Transit Fare Management and Operation Issues

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Introduction

In recent years, transportation systems throughout the United States have been seeking alternatives to the historic methods of funding their operations. Among the possibilities which have been receiving particular attention is the expansion of user fees for this purpose. Mass transit organizations have relied upon user fees in the form of passenger fares throughout their history, albeit with varying levels of success. As governmental support for transit continues to tighten, greater emphasis on farebox revenue will be necessary to maintain service.

At the same time, societal changes have greatly aggravated the concerns which face revenue management, particularly concerning the security, control and protection of the revenues and associated personnel. As fare levels have risen, and overall economic conditions have weakened, the temptation placed on persons in the revenue stream, has intensified. Additionally, an increased awareness of passenger sensitivities has placed a greater responsibility on revenue agents and collectors to deal with passengers with an eye towards customer service.

Accordingly, revenue managers are faced with a new array of issues in their daily activities. To assist in this effort, managers can rely on the availability of technological advancements in sales and collection, however the management of this technology can present yet another burden.

Through this paper, we examine the approaches and tools which can be applied to the task of managing the revenue process.

Initially, a general perspective of the responsibilities and philosophies of management which should be considered in assessing revenue activities is presented. Focus then shifts to some of the specific tools which can be applied in the management of the revenue process. The prospect of transferring revenue activities to contracted parties in a number of revenue areas is discussed as well as the opportunity to identify private assistance in performing or financing improvements to existing systems.

Finally, several suggestions are presented for attention and research focus by the transit industry in an arena which certainly will undergo extensive scrutiny in the coming years by transit providers, funding agencies and our customers, the riding public.

General Conditions

A study performed for the Urban Mass Transportation Administration (UMTA, now the Federal Transit Administration—FTA) by Watson Rice & Co. noted that a 1986 UMTA Fare Collection Task Force estimated that transit revenue shortfalls created through evasion and theft exceeded $400 million or 15% of collected revenue annually.(*1*) Although a large portion of this loss is attributable to abuses by the public, such as fare shorting, counterfeiting and fare avoidance, a substantial element of the problem can be assumed to exist internally.

The vast majority of public fare evasion can only be corrected with the assistance of police and the legal system. Only through the well-publicized capture, trial and punishment of offenders can the evasion of fares by transit customers be discouraged and curtailed. Bus drivers and transit cashiers can only address these conditions within the context of their primary functions, that is the safe operation of a vehicle and limiting access to the system through the use of available resources. Any excessive or heroic actions on the part of these employees can only lead to service disruptions, passenger inconvenience and risk to the health and safety of the employee and others.

Accordingly, revenue management should focus its attention and resources primarily on those areas of revenue control over which some measure of improved security and control can be achieved.

With regard to abuse by the public, revenue managers and the senior management of the transit agency should work aggressively and cooperatively with appropriate authorities, such as the local police, district attorneys and government officials. With regard to internal theft or misappropriation, a variety of actions can be taken to enhance the level of revenue protection existing in the transit environment.

Management Issues

Revenue management entails a variety of responsibilities and attendant concerns. Today's revenue operations entail several major areas of responsibility—the sales, collection and processing of the firm's revenue. Many of the areas under management have counterparts in private industry, however, the combination of the tasks within one organization is truly unique.

In many instances, the similarities between transit and commercial applications are quite direct. For example, transit sales functions require sensitivity to customer service interactions, in the same fashion as a bank teller operation.

However, although most commercial organizations perform numerous sales transactions daily, very few receive the volumes of cash which must be handled on a daily basis in the transit environment. An issue such as the protection of unreconcilable cash is relatively unknown in private industry, since product inventory and the known volume of customers is generally available to a business. Unfortunately, due to historic operating conditions and the absence of appropriate technology, this problem is faced by the many transit properties which are using non-reporting collection devices.

With greater use of advanced technologies in the industry, the opportunity to improve revenue systems in transit is enormous. However, substantial improvement can be achieved through means other than technology. Such change should be developed in tandem with the many other alterations to the transit environment, such as the need to enhance the overall quality of customer relations as well as to create additional efficiencies in personnel utilization.

Control Issues

Revenue department management should be extremely familiar with the concept of internal control, as defined below. All activities and plans should be developed with extreme sensitivity to relevant impacts on the control of revenue and all related instruments, personnel, facilities and equipment.

