

Reduction of ATM Operational Cost by planning Cash Replenishment

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Cash replenishment planning is a formulation of a plan to replenish the cash that are withdrawn from an ATM (Automated Teller Machine).

Japan Business Operations (JBO) provides cash replenishment planning service using OKI's predictive cash replenishment planning system. This article describes OKI's predictive cash replenishment planning system and the cash replenishment planning service provided by JBO.

Cash Replenishment Planning

Cash replenishment planning is a formulation of an optimized plan to maintain adequate amount of cash in ATMs by monitoring the amount of remaining cash, forecasting future demand and appropriately timing replenishment.

(1) Aim of cash replenishment planning

For financial institutions, cash replenishment accounts for a large portion of ATM operational cost. The aim of cash replenishment planning is to reduce replenishment cost through efficient planning that benefits both the financial institutions and security companies without forcing security companies to cut their fees.

(2) Benefits of cash replenishment planning

In cash replenishment planning, the plan will be formulated to achieve the following benefits.

(a) Improvement of uptime ratio by preventing ATMs from running out of cash

Customer convenience is improved by eliminating ATM downtime due to lack of cash.

(b) Reduction of operational cost by eliminating unnecessary cash replenishments

ATM operational cost is reduced by eliminating unnecessary cash replenishments and reducing the number of replenishments. Downtime required to perform the replenishment is also reduced.

(c) Reduction of cash procurement cost by optimizing cash amount in ATM

Amount of cash required for ATM operation is

reduced to ease cash procurement cost by eliminating excess unused cash in the ATM.

Cash Replenishment Planning Issues

Financial institutions or security companies often carry out cash replenishment planning. However, systemization is still inadequate. Therefore, it is not unusual for a planner to take the previous years' outflow records and apply his/her experience and intuition in formulating a plan.

Systemization requires extraction of useful information from the massive amount of data accumulated daily in each ATM. For this reason, it is necessary to resolve issues such as increase in system cost, challenge of extracting significant information from large amount of data, and difficulty of predicting outflow and evaluating the replenishment plan.

In particular, formulating an efficient plan using the large amount of data is difficult. Excess cash is tended to be replenished resulting in increases of replenishment cost and amount of cash. Unreasonable reduction will increase the risk of running out of cash.

Cash Replenishment Planning and Its Merit

Cash replenishment planning service helps formulate an operating plan using OKI's predictive cash replenishment planning system. The overview of the service is shown in **Figure 1**.

Cash replenishment planning service provides cash replenishment planning as an operation support service that includes the fee for system use. In addition to formulating a replenishment plan, all other services related with ATM cash replenishment such as interacting with the security company necessary for plan execution and performance record management are collectively provided.

(1) Benefits for financial institutions

Through cash replenishment planning service, ATM uptime ratio can be improved while reducing both ATM operational cost and cash procurement cost. Financial

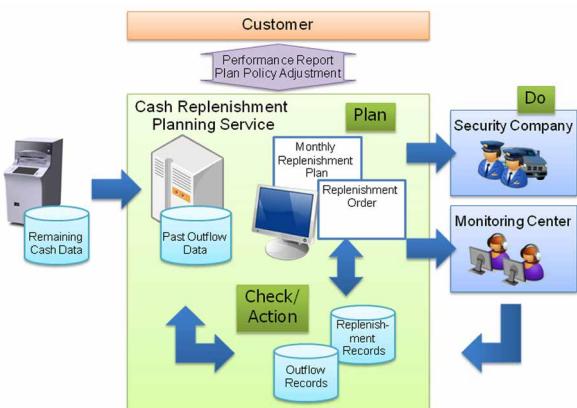


Figure 1. Overview of Cash Replenishment Planning Service

institutions can also promote businesses by not investing in development of a new cash replenishment planning system. Furthermore, they will be freed from ATM cash replenishment work enabling them to focus on core business development that increases revenue.

(2) Benefits for security companies

The optimized replenishment plan from the cash replenishment planning service will reduce the number of replenishments the security companies need to perform, thus enable them to respond to the financial institutions request to reduce the cost. Additionally, efficient cash replenishment operation can be expected since plan accuracy will reduce interim replenishments.

Operation of Cash Replenishment Planning Service

Operation of cash replenishment planning service can flexibly comply with the operation policy of the financial institution and security company. Standard operation procedure is shown in **Table 1**.

