of IC cards in the financial field, we find that it was France that first actively promoted their introduction.

Roland Moreno invented and patented the basic mechanism of the current IC cards in France in 1974. These cards, dubbed “smart cards,” were first used for bank cash cards and telephone cards in the 1980s. By 1992, credit cards in France were totally shifted to IC cards.

Based on its belief that the IC card would serve as one of the infrastructure technologies in the development of the IT (information technology) industry, the French government actively promoted the issuance of IC cards through the united efforts of the government and the private sector. These endeavors made France, which had been regarded in Europe as a country with a low level of awareness of IT among its people, a leader in Europe as far as IC card technology is concerned.

With the European Union (EU) playing a central role, efforts are now being made to standardize the electronic

money specifications that are inconsistent between countries. The future emergence of electronic money that can be used universally among multiple countries is expected. Electronic money is one of the most promising formats for the use of IC cards, and the scope of IC card applications has been expanding in Europe.

In addition to the purpose of vitalizing the IT industry, a major background factor behind the spread of IC cards in France included that industries were forced to take measures with respect to the vulnerability of magnetic cards. The degree of loss caused by forgery had reached a point that could not be ignored.

In Europe, where the use of checks is common, the spread of IC cards has also been spurred on by the savings in time and labor required by handling checks as compared with electronic payment using IC cards. As such, in France, which is leading other countries in the spread of IC cards, that the needs of government and the private sector matched constituted a major factor behind such a wide spread of the use of IC cards. These needs represent the government’s industrial policies, measures against crimes and forgery as well as the streamlining of payment processing in the private sector. In comparison, Japan lags far behind Europe in the spread of IC cards.

In actual fact, Kunitaka Arimura, a venture entrepreneur, acquired a basic patent on the smart card concept in 1970 before Moreno in France. Considering that Japan is one of the countries where the IC card was developed at its earliest stage, the current situation in Japan is somewhat lacking in vitality.

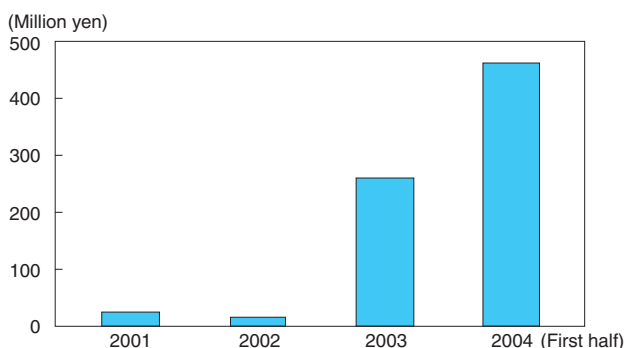
However, it was also true that not many advantages of using IC cards, which require higher initial costs, were seen in the past by companies that issued cards such as credit card companies and NTT (which issues telephone cards) because Japan was a relatively safe country compared to France and the amount of loss from card forgery was limited. In addition, it is common in Japan to use bank account transfers for payments, and the accuracy of processing such transfers is high. Accordingly, there is almost no need for the general public to use checks. This provided less incentive to use IC cards relative to the costs involved.

In this sense, it was not necessarily a welcome situation that the introduction of IC cards started to be discussed in 2000—first for credit cards and then for cash cards. This is because Japan also started to face increases in losses from forgery and other crimes that could not be overlooked, and that costs from the perspective of the card issuer reached a level that could be justified (or is expected to be justified in the future).

## 2 Structure and Functions of IC Cards

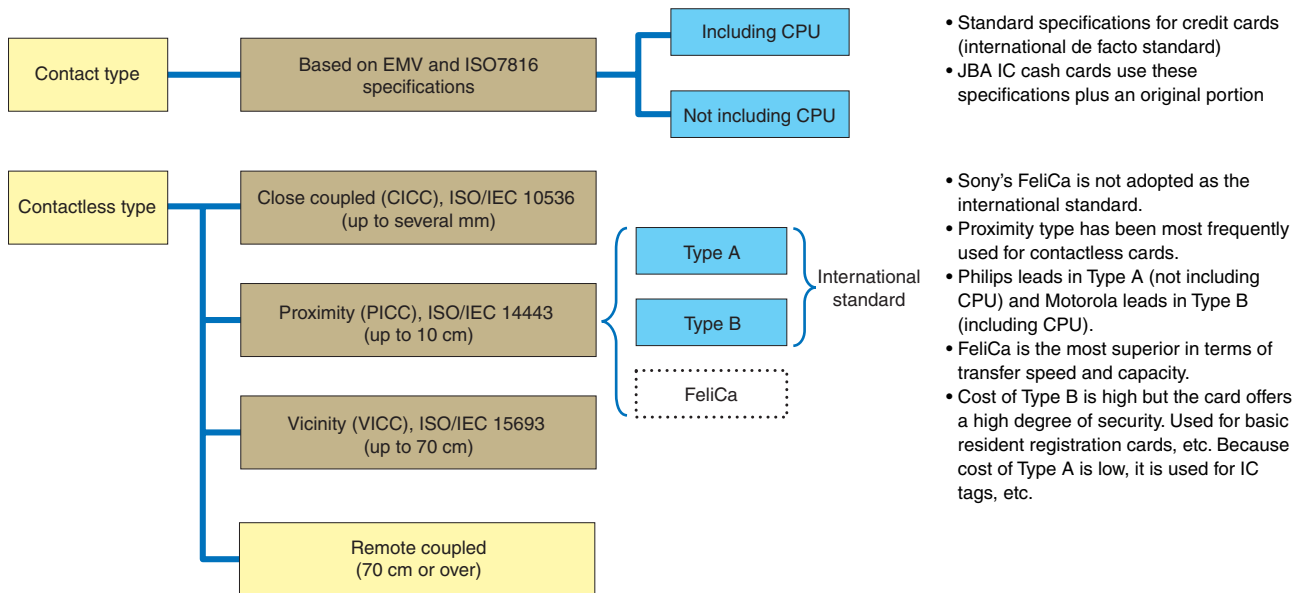
Generally, IC cards are classified into two types depending on whether they physically contact the terminal such as in an ATM (automatic teller machine): contact type and contactless type (Figure 2).

**Figure 1. Loss from Cash Card Forgery**



Source: Compiled based on the results of a survey conducted by Nippon Television Network Corp.

**Figure 2. Classification of IC Cards**



Notes: CPU = central processing unit, EMV = common specifications for EuroPay, MasterCard and Visa, IEC = International Electrotechnical Commission (ISO organization responsible for the telecommunications field) and ISO = International Organization for Standardization.  
 Source: Compiled based on the website of the Japan IC Card System Application Council, etc.

A contact type IC card functions by physically contacting the terminal equipment. For example, an ordinary IC credit card has an exposed gold-color terminal portion on the left side of its face.