> Internal Control comprises the plan of organization and all of the coordinate methods and measures adopted within a business to safeguard its assets, check the accuracy and reliability of its accounting data, promote operational efficiency, and encourage adherence to prescribed managerial policies . . . a "system" of internal control extends beyond those matters which related directly to the functions of the accounting and financial departments. [Statement on Acctg. Stndrds No. 1 (¶320.09)(*2*)]

Since 1983, the average revenue received for an unlinked transit trip has increased by 70%.(*3*) Passenger revenue, in total, has increased by almost 100% to over $6 Billion in 1991.(*3*) As a result, the amount of coin and currency moving through the average transit system on a daily basis has grown dramatically during this period, with the exposure to loss expanding in equal cadence. Many transit firms have been unable to replace technologies or practices at a pace sufficient to ensure protection of this influx of revenue.

In some of these cases, paper transfer stock, printed in bulk on a daily basis, is distributed to every vehicle operator in the system for passenger use. It is doubtful that transit systems with such programs have taken steps to control the transfer stock in the same fashion as cash, despite the fact that the value of an adult base fare and accordingly the value of a transfer has increased from pennies to over 80 cents.(*3*)

Such conditions warrant an extensive review of all revenue activities and programs to establish the appropriateness of existing activities in the current transit fare environment.

Reliance on Technology

In today's revenue environment, much attention is placed on the use of highly sophisticated technological equipment to sell, collect and analyze revenue transactions. Such attention is well placed, since the volumes and complexity of today's fare systems require technological assistance, such as is now available through registering fareboxes, light data transfer, and electronic access controls. However, the use of technology can not replace the need to rely primarily on the revenue employee as the chief ingredient to successful performance.

The most sophisticated technology requires human intervention to pull vaults, perform maintenance, install ticket inventory and control the process. Analytical tools and programs are only as effective as the employees who must design and interpret the output of such resources.

Accordingly, with each investment in tomorrow's sales and collection equipment, the transit firm must provide revenue management with adequate resources to properly hire, train, and assist the revenue employees who will use the equipment. Such investment in human capital can ensure the success of any investment in equipment. Conversely, an absence of such human capital can ensure the absolute failure of any technological program.

Corporate Sensitivity to Revenue Issues

Transit authorities have historically had little incentive to consider revenue issues as a high priority within their organizations. The ability to readily obtain operating revenues from non-farebox sources, such as taxes or grants has caused the attention to revenue collection and control to become diminished. Unlike most private firms, where revenue is the primary reason for existence, public sector entities have found that the performance of the operation is first and foremost in the attention of senior management and the various governing bodies.

The previously cited UMTA study noted that senior

management tends to hold the public responsible for revenue loss. The study reports that ". . . most transit executives avidly deny that internal theft exists within their organizations saying 'Our people don't steal.' Conversely, most lower level managers and supervisors and security personnel blame fellow employees for revenue loss."(*1*)

Such a lack of focus on revenue concerns at the corporate level is a major cause of revenue problems at many transit firms. Revenue issues are often assigned to managers who coincidentally hold responsibility for transportation, maintenance or accounting functions. Thus, the ability to focus specific effort on revenue issues is often reduced due to other pressing issues.

This attitudinal conflict must be corrected before meaningful change in the revenue process can be accomplished. As the funding structures of transit properties continue to move from governmental grant assistance to alternative funding modes, greater attention will certainly be focused on this arena.

Defining Exposure Points

Revenue management should be guided by the adage that states "an ounce of prevention is worth a pound of cure." Extensive and continual efforts should be expended in the identification of potential points in the revenue stream at which "leakage" can occur.

Control weaknesses can never be completely eliminated from a financial cycle. However, through the use of various reconciliation reviews and consideration to segregation of duties among responsible parties, management can ensure that control problems can be averted, or at least detected when they occur.

In assessing a revenue system, it is prudent to chart each transaction type in order to clearly identify potential weaknesses which may exist in the process.

Each transaction flow should be carefully documented by objective individuals, with the intent of identifying every step of a specific transaction process. Charts should be created to reflect movement of actual cash as well as controls on storage devices, keys, revenue instruments and the recording of transactions.

Each point of responsibility transfer should be noted and assessed to ensure that the passage of responsibility is clearly controlled through documentation, approvals or miscellaneous control activities. Figure 1 presents a preliminary outline of such a flow review.