Characteristics of the financial institution and ATM location need to be taken into consideration when planning cash replenishment. Therefore, a standardized operation may not produce sufficient results. Cash replenishment planning service performs predicted/actual outflow comparisons, planned/actual replenishment comparisons and problem analysis on a monthly basis and runs the PDCA cycle that repeatedly makes improvements to formulate an optimal plan for each financial institution.

Since OKI is a leading vendor of ATMs, JBO can provide operation with deep understanding of ATM characteristics. JBO can formulate a replenishment plan that makes full use of the ATM's capabilities regardless of whether it is an OKI ATM or ATM from another vendor.

The ATMs can also be linked with OKI's ATM monitoring system, which will enable formulation and execution of a plan that automatically monitors the cash remaining in the ATM and run automated examination.

Table 1. Operation Procedure of Cash Replenishment Planning Service

Procedure	Cycle	Description
Retrieve outflow records	Daily	Linking with ATM monitoring system, daily outflow record for each ATM is retrieved and stored.
Create outflow prediction	Monthly	Using past outflow records, the outflow amount is predicted for each day of the following month.
Formulate monthly replenishment plan	Monthly	Using the outflow prediction, changes in remaining ATM cash are calculated, and the date(s) supplementation would be required are determined to formulate the month's replenishment plan.
Finalize replenishment plan	Every business day	Plan is adjusted based on the ATM's most recent remaining cash data and replenishment amount is finalized. Finalized plan is forwarded to security company for action.
Record management, analysis	Monthly	Actual record is compared with plan and problems are analyzed to improve plan.

Features of Predictive Cash Replenishment Planning

OKI/JBO developed the predictive cash replenishment planning system based on expertise and experience culminated from years of operation as an ATM vendor and operation service provider. The system can formulate plans efficiently using large amount of data. Function enhancements and additions are repeatedly made to streamline the planning process and improve plan accuracy. The detailed features of the predictive cash replenishment planning system are described below. System can be provided as an ASP service allowing financial institutions to perform the replenishment planning themselves.

(1) Outflow prediction

The system creates an outflow prediction from trends found in the past outflow records that have been saved.

ATM's outflow trend is not limited to an overall trend of actual outflow amount, but also includes monthly, weekly and specific date trends. For instance, on a monthly basis, transactions tend to be low during the first part of the month, but increase in the latter half. Weekly, transactions increase on Friday and decrease on Saturday, Sunday and holidays. Specific days are days when increased transactions occur repeatedly monthly, bi-monthly or

yearly. Such days include 24th to 26th of the month, which are paydays for many businesses, 15th of even months when pension are paid and on “gotobi”, Japanese term for days of the month ending in 5 or 0.

Reflecting these trends is important in improving the accuracy of the outflow prediction. However, these trends are influenced by financial institution, region and actual location of the ATM, therefore they are different for each ATM. The system uses monthly/weekly trends that are extracted through statistical processing. Furthermore, the system is capable of automatically extracting specific day trends seen monthly from past records and taking into consideration weekends/holidays to reflect it in the outflow prediction.

In addition to the above trends, changes in transaction due to events such as bonus payouts, year-ends and universities' summer break are taken into account when creating the outflow prediction.

Figure 2 is a comparison between an outflow prediction that was created and the actual outflow record. A minus outflow indicates an inflow and that the deposits exceeded withdrawals.

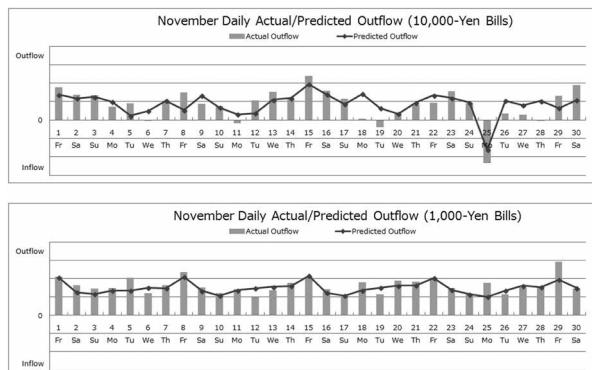


Figure 2. Comparison of Predicted and Actual Outflow

(2) Formulation methods for replenishment plan

Formulation methods for determining replenishment dates are classified into one of the two methods described below.

(a) Fixed day replenishment method

Day of the week the ATM is to be replenished is decided beforehand and amount of cash required until the next replenishment day is loaded into the ATM.

This method improves efficiency for security companies since travel route can be taken into day. On the other hand, it is harder to reduce the number of times cash is replenished.

(b) Non-fixed day replenishment method

In this method, certain amount of cash is loaded into the ATM and replenished on the day when remaining amount of cash is low.