A contactless type IC card is equipped with a built-in antenna, and can function via radio frequency when it is brought near terminal equipment even without physical contact. The representative IC card standard of this type is FeliCa, which is widely used for electronic money and transportation-related cards. (Two major credit card franchises, MasterCard (PayPass) and Visa (Contactless) have already agreed on a common communications protocol for contactless type IC credit cards.)

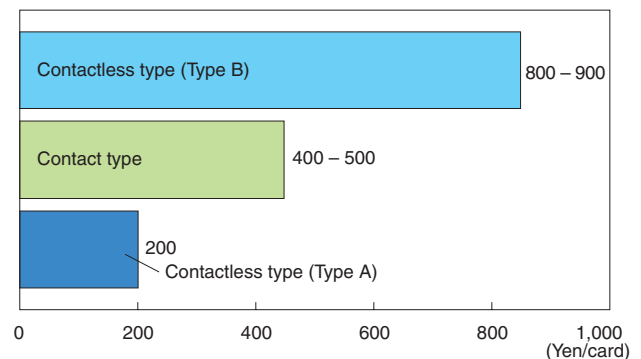
Contactless type IC cards are subdivided into four types under the international standard based on operating distance: close coupling, proximity, vicinity and remote coupling. The proximity type is most frequently used, and operates at a distance of about 10 cm from the terminal equipment.

From the perspective of the CPU (central processing unit), there are two types: one that includes the CPU and one that does not.

While the price is inexpensive, the type that does not include the CPU essentially functions only as a memory, and cannot perform complicated operations. However, for read-only functions such as IC tags used for automatic radio identification, the lower cost serves as an advantage. Recently, so-called “conveyor belt” sushi restaurants, which sell inexpensive sushi, have emerged that use dishes with built-in IC chips for automatically calculating the total bill.

In comparison, an IC card that includes a CPU can autonomously perform more complicated functions based on a software program. Accordingly, this type is

**Figure 3. Cost Comparison by Type of IC Card**



Source: Compiled based on information on the website for MasterCard PayPass.

principally used for IC cards in the financial field, which requires advanced authentication functions, etc.

From the perspective of memory capacity, while the magnetic stripe type has a capacity of 72 bytes, the currently most popular IC card has a capacity of 32 kilobytes, more than 400 times greater. IC cards with an even greater capacity are now under development. Although magnetic stripe cards store only extremely limited information because of their limited capacity, IC cards can store multiple programs and complex data.

However, because of the advanced functions they offer, IC cards have a higher unit cost. The price per IC card is roughly estimated in Figure 3. As this figure shows, because the maximum cost of a magnetic stripe card is less than 100 yen, the cost of a contact type IC card is about four times greater. The cost of a Type B contactless IC card (with CPU included; Type A does not include a CPU) is more than eight times greater than that of a magnetic stripe card.

For generally used IC cards, a basic standard is applied for the interface portion such as the IC chip location. The EMV (EuroPay, MasterCard, Visa) specifications for credit cards, as explained in the subsequent section of this paper, serve as the de facto standard. The JBA's IC card standard specifications, which are used for the cash cards of Japanese banks, were developed in conformity with the EMV specifications.

Software mounted in an IC card includes a common portion in a variety of cards that is equivalent to OS (operating software). Each card can have functions added that are specific to its purpose to this OS portion. For example, various point-based reward programs for point cards and the original content of each company can be added as specific functions.

In the example of the JBA IC card shown in Figure 4, the card consists of (1) an area to accomplish the function as a cash card, (2) a particular area where any bank service can be included (this area is used to include a point program particular to each bank, etc.) and (3) a lending area to a third party to provide a credit card function, etc.

The programming languages most often used to write programs in IC cards are Java and Multos. While many engineers can handle Java because of its wide use, Java is not often used for bank-related systems. Multos was originally developed for functions involving electronic money, and is said to be amenable to the creation of financial software. Nevertheless, because both languages have been improved, there are no major differences between the two at present. Visa recommends Java and MasterCard recommends Multos.

### 3 Features and Applications of IC Cards

As compared to conventional magnetic stripe cards, because CPU-embedded IC cards are equipped with the mechanisms so far explained, they have two major features.

The first feature is a high degree of security. Because it is easy to control access to information in an IC chip, an IC card can offer a high level of safety. For example, an IC card can be designed so that any unauthorized attempt to access information it contains automatically destroys the information itself. Furthermore, adding the use of biometrics can guarantee an even greater degree of security.

This feature enables the use of an IC card as a "key (to information, location, etc.)," such as an access key and employee certificate, to connect to an intranet (an in-house network using Internet technology). Usage schemes currently expected for IC cards combined with biometrics, which guarantee a higher degree of security, include access cards to accounts containing the financial assets of wealthy people and cards to manage a company's important information. If the cost is substantially reduced, IC cards will be used more extensively.

The second feature is that a single card can be used for a range of multiple applications (enabling access to multiple functions). As is clear from its structure, a single IC card can contain multiple programs in one IC chip.

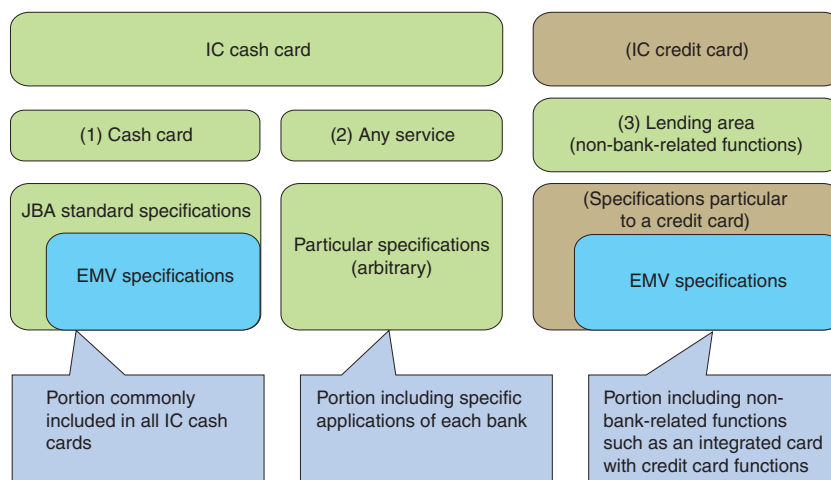
This second feature theoretically enables the integration of multiple cards into one single card, and the creation of one card that enables access to diverse services of different companies. One example is a card that serves both as a credit card and a cash card. However, a possible bottleneck in integrating multiple services each having their own expiration dates would be the determination of the card's renewal date.

Figure 5 summarizes possible IC card applications by employing these two features.

The functions expected of an IC card include calculation, authentication and value accumulation.