There are seven steps in the initiation and execution of every kind of revenue/sale transaction.(*2*) These steps, and the corresponding transit revenue activity, are highlighted next. Control analyses on each of these areas can assist in providing management with greater comfort levels on the adequacy of revenue protection.

Standard Transaction

- Receipt and acceptance of customer order
- Preparation of order form
- Confirmation of order
- Preparation of execution documents
- Physical execution: withdrawal from stock and delivery
- Completion of invoice and billing of customer
- Collection of invoice

Transit Sales Transaction

- Customer requests tokens
- Agent checks terms, prices, confirms availability
- Agent prepares receipt and sales report entry
- Agent gives tokens to customer
- Customer pays agent
- Agent completes sales report of cash

Control documents and approvals should be assessed to ascertain that complex and overbearing mechanisms are removed, since actions which are deemed difficult are often not performed on a regular basis, thus eliminating the usefulness of such processes.

These control analyses, which should enlist the assistance and expertise of internal or external auditors, should be a product of extensive consultations with the persons responsible for supervising and performing the tasks under review. The final product should be reviewed carefully with these individuals to ensure clarity and appropriateness of the program prior to implementation.

When an inadequate control point has been identified, management must determine the appropriate level of effort which should be applied to correct or minimize exposure. Many such weaknesses can be alleviated through investment in technology, reassignment of personnel or redesign of reports and processes. In other cases, compensating controls can be relied upon for revenue protection, particularly in situations where more aggressive protective efforts would require extensive cost or human capital. The listing below provides an example of compensating control elements.

Potential Control Weakness

- Did the customer receive the proper quantity of tokens for the cash tendered to a sales agent?

Possible Controls

- Cameras could view each transaction; an on-site supervisor could view each transaction; a token dispenser could be used to replace the sales agent.

Compensating Control

- The customer will complain to the sales agent in the event that an improper quantity of tokens is received. In the event that the customer is dissatisfied with the transaction, a complaint will be filed with management.

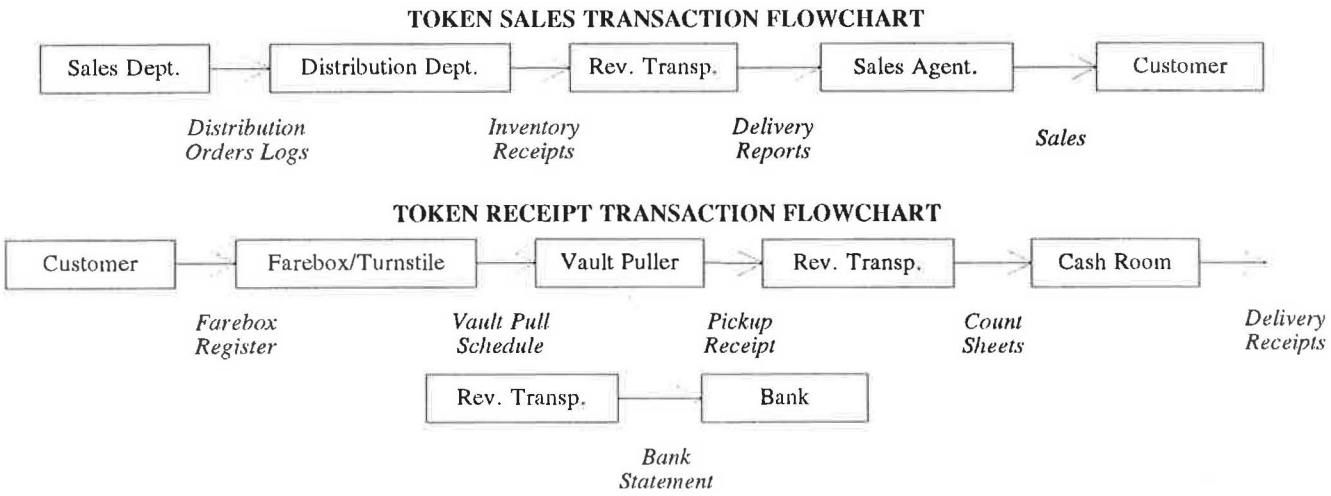

FIGURE 1 Token sales and receipt process.