Since replenishment takes place only when cash amount is low, unnecessary replenishment is eliminated, and it is easier to reduce the number of replenishments. However, this varies the number of replenishments in a day and tends to concentrate replenishments on high transaction volume periods. This makes it difficult for security companies to improve efficiency.

OKI's system is capable of formulating a suitable replenishment plan for both fixed day and non-fixed day methods.

(3) Adjustments of replenishment plan

When formulating a plan, the number of replenishments a security company is capable of performing in a single day is taken into consideration. With the non-fixed day method, if replenishment day falls on a weekend/holiday, and the security company only performs replenishment runs on business days, the plan will push the replenishment day forward to the day before the weekend/holiday. However, this may cause a concentration of replenishments and exceeds the capability of the security company. OKI's system will automatically adjust the replenishment day to ensure the number of replenishments is within the capable limit of the security company.

Operational notices such as temporary ATM shutdown due to planned power outages also need to be taken into account. If these notices are entered in advance, the system will automatically reflect them in the plan.

(4) Optimization of replenished cash amount

Number of times ATM cash is replenished ties closely with the amount of cash that is replenished. If cash is replenished to the ATM's full capacity, number of replenishments can be significantly reduced, but that will increase cash that will sit in the ATM unused resulting in waste of funds.

OKI system prevents waste of operating funds by (a) balancing cash denominations and (b) limiting maximum cash amount.

(a) Balancing cash denominations

ATMs are replenished with several cash denominations but the outflow of each denomination is different for each ATM. Certain ATM may have a high demand for 1,000-yen bills while outflow of 10,000-yen bills is half of 1,000-yen bills . The opposite may be

true for the other ATM. For such ATMs, denominations are replenished as demanded and balanced so that 10,000-yen bills and 1,000-yen bills will run out at about the same time to prevent wasting funds.

(b) Limiting maximum cash amount

Amount of cash that can be used for ATM operation is arranged with the financial institution in advance, and replenishment amount is established so that it will be within the allotted amount of cash.

Furthermore, in ATMs with low outflow, by ensuring amount of cash does not exceed the amount predicted for a certain period, financial institutions will prevent wasting cash.

Case Example and Result

JBO has formulated cash replenishment plans for more than 2,500 ATMs over a four-year period. These plans along with improvement in replenishment operations have decreased the number of replenishments by 40% despite a 1.7 fold increase in ATM outflow. If the contract with the security company were on a per replenishment basis, it would equate to a 40% cost savings. Moreover, occurrence of interim replenishments was reduced by 65% helping to ease the burden on security companies.

Future Developments

(1) Service types

Cash replenishment planning can be provided in the following forms.

- (a) ASP service of predictive cash replenishment planning system
- (b) Cash replenishment planning service
- (c) Cash replenishment service (includes cash replenishment work)

Quality improvement and cost reduction effects of cash replenishment become higher in the order of (a),(b),(c). In the future, these services will be provided as advanced services in order to respond to the financial institutions demand for cost reduction.

(2) ATM-LCM service

OKI's ATM-LCM service is a full outsourcing service that covers all the work necessary for ATM operation including ATM leasing, ATM monitoring, repairs, cash replenishment planning and cash replenishing. By utilizing the cash replenishment planning service as a means of

cost reduction in LCM service, OKI's superiority will be enhanced.

(3) On-premise ATMs

Cash replenishment planning service currently targets off-premise ATMs, but can be applied to on-premise ATMs. ATMs in bank branches are replenished by a bank staff, but can be replenished by the security company as part of the cash replenishment service reducing the burden on bank staffs.

There have already been a service request for operation with on-premise ATMs, and a trial has started at some bank branches.

(4) Cash management

Demand prediction and plan formulation methods used in OKI's predictive cash replenishment planning system can be applied to other systems besides ATMs such as bank branch's cash management systems and automatic tellers used in the retail industry.

Summary

JBO's cash replenishment planning service has been introduced. This service improves ATM uptime ratio and customer convenience while reducing operational cost, thus provides great benefit to financial institutions. ♦♦

Authors

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TIP [Glossary]

Interim replenishment

Rapid unscheduled replenishment when amount of cash in the ATM is low.

Automated examination

Amount of cash in the ATM is counted automatically, and transaction verification (examination) is automatically performed.

Gotobi

Japanese term for days of the month ending in 5 or 0. Financial settlements are often made every month on the 5th, 10th, 15th, 20th, 25th and month's end.