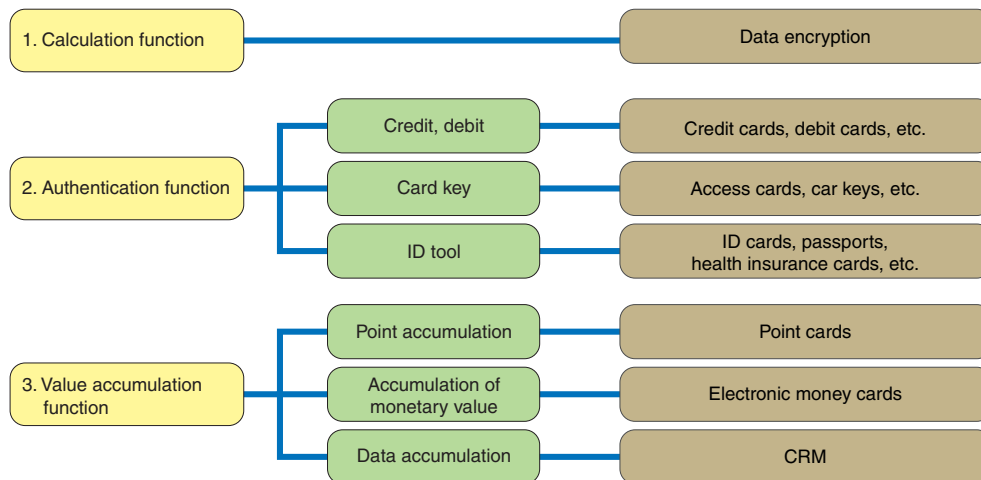
- (1) Calculation function: Because an IC card has a built-in computing device, it can convert and encrypt data that is entered.

Figure 4. Concept of an IC Card with JBA Standard Specifications



Source: Compiled based on the "JBA IC Cash Card Standard Specifications (Summary)" by JBA.

**Figure 5. Basic Functions and Applications of IC Cards**



- (2) Authentication function: By taking full advantage of its high degree of security, an IC card could be used for diverse purposes. For example, an IC card could be used as an access key to different locations and information by encrypting and storing ID (personal identification) information.
- (3) Value accumulation function: With its ability to store a large volume of data, an IC card can accumulate an assortment of values. Possible values to be accumulated include points for various reward programs, monetary value and customer information.

Application examples of an IC card that use these functions include a shared point card among multiple stores and CRM (customer relationship management) tools using customer data and electronic money.

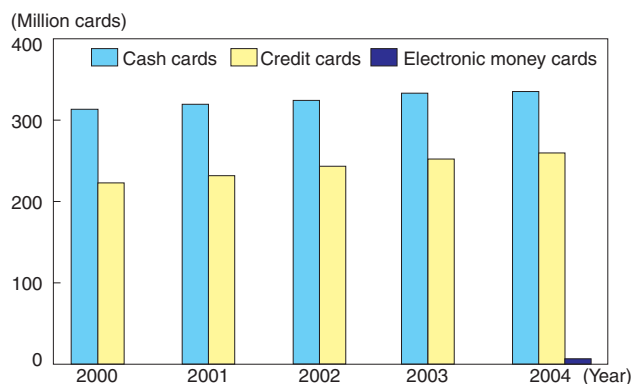
Unfortunately, the number of situations in which innovative services are being offered that make the best use of the multi-application feature of IC cards is still limited. However, in the future, with the increasing number of diversified business affiliations and original services, what programs are included on the IC portion and what functions are to be provided will become increasingly important.

## II IC Card Applications in Japan

### 1 Credit Cards

When we observe the current status of the credit card market in Japan, we find that about 260 million cards are in circulation (as of the end of March 2004; surveyed by the Japan Consumer Credit Industry Association) and the payment scale reached somewhat more than 24 trillion yen. Next to direct cash transactions, credit cards serve as the largest means of payment in individual settlements (Figure 6).

**Figure 6. Number of Cards Issued by Type of Card**



Note: Figures for each year are based on data at the end of March. Source: Compiled based on the *White Paper on Financial Information Systems 2005*, edited by the Center for Financial Industry Information Systems, etc.

Unlike debit cards, credit cards do not directly connect with bank accounts on a real-time basis. In addition, the maximum spending amount is based on the credit rating of the cardholder. Consequently, loss from theft or counterfeiting is limited. Nevertheless, because conventional magnetic stripe credit cards are vulnerable to counterfeiting and skimming (data reading), a sense of crisis began to develop in the credit card industry in the face of gradually increasing losses.

Under these circumstances, centered on MasterCard, Visa and EuroPay in Europe, a credit card standard using IC cards that are less vulnerable to counterfeiting and skimming was established as the EMV standard in 1989. This standard is now regarded as the standard set of specifications for IC credit cards. Its name is based on the initials of EuroPay, MasterCard and Visa.

The use of IC cards first began in continental Europe, and some delays were encountered in their diffusion into the United Kingdom and the United States. This was because the effect of revenue increases or cost reduction that would absorb the cost increase by shifting to IC cards could not be estimated. However, in response to

increased losses from counterfeiting and fraud, the introduction of IC cards was also accelerated in the United Kingdom and the United States at the beginning of the 1990s.

In Japan, in 2001, almost 10 years behind these countries, Sumitomo Mitsui Card Co. and Toyota Finance Corp. were first in introducing IC cards. By the end of 2003, Toyota Finance had issued 4 million IC cards. Sumitomo Mitsui Card is using IC cards for all newly issued cards, except for some affiliated cards, and had issued 12.75 million IC cards by the end of March 2004.

Since the latter half of the 1990s in Japan as well, due to yearly increases in the amount of losses from counterfeit credit cards, etc., the shift to IC cards was accelerated principally among bank-affiliated credit card companies. As a result, since 2001, the amount of loss has been steady or has actually begun to decline (Figure 7).

## 2 Electronic Money Cards

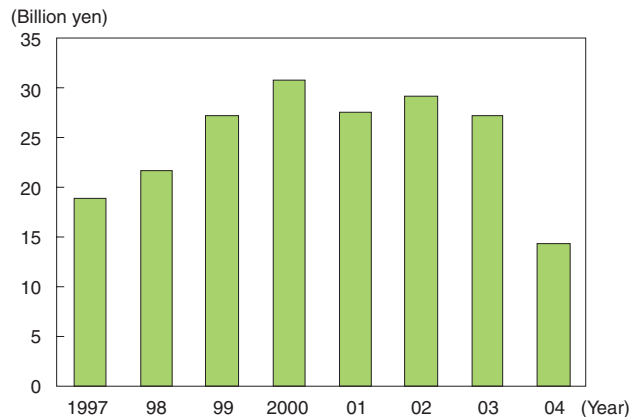
During the era of magnetic stripe cards, there was also a type of magnetic card that had a certain value such as single-use prepaid cards. However, with the emergence of high-security IC cards, electronic money that can be recharged (money can be loaded) many times and that can be used in a more secure manner has become a reality.