Data and Information Issues

Senior management in revenue sensitive organizations must have access to data reflective of the performance of revenue operations and the level of service to passengers. Potential forms of management data requirements follow:

Administrative
- Cost per transaction by instrument
- Cost per delivery
- Cost per bank deposit

Control
- Receipts by location, date, time
- Type of receipt, bills/coin, tokens
- Daily token inventory report, by location
- Vandalism analysis, prevention
- Revenue received, by type, by location
- Revenue received compared to prior periods
- Ridership data vs. revenue received

Operations
- Number of distribution points
- Trouble calls
- Vehicle movement reports
- Headcount utilization
- Counting/processing errors

Maintenance
- Percentage of units in service
- Transactions between failures
- Farebox pullouts between failures
- Repeat repairs

Sales
- Number of outlets
- Number of machines
- Number of refunds
- Sales locations, by neighborhood
- Sales by location, by type

Among the most essential financial data which revenue management should receive on a daily basis are the receipts and inventory reports. These reports, which can take the simple format demonstrated below, should be generated through computer interface, secured to minimize the level of employee access to the data input process.

Daily cash receipts are usually determined from the following sources: Coinage can be reported directly from computer meters attached to the coin counting mechanisms. Dollar bill counts can be generated from metered bill counters.

Sales agent figures can be produced from a computerized reconciliation system which is used to reconcile the daily banks submitted by the sales agents.

All receipt figures should be reported into the reporting computer through secured computer modem, producing the consolidated report format shown in Tables 1 and 2. Inventory reporting, which should be performed daily for each type of revenue instrument can be generated through the data from sales reports, inventory journals and distribution logs.

Each day, the total token inventory should balance to the number of instruments purchased from the manufacturer.

Sensitivity to Corporate Perspective

The revenue function has changed in recent years. In the area of sales, the revenue agent transacting the sale of tokens, passes or tickets is perhaps the most direct point of communication between the customer and the firm. Accordingly, sensitivity to the customer's initial perception of the corporate appearance should be of paramount importance at the sales point.

TABLE 1 Daily Cash Receipts Report

	Coinage	Notes	Total Cash	Tokens
Rapid Rail Line 1				
Rapid Rail Line 2				
Subtotal - Rapid Rail				
Bus District 1				
Bus District 2				
Bus District 3				
Subtotal - Bus Districts				
Sales Agent Receipts				
District A				
District B				
Subtotal - Sales Agents				
Total Daily Receipts	_____	_____	_____	_____

TABLE 2 Sample Token Inventory Report

	10 Pack	Loose	Total
On-hand Stock:			
Vault room			
Reconciliation in process			
Distribution Center			
-in safe			
-in process			
-prepared for shipment			
Packaging plant			
Total in Hand			
Sales Locations			
Station agents			
Vending machines			
Sales offices			
Contractors			
Total Sales Locations			
Outstanding Tokens Purchased			
Total Token Inventory	_____ (should always be the same)	_____ (should always be the same)	_____ (should always be the same)

Revenue management should remember that although their function is the control and collection of funds provided by passengers, they also provide essential services to other departments within the agency. Interactions with the transportation department and the maintenance department through performance and training efforts as well as the impact of revenue activities on the firm's scheduling process create opportunities for revenue personnel to address the needs of their counterparts in other departments.

Revenue personnel should maintain responsibility for training all agency employees who deal in revenue issues, such as vehicle operators, cashiers, and rail conductors, in the appropriate revenue issues which the employee will face. Through training techniques such as role playing, employees can become sensitized to the needs of passengers and customers.

Training should be a recurring practice, with each employee receiving some form of reinstruction annually. New employees should receive some interaction with their instructors several months after entering full service, in order to relate specific concerns as well as to present inquiries on revenue issues. At least some portion of the costs associated with such training should be borne by revenue management.

Other needs of the agency, in the corporate sense, can be fulfilled through open accessibility to data generated through revenue systems, particularly those volumes of data available through the use of recent technologies, such as registering fareboxes or entry gates. The interchange of information should involve data pertaining to ridership and revenue data. The agency's budget personnel, traffic managers, rate department and schedule makers should be frequently provided with data created through revenue department technology. In this fashion, appropriate consideration can be given to revenue sensitive issues, as well as actual service demand levels at particular routes or time periods.