With respect to the IC cards used for electronic money, the contactless type such as “Edy,” which is explained later in this paper, constitutes the majority. This is because focus is placed on the convenience of not having to remove a card from a wallet or purse for each use. The contactless type is considered suitable for paying small amounts because it requires less time for authentication than does the contact type. While it is also said that the contactless type is somewhat inferior to the contact type in terms of security, major losses from counterfeiting, other than theft, have not yet been reported. Assumedly, this is because the card is mostly a means of paying small amounts.

Electronic money is positioned as an alternative to cash. Accordingly, anybody can use electronic money if one possesses this type of card. Although its use is simple, from the security perspective, the card is not suitable for paying large amounts because there are no measures other than those taken by a cardholder, such as limiting the amount charged.

Nevertheless, a growing trend in using the electronic money function has been seen recently. Examples are the incorporation of this function in credit cards, cash cards, “Suica” (JR East’s train tickets) and mobile phones. An electronic money card named “Edy,” which is issued by Bitwallet, a joint venture with the initiative taken by Sony, uses the contactless IC card technical specifications developed by Sony that are incorporated in FeliCa, explained above. As of the end of April 2004,

**Figure 7. Losses from Counterfeit Credit Cards**



Source: Compiled based on statistical data on the website of the Japan Consumer Credit Industry Association.

**Table 1. Annual Settlement Amounts of Credit Cards, Debit Cards and Electronic Money Cards**

(Unit: Billion yen)

Means of settlement	Amount settled
Credit cards	26,581.9
Debit cards	708.7
Electronic money cards (Edy)	32.4

Notes: (1) The figure for credit cards is that for 2003 announced by the Japan Consumer Credit Industry Association. The figure for debit cards is that for 2004 announced by the Japan Debit Card Promotion Association. (2) Because the actual settlement amount of Edy was not disclosed, the annual settlement amount was calculated by multiplying the 5.4 million monthly cases announced in January 2005 by 12, which was then multiplied by an assumed unit price of 500 yen.

about 4.5 million Edy cards had been issued. According to calculations based on the number of settlement cases publicly announced (about 5.4 million cases monthly), it is estimated that the annual settlement amount is on the scale of 30 billion yen (Table 1).

In the field of domestic transportation, the usage of FeliCa had already reached the level of more than 10 million cards as of fiscal 2003. If progress is made in the future in incorporating the electronic money function in transportation cards, which are being issued in large quantities, the scope of IC card applications is expected to expand even further.

## 3 Cash Cards

In 2004, a move to use IC cards as cash cards emerged in Japan. This timing nearly corresponds to the time when losses from counterfeiting, etc., started to expand. According to statistics developed by JBA, the annual amount of cash withdrawn from ATMs by using cash cards amounts to some 20 trillion yen in terms of cash withdrawn from ATMs of other banks. This does not include cash withdrawn from the ATMs of the same bank’s own ATMs. This scale is close to the annual amount settled by credit cards. Accordingly, the improvement of security is an urgent necessity.

Cash cards are also used as debit cards. Unlike credit cards and electronic money cards, debit cards in Japan are the only means of settlement for which bank deposit accounts are accessed on a real-time basis. (Most other countries use off-line debits rather than on-line debits.)

Japan's history of using debit cards is still young. The Japan Debit Card Promotion Association (JDCPA) was organized in 1998. In 1999, the use of debit cards became possible in some high-volume home electronics retailers. In 2000, the JDCPA clearing center started operations, making it possible to develop debit cards on a nationwide basis. In 2004, the annual amount of debit card use reached about 700 billion yen.

However, cash is still the principal means of payment used by individuals, and the popularity of debit cards is still limited. Incidentally, according to the statistics developed by the Bank of Japan, the amount of cash being circulated as of the end of January 2005 was about 80 trillion yen.

While cash cards have a large influence on the personal settlement market, as explained above, banks have so far been indemnified for compensating for any loss caused by withdrawals using counterfeit cash cards if the prescribed requirements under the deposit stipulations were satisfied, such as that the correct password was used. Partly because of this indemnification given to banks for assuming responsibility, banks were not so enthusiastic to adopt the costly measures necessary to shift from magnetic cards to IC cards.

However, with a growing sense of awareness on deposit security among customers as influenced by the mass media, some megabanks such as Mizuho Bank and the Bank of Tokyo-Mitsubishi started to take more active approaches in their shift to IC cash cards, and have announced such measures as service features to appeal to customers.

As we entered 2005, losses from counterfeiting and frauds started to be regarded as a social problem because of the large size of such losses. To deal with this situation, in January the Financial Services Agency requested each bank to introduce rules to relieve victims as measures to recover deposit losses. In response, the number of banks that have announced the promotion of the shift to IC cash cards has been increasing, chiefly among many megabanks and major regional banks.

However, besides the number of new cards to be issued, more than 330 million magnetic stripe cards have already been issued (as of the end of March 2004; survey by JBA). The breakdown by bank type is as follows: about 110 million cards issued by city banks, about 100 million cards issued by regional banks, about 30 million cards issued by the second regional banks and about 50 million cards issued by *shinkin* (cooperative) banks. Unlike credit cards, cash cards do not have an expiration date for renewal (many banks plan renewal of IC cards every 5 years for newly issued cards). For that reason, it is expected that a substantial amount of time will be

required to replace all magnetic stripe cards with IC cards.

To promote the spread of IC cash cards in the future, the systems must be developed and in place to provide new advantages to customers and to increase the revenues of banks that issue cards by using such advantages.

## 4 Applications in Other Fields

Up to now, the principal use of IC cards is in the three fields discussed above. In other financial fields, such as securities and insurance, there are almost no cases in which IC cards are actively used (or even planned).

However, if the adoption of IC cards for bank cash cards becomes standard and customer awareness concerning security is increased, there is no doubt that security at the same level will also become the de facto standard in other financial fields. If this occurs, moves may be accelerated to adopt IC cards for cards to withdraw cash, such as loan cards issued by consumer finance companies, deposit/withdrawal cards issued by securities firms and loan cards for policyholders issued by insurance companies. Probable fields for the use of IC cards other than financial fields include the public sector such as basic resident registration cards, transportation, distribution and communications (IC telephone cards).

Among these companies and organizations, those that use IC cards on their own or through affiliations such as that between Mizuho Bank and JR and attempt to enter the financial fields by using IC cards may emerge. (However, please note that NTT discontinued the use of IC telephone cards and public telephones accepting such IC cards in January 2005 because the number of public telephone users declined substantially in Japan due to the spread of mobile phones and progress in wireless LAN [local area network] technology.)

## III Banks' Responses to Shift to IC Cards

### 1 Background behind the Shift to IC Cards

From the perspective of criminals, the amount of time and labor required and the number of persons involved in acquiring cash increases when credit cards are involved. One example is using a counterfeit card to purchase goods that can then be sold and converted into cash. However, with counterfeit cash cards, cash can be withdrawn directly from an ATM without the time and labor needed to convert the goods into cash. This appears to constitute one of the reasons for the increasing number of crimes related to cash cards.

When we look at actual crimes, clearly abnormal transactions such as several hundred consecutive

withdrawals of 200,000 yen each, totaling 40 million yen, are conspicuous.

It must be easy for banks to issue alerts reporting such abnormal transactions since banks keep records of all transactions and photo records of the cards used in the transactions.

In the consumer finance industry, for example, this type of measure has already been taken. It is unquestionable that the bank industry has lagged behind in taking similar measures. Nonetheless, the number of banks taking measures such as enabling their customers to limit the withdrawal amount in a single transaction by using a card has recently been increasing.

However, in the above-mentioned example, even if the withdrawal limit were set at 200,000 yen, the victim would not be aware of the incident until the total amount of 40 million yen had been withdrawn. Accordingly, setting a limit cannot be regarded as a fully adequate measure. Further security measures such as making the theft of a password more difficult through a shift to IC cards are still required.

In the United States and Europe, in anticipation of losses by counterfeiting or unlawful use when using an electronic means of payment, customer protection was facilitated from an early stage by the establishment of a legal framework. (Viewing this situation from the other side of the coin, this means that many crimes of a similar type have been prevalent in the past in these countries.) Such measures include the “50-dollar rule” in which even if a loss occurs due to counterfeiting, etc., the maximum amount of liability the customer must bear is 50 dollars, with the remaining amount being borne by the bank.

In Japan, if IC cards cannot provide 100-percent security, the next step that should be taken would be to establish a similar legal framework or set of regulations.

## 2 Economic Costs Required for Shifting to IC Cards

There is a major problem in shifting to IC cash cards: the cost involved. At present, this type of cost is usually borne by the users. Many banks collect a handling fee of 1,000 to 2,000 yen for issuing or renewing a card. However, as seen in the campaigns implemented by some of the megabanks, IC cards are provided free of charge, although only during an introductory period. As such, there is no guarantee that future increases in cost can be passed to customers under increased competition. (UFJ Bank is now implementing a free-of-charge campaign for only a limited period. Mizuho Bank announced the issue of new IC cards and the shift to IC cards with no handling fee during the period from March to September 2005. Starting in October, continuation of the free card issue is planned for members of the Mizuho Mileage Club.)

If costs are to be borne by banks, estimates indicate that costs totaling some billion yen per bank will be required for card renewal. This is because among the megabanks, Sumitomo Mitsui Banking Corp. (that has issued the largest number of cards) has issued about 26 million cards and even the Bank of Tokyo-Mitsubishi (that has issued the smallest number of cards) has issued about 17 million cards (Table 2).

**Table 2. Number of Cash Cards Issued and Number of ATMs Installed by Major Financial Institutions (As of the End of March 2004)**

	Number of ATMs (unit)	Number of cash cards issued (1,000)	ATM remodeling cost (billion yen)	Card renewal cost (billion yen)	Total cost for IC card introduction (billion yen)
City banks					
Mizuho Bank	5,712	25,328	3.4	5.1	8.5
The Bank of Tokyo-Mitsubishi	3,045	17,100	1.8	3.4	5.2
UFJ Bank	6,069	23,000	3.6	4.6	8.2
Sumitomo Mitsui Banking Corp.	6,958	25,706	4.2	5.1	9.3
Resona Bank	2,953	9,778	1.8	2.0	3.7
Saitama Resona Bank	1,528	5,214	0.9	1.0	2.0
Regional Banks					
The Bank of Yokohama	1,434	5,592	0.9	1.1	2.0
Shizuoka Bank	1,062	3,216	0.6	0.6	1.3
Others					
IY Bank Co.	7,804	163	4.7	0.0	4.7
Total of depository financial institutions	137,771	335,790	82.7	67.2	149.8
(Reference) Postal Savings	26,483	101,780	15.9	20.4	36.2
(Reference) Four major consumer finance companies	7,367	10,763	4.4	2.2	6.6

Notes: (1) For companies that have not announced such data, the estimated number of cards is based on the number of accounts. (2) Total cost for IC card introduction is based on the assumption that 600,000 yen is required for each ATM (as per *Nihon Keizai Shimbun*, April 4, 2005) and that 200 yen is required for each card. (3) The four major consumer finance companies are Takefuji Corp., Promise Co., ACOM Co. and Aiful Corp. The total number of unsecured consumer accounts is used for calculation. (4) Figures at the end of September 2004 are used for the Bank of Tokyo-Mitsubishi and the four major consumer finance companies.

Sources: Compiled based on *Nikkin shiryō nenpo* 2005 (Japan Financial News Yearbook, 2005), the Japan Financial News Co., 2004; *White Paper on Financial Information Systems 2005*, edited by the Center for Financial Industry Information Systems, 2004; *Gekkan shohisha kin'yu* (Consumer Finance Monthly Magazine), January 2005, etc.

According to estimates by the industry, a cost of about 600,000 yen per machine is required to remodel an ATM to enable the use of IC cards. A bank that owns 1,000 ATM units can expect an additional cost of 600 million yen.

In total, the additional costs of each bank in the megabank class would amount to 5 to 9 billion yen when the above two factors (card renewal costs and ATM remodeling costs) alone are considered. The costs required by regional banks would amount from several hundred million yen to 2 billion yen, depending on the scale of the bank.

In addition, these costs will certainly increase further if additional security measures such as biometric identification technologies are adopted and the development of multiple ATM functions is promoted, as explained in a subsequent section of this paper.

### 3 Lack of Unity in Responses

As explained in the previous section, the costs required to shift to IC cards are still substantially higher than the costs from the current losses from counterfeiting, etc. Accordingly, there is a negative mood among some regional banks with respect to the introduction of IC cards at an early stage. According to the reports by the Financial Services Agency, losses from the use of counterfeit cash cards have so far been concentrated in the Kanto area. It is understandable that some regional banks do not actually feel that the introduction of IC cards is a pressing necessity.

Nevertheless, because this issue concerns the reliability of the overall financial clearing system, each bank is required to take necessary measures at a certain level at an early stage in order to secure customer trust. If investment in such measures is inevitable, a proactive concept of pursuing new revenue opportunities by using the ATM network extending throughout the country (about 140,000 ATM units throughout the country plus about 26,000 units for postal savings) and IC cards as an infrastructure is needed (this concept is discussed in Chapter IV).