Managing Revenue Operations

To present the overall responsibility of a revenue manager's efforts, consider a bell curve. This curve (Figure 2) presents a hypothetical frequency distribution representing the probability that an individual within a population group would steal funds.

In general terms, the left end of the curve represents persons who will ALWAYS attempt to take funds, regardless of conditions, or circumstances. The right end of the curve represents those individuals who will NEVER take funds in any circumstances. The majority of the population of employees can be swayed in either direction by environment and circumstance.

The revenue manager's general function is to sway the population towards the NEVER take category, while using appropriate methods to reduce opportunity for the ALWAYS steal group. The manager's limited resources should be expended in positive efforts for the behalf of the vast majority of employees who are not inclined to misappropriate funds, with less managerial emphasis on the negative. In fact, when the correct atmosphere is created in the work place, the manager will be frequently assisted in the primary task by the employees themselves.

Human Resources Issues

The primary participants in the revenue collection process are the employees. Regardless of the capabilities and complexities of machinery and technological mechanisms used in the process, the entire program must rely on the competence and supporting roles of all assigned personnel to perform the revenue process properly.

Unfortunately, many weaknesses in any revenue system are related to the assigned personnel, who have the access and the capability to misappropriate funds through acts of commission or omission. The manager's function, as in any operating environment, is to maximize return from the employee's competence and capability, while minimizing the employee's exposure or incentive to act improperly.

Import of Employee Relations

Interaction with the appropriate bargaining unit representatives can offer great assistance in the implementation of a revenue management program. Rather than approaching the employee groups in an adversarial fashion, some success can be achieved in this arena through participation.

The nature of revenue protection task requires some confrontation with employees who do not perform their responsibilities in a proper fashion. However, managers should remember that the labor grievance process consumes energy and the resources of both the firm and the bargaining units which could be better used in a more positive effort. The pursuit of one grievance or judiciary process can cost the agency over $100,000 in management time, replacement labor costs and the costs incurred in the event that a grievance is upheld for labor. The bargaining unit also incurs costs. Accordingly, it is financially astute of both management and labor to avoid such activities through preventive efforts in the arena of personnel management.

It should be noted that the level of success related to necessary disciplinary proceedings can be greatly enhanced through thorough training of supervisors and managers in the specific legal requirements associated with proof of wrongdoing, custody of evidence and the vagaries of entrapment.

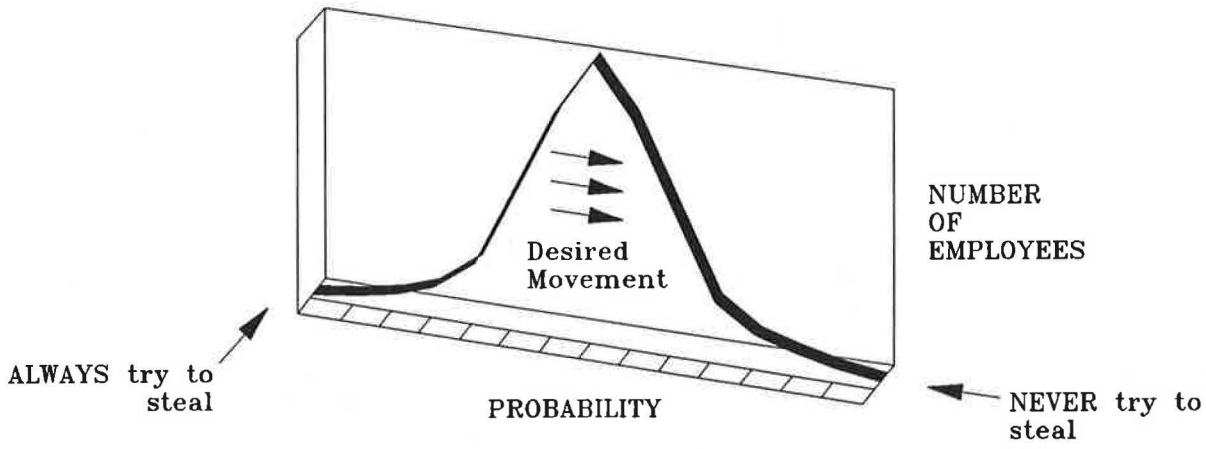

FIGURE 2 Propensity to misappropriate revenue.