In addition, it must also be noted that delays in taking measures would boomerang on each bank in the form of increased costs if the “loss-bearing rules” (rules equivalent to the 50-dollar rule in the United States that limit the amount to be borne by a victim to a certain level) that the Financial Services Agency and related organizations are now studying are introduced. According to a survey conducted by Kyodo News, about 80 percent of the regional banks are studying the introduction of IC cash cards, and the Regional Banks Association of Japan has established a study group concerning the elimination of counterfeit cash cards.

Because the revised version of the JBA IC cash card standard specifications was established in 2001, JBA has requested each financial institution to conform to the

new IC cash card standards by setting up a preparatory period by the end of March 2006. Furthermore, as part of its efforts to circulate IC cards at an early stage, JBA has already established the JBA Certification Authority and developed an approval system to certify financial institutions using IC cash cards so as to guarantee terminal interoperability in conformity with these specifications.

## IV Changes in Retail Banking Strategy with the Use of IC Cards

### 1 Strengthening Measures for Cost Reduction

The management of financial institutions is considered to be subject to a major change by using IC cash cards. In order to recover the huge costs required to shift to IC cards, changes will occur in management strategy in terms of both cost reduction and revenue expansion. Specifically, increased efforts will be made to reduce operating costs and to increase sales capability in pursuit of revenue expansion.

The first on the list of specific measures for cost reduction is reducing the amount of cash stored in the ATMs. Before the frequent occurrence of incidents involving counterfeit cash cards, the maximum cash withdrawal from an ATM was several million yen per withdrawal or per day, which was equivalent to nearly limitless. However, since the frequency of such crimes has increased, most banks have reduced the maximum withdrawal limit. After the shift to IC cards, some banks have started to recommend that customers set the maximum amount at 500,000 to one million yen per withdrawal for magnetic stripe cash cards.

Because banks had set the maximum withdrawal limit at a substantially high level, the average amount of cash stored in a single ATM is said to be 30 million yen. Accordingly, it is estimated that the total amount of cash stored in 140,000 ATM units throughout the country is some 4 trillion yen. This situation appears to be one reason for the frequent occurrence of ATM robbery involving the use of heavy machines such as excavators. While it would not be a major problem today when interest rates are low, if the interest rate increases, the presence of stored cash will no longer be negligible as fund costs.

Incidentally, is there any method to decrease the percentage of cash in individual payments? In comparison to other countries, relying on settling debts by using cash is particularly high in Japan, and cash occupies a relatively major position in the personal fund settlement market. While a declining trend in relying on cash has recently been seen somewhat due to an increasing number

of incidents of counterfeit currency backed by the development of copying technology, there is no significant fluctuation in the reliability of cash itself as a means of payment.

Accordingly, if this situation remains the same, cash will continue to assume a major role as a means of settling the debts of individuals. In order to replace the use of cash, a mechanism must be established that uses a means of payment other than cash while obviously benefiting customers. One example would be to provide incentives to customers by setting up various reward programs that would give points to customers who use debit cards, credit cards or electronic money cards to purchase products or services.

Another example of the benefits of a card is that as seen during the introductory phase of credit cards in South Korea: receipts for payments by a means other than cash are used for lottery chances to obtain gifts.

Of course, it would be difficult to drastically change traditional social practices. However, from the bank perspective, penetration of payment behavior by other than cash among customers even at a gradual pace would not only reduce the amount of cash to be stored but also provide opportunities to obtain customer information and to acquire additional revenue such as credit card interest and handling fees paid by member stores and vendors.

## 2 Retail Banking Innovation by Enhancing Customer Information

The first step in working to strengthen sales capabilities would be to create customer segments based on the detailed customer information obtained, and to establish a focused sales strategy for each customer segment.

As seen in the “Main Bank” service by Bank of Tokyo-Mitsubishi and “One’s Plus” service by Sumitomo Mitsui Banking Corp., banks have so far taken various measures to secure good customers and improve profitability in the retail field. These measures include preferential treatment in terms of loan interest rates and handling fees and giving points for various programs to customers for transactions that contribute to labor saving and improvement of profitability. At the same time, a marked trend is also being seen where customers with small-sum deposit accounts or a small number of transactions are required to pay fees for having a bank account.

However, there are many cases that lack scientific grounds for the creation of customer segments based on deposit balance, such as categorizing the deposit balance into 100,000 yen, 500,000 yen and 3 million yen based on past experience acquired through the *maruyu* program (tax-free small-sum savings system). It appears that the focus of a series of depositor-preferential measures has been given to the reduction of small-sum accounts that are often inactive and are costly for a bank, rather than to measures for rewarding good customers.

As a background factor behind the introduction of measures of customer segmentation, how to identify good customers and how to secure highly profitable transactions have become vital issues for financial institutions under the circumstances where large growth in the number of customers cannot be expected because of the social trend towards fewer children in each family and an aging population. Customer information that can be obtained during transactions can serve as basic information to secure good customers. However, there is a limit to the collection of such information in the framework of conventional transactions centered on deposits.

With respect to customers who have credit transactions such as housing loans, it is possible to obtain detailed information to some extent, such as annual income, company affiliation, guarantor information, etc. However, the information that can be obtained from customers who have only deposit accounts is limited to name, birthdate, address, telephone number, etc. In these cases, the only data that can be used as the basic information for customer segmentation is the deposit balance.

Because of this, some moves have been seen among the megabanks where it appears that strengthened efforts are being made to obtain customer information and secure customers by linking the shift to IC cash cards with credit cards and loyalty programs (e.g., programs offering benefits to secure good customers, such as point programs).

For example, both the Bank of Tokyo-Mitsubishi and Mizuho Bank are promoting the issue of IC cash cards integrated with credit cards free of charge. At the same time, they have announced that IC cash cards without the credit card functions will require handling fees after the completion of a campaign period, thereby promoting the distribution of IC cash cards with credit card functions. With credit cards, relatively more customer information such as whether a customer is a homeowner can be obtained when issuing a new card, as compared to information related to deposit transactions.

In addition, Mizuho Bank not only issues IC cash cards free of charge but also imposes no annual member fees for credit cards with respect to members of its original loyalty program, “Mizuho Mileage Club.” This move can also be seen as part of its efforts to strengthen the acquisition of customers by regarding the issue of IC cash cards as a business opportunity.

If the volume of information obtained increases, if the accuracy of customer segmentation improves and if customers can be effectively retained through various loyalty programs, the next step would be to precisely identify the financial needs generated among such customers.

The use of credit cards that enables the acquisition of information on the purchasing behavior of customers is also effective in this regard. In addition, if it also becomes possible to manage purchasing information via debit cards and electronic money cards in a single CIF

(customer information file), the events in a customer's life can be predicted with higher accuracy than is possible now. In addition, a person who purchased certain goods or services is highly likely to engage in anticipated behaviors in the future. (For example, a person who paid fees for a course in driver training is highly likely to purchase an automobile in the near future, meaning that the need for a car loan will occur.) This so-called "trigger marketing" will also become possible.

As such, it will become theoretically possible for banks to predict a customer's life events precisely and to respond positively to the financial needs that will accompany such events.

In the banking industry, products sold at bank counters have become increasingly more diversified such as the permission to work as sales agents for securities companies in addition to the sales of investment trusts and annuities. Moreover, the number of joint offices of securities companies and trust banks has increased, thereby diversifying the points of contact with good customers.

If it becomes possible to analyze multilaterally the financial products purchased by a good customer within the same office, sales efficiency can be improved. It is believed that banks have large expectations on the enhancement of customer information and the analyses of the needs for each customer segment. This is because such enhancement and analyses can be tools to increase the effectiveness of consulting sales activities that have already been evolved on an expanded scale. If sales activities can be conducted that meet customer needs, customer satisfaction and the customer retention rate will also increase.

Through the loyalty programs of some major banks, moves have been started to share information obtained from IC cash cards integrated with credit cards issued by a bank among member companies of this financial group.

In addition to developing a strategy to obtain and retain good customers by responding to their life-long financial needs, major banking groups that include securities companies and credit sales companies appear to be considering the opportunity of issuing IC cards as a golden opportunity to establish a mechanism to efficiently sell diversified products offered within the group. Specific measures taken include the development of a cross-selling (recommending the purchase of related products and services) model to approach good customers based on chronological analyses of the purchase history of diversified financial products and the implementation of such a model.

In this sense, depending on the extent of the future diffusion of IC cash cards integrated with credit card functions, it is highly likely that the number of banks that will attempt to implement a radical reform with respect to their own information systems for sales and marketing will rapidly increase. This is a great leap for-

ward for banks that have so far limited themselves to dealing with information such as address, deposit account information and withdrawal data.

### 3 Strengthening Sales by Offering New Services

As the second step, the development and offering of new services are considered. While it may not be possible to actually refer to them as new services, moves such as Mizuho Bank and ANA (All Nippon Airways Co.) sharing a loyalty program are likely to increase in the future.

If the multiple functions available on IC cards are utilized, it is easy to include multiple point card programs in a single card, and to share points among such different programs. Accordingly, it is expected that a program for sharing various point cards will emerge in the future. This means that offering preferential treatment in financial services is enabled by using the points obtained through purchasing or using specified products and/or services with cards of affiliated brands.

It will also be possible to share points obtained through the use of credit cards and bank transactions. One example is a system in which preferential treatment is given when a financial product is purchased at a bank in terms of interest rates and handling fees if a credit card is used to purchase certain products. Some megabanks have already started to implement similar point programs.

However, there are also many cases where this type of affiliated program is not necessarily considered convenient for the customer. Careful studies are necessary to determine whether such a service truly meets customer needs.

Another measure would be to accelerate activities to promote consumer loans. In the past, banks in Japan independently or in affiliation with consumer finance companies entered the consumer loan market. The banks failed to predominate in this market fully as compared to dedicated consumer loan companies such as credit card companies and consumer finance companies.

Several reasons can be identified for such failures. These include an inadequate mindset on the part of bank employees to deal with the consumer finance business, and the insufficient accumulation of personal information. As compared to credit card companies that possess first-hand customer purchasing data and the consumer finance industry that accumulates and manages customer credit information by creating a credit information center, banks seemed to lag behind in terms of competency regarding personal credit ratings.

However, as it becomes possible for banks to issue their own credit cards, they are able to acquire purchasing history data on their own. This means that banks are ready to accumulate personal credit information in the same manner as credit card companies. In addition, banks can use information available to them regarding other means of settlement, such as debit cards and account transfers. Accordingly, depending on how

successfully they use such information, banks may outdo the existing industry in terms of quality and quantity of information.

The use of IC cards may also lead to changes in the locations where various financial services are provided. Thus far, these locations have included branches of financial institutions and ATMs. Now, however, retail stores and even convenience stores (where a POS [point of sales] system is installed) could be major locations for providing services.

In other countries such as the United Kingdom, cash-out service, rather than ATMs, is common as a cash withdrawal service. In this service, when a customer purchases goods at a supermarket, the customer receives cash from a store clerk operating a POS register by withdrawing an amount from his or her bank account in addition to the cost of the purchase. This service is also possible in Japan as many POS registers can process debit cards and present no technical problems.

In addition, an array of new services will become available through POS systems. It is theoretically possible to use ATMs and POS systems for many purposes because the use of IC cards enables the inclusion of diverse functions in a single card. Such functions include loading and withdrawing electronic money, registering transfer destinations (some banks have already implemented this service), loading Suica and purchasing commuting tickets by using ATMs and POS systems.

If the number of services that can be provided through ATMs and POS systems increases, the value of these terminals as part of the infrastructure will increase. This will probably lead to securing new sources of revenue, such as increased connection charges and transaction fees from newly connected ATMs.

At the same time, it is also true that if many functions are added and ATMs must be equipped to handle such multiple functions, the costs of remodeling the hardware involved might increase. Moreover, because the ATM network itself is limited in its processing capability, the number of connection sites cannot be increased indefinitely. Accordingly, each financial institution needs to have its own strategy with respect to the functions that are to be added to its ATMs. Adequate consideration must also be given to profitability as examined from the remodeling costs required and the estimated increase in revenue.

Of course, a bank can choose to specialize in the cash withdrawal functions as before without adding other functions. For such a bank, efforts to reduce costs as explained in the previous section will increase in importance.

#### 4 New Issues Facing Banks

While the introduction of IC cards brings banks a major potential in increased revenue, some rules must be established, as there may be many customers who may feel

uncomfortable about third parties learning about their behavior.

The realization of services so far explained is based on the mutual usage of personal information among related companies. Personal information has been disclosed in some companies, and the management of such information has become a major issue. Some people forecast that compensation liability for such an incident is likely to become a major risk for companies. In particular, as finance-related personal information can trigger serious problems, companies face the need to establish a suitable information management structure. At the same time, each individual should become more aware of who is using what information about oneself.

While not directly related to IC cards, if database marketing based on detailed customer information becomes prevalent, another issue facing companies is to create a business model to ensure that the resulting business opportunities contribute to increased revenue. It is also necessary to establish a sales structure to actually implement such a business model and to educate salespersons.

In the past, the headquarters of a bank set a variety of numeric goals for each salesperson to achieve. In order to achieve such goals, salespersons have competed in “pushing” financial products to the customers to whom they are assigned. This situation has not infrequently led to cases where salespersons have sold products not necessarily in the customer’s best interest. However, if a customer database is established, the accuracy of projections on what products will sell and to what extent can be increased, enabling the development of a sales structure that better matches real customer needs. If this structure becomes available, a bank, bank clerks and customers can be more comfortable in achieving their respective purposes.

#### 5 Emergence of Dissonance in ATM Network Connections

As described in Chapter III, the cost for shifting to IC cards would reach an enormous amount from an industry-wide perspective. Therefore, it is highly probable that banks and other financial institutions that actually make capital investments for this purpose will pass on at least part of their investment to users.

In such a case, it is expected that ATM connection handling fees may be increased. Such increases in usage charges may affect the management of banks such as Internet banks that have been dependent upon infrastructure elements such as ATMs installed by other banks and have not invested any of their own capital for infrastructure.

Depending on the extent of such dissonance, financial institutions that depend on the infrastructure provided by other banks must take some measures such as providing value-added services to financial institutions that own

ATMs in order to avoid the payment of high connection charges. For example, the number of banks that cooperate with point programs is expected to increase as a quick and simple measure to fulfill this purpose.

### 6 Use of IC Cards in Local Financial Institutions with the Community

How should local financial institutions make the best use of IC cards? Is it possible to promote the vitalization of local communities by using IC cards and infrastructure such as ATMs? Possible measures could include the sharing of point card programs between stores in the community and regional banks for revitalizing the stores.

For example, ShinGinko Tokyo announced a plan to use IC cards in affiliation with Mitsukoshi (department store) and JR (railway company). A similar plan could be adopted by regional banks in cooperation with community stores and private railway companies (Figure 8).

Another example is the Digital Pusan Card issued in Pusan, South Korea. Because cash card, credit card and electronic money card functions are integrated in a sin-

gle card, the card can be used as a transportation pass, medical ID card, etc.

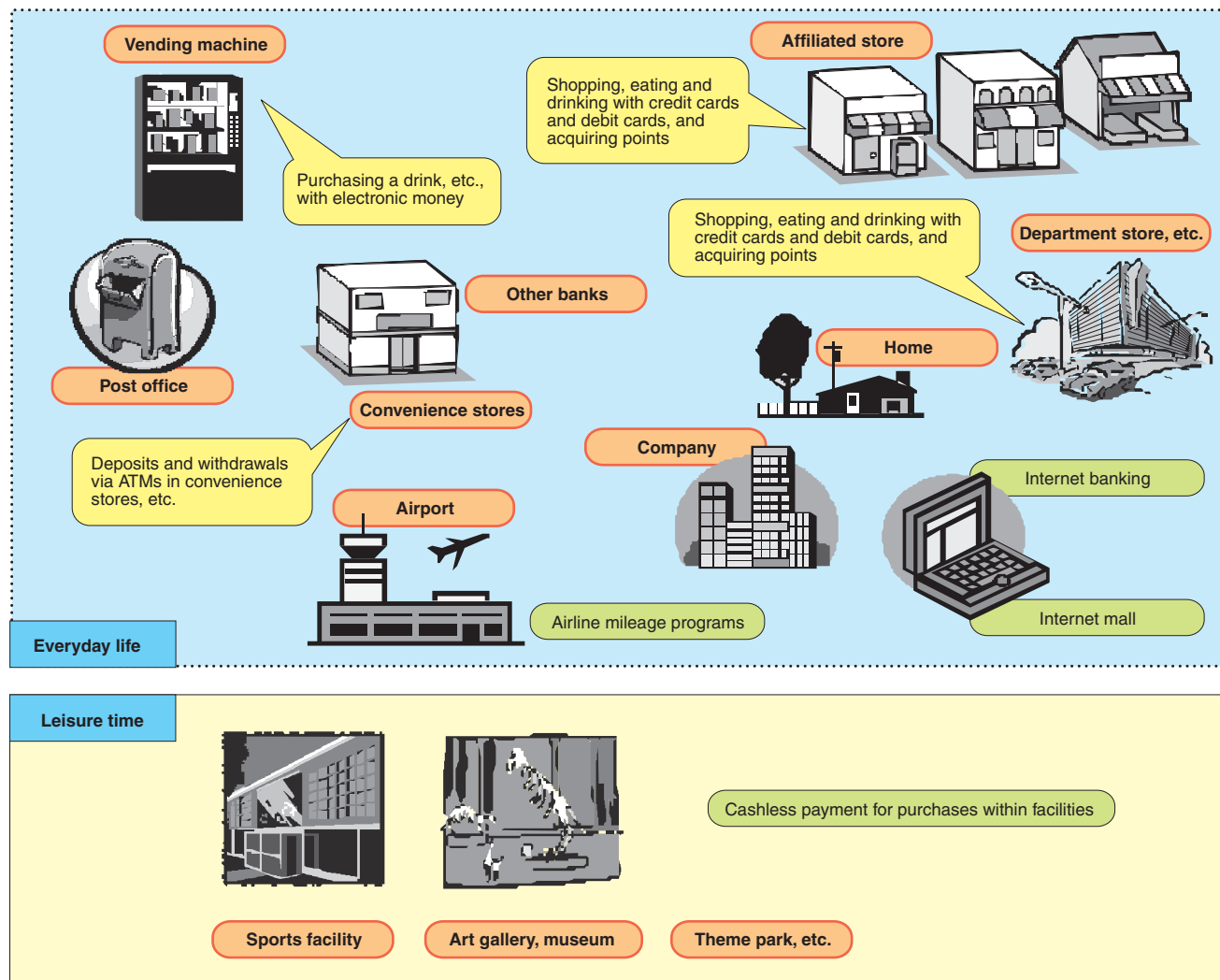
Mixed usage with community currency is also possible. A community card that is loaded with community currency in the form of electronic money would contribute to the strengthening of the loyalty of community customers.

In the past, focus that was given to a community perspective was generally from a group based on territorial connections and family ties. However, it is highly likely that a new type of community could be created by overcoming such walls of limited connections by using the Internet, etc.

From the standpoint of financial institutions, the potential to explore new customer segments and strengthen the loyalty of customers will emerge through such community ties. In promoting these activities, IC cards will serve as an access key to venues and information to join such a community.

If it becomes possible to retain customers through such a community, financial institutions might be able to cultivate new customers without being bound by locale, as was the case in the past.

Figure 8. Potential Uses, Purposes and Locations of IC Cards



Furthermore, without being limited to financial products, IC cards may be used as a tool for comprehensive asset management including cash. If an IC card could be used as a card key for a safe-deposit box that contains a real estate deed in addition to deposited money, insurance policies and securities, and could be equipped with the functions to manage such assets, a single IC card could be used for comprehensive asset management. Of course, a high level of security must be provided for such a card.

As such, the range of IC card applications is extremely extensive; the cards have the potential to revolu-

tionize future financial activities. Through repeated trial and error, a company that can be first in offering services that truly meet customer needs will gain the largest benefits.

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