Although many transit supervisors assume that each employee will attempt to misappropriate funds, consideration should be given to alternative positions, such as the possibility that the individuals are appearing at the worksite to perform their tasks in return for their wages. Every effort should be made to encourage this line of thinking, since the alternative is management through fear with the implementation of an aggressive and expensive police program designed to capture, prosecute and punish the workforce.

Through the development of a positive relationship with revenue employees and their bargaining unit representatives, significant progress can be achieved in the general attitudes affecting the business.

Through the formation of employee/management programs, the efforts of both personnel and supervision can be recognized and applied to the overall improvement of revenue operations.

Programs such as intra-departmental contests, with a schedule of pre-defined parameters, such as those noted next, and *de minimus* awards, such as gift certificates, can be developed with labor, in such areas as productivity, attendance and general performance among peer groups. A contest may award points for such items as reduced sick days or reduced equipment failures. Another program may solicit comments from the department's customers, such as the transportation department or the vehicle maintenance department. Favorable ratings might then be used in an award program.

Performance
- Productivity—on schedule, volume
- Safety—injuries
- Equipment handling—breakages per volume
- Equipment performance (maintainers)

Paperwork
- Completeness
- Accuracy
- Legibility

Uniforms
- Appearance
- Completeness

Customer Satisfaction (from Operating Depts)
- Timeliness
- Cooperative Attitude
- Accuracy, Quality

Facility
- Appearance
- Security
- Safety

Attendance
- Latenesses
- Unscheduled Leave

Suggestion programs have also been found helpful in several instances. Through such programs, the technical expertise of employees at every level can be tapped for the purpose of improving the overall activities of the revenue function.

With the involvement of union representatives, as well as other employees and first-line supervisors, such programs can be very helpful in improving employee relations, while providing the company with needed improvements in productivity or cost reduction.

Import of Overall Working Conditions

Managers often place the blame for revenue loss or "shrinkage" on the employees. However, in order to understand cause more fully, a manager should first

consider the employees' position in ascertaining the reason for a theft or loss.

The manager must honestly determine what can be expected to occur if an employee is placed into an inhospitable, often dangerous environment, with little support, frequent confrontation with customers, risk of personal financial exposure for unintentional or unrelated shortages, risk to personal safety due to robbery, and constant pressure or abuse from supervision.

To this picture, add an undeserved stereotypical reputation of corruption or laziness that is frequently ascribed to the employees in revenue positions. Now place this employee into a position in which they are in direct contact with clearly uncounted, unproved cash for even a short period of time.

Over time, most people who are placed into such circumstances for eight hours or more daily for a period of months or years, will be tempted to "borrow" some of the cash for personal use, such as lunch, with the full intent to replace the funds at a later time. Unfortunately, the intention to repay becomes forgotten over time, particularly with continued success in avoiding detection or suspicion.

The result is a revenue loss. In such instances as those described, revenue loss can be prevented through a concerted effort by the firm's management to address each of the issues that created the situation.

Causes of Internal Theft and Remedies

The basic causes of internal theft are ". . . need, greed, revenge or challenge."(*1*) In most instances such conditions exist through management's failure to address employee needs or basic quality of life standards which are expected to exist in any work place. In order to correct this environment, managers must exert sincere efforts to improve the conditions. Some of the actions which can be taken include those items are noted below.

- Provide employees with information of the revenue control process in its entirety. "No man is an island," nor is any revenue employee a free agent. Many mechanisms are in place to identify loss or misappropriation. All employees should be aware of this fact, and should be encouraged to offer improvements to the process. Such knowledge of control systems may be sufficient to discourage attempts at theft.
- Ensure that the employees' specific responsibilities and duties are clearly stated and understood by all parties, including direct supervisors.
- Ensure that the employees' duties are commensurate with the individual's educational skills. (i.e., does a sales agent with only a grade school education understand what a reconciliation is?)
- Provide continual training to employees and supervisors in all aspects of their duties. Training should address not only the technical aspects of the position, such as fare types, machine operation and weapons handling, but also issues such as basic negotiation skills involving customers, or basic management training in areas such as stress management.
- Improve the quality of work facilities in minor ways, such as painting work areas, correcting HVAC problems or providing clean chairs and work tables.
- With the participation of bargaining units, redefine employee job descriptions to ensure that the employee's time is fully utilized, in order to prevent boredom. As an example, a vault puller may become involved in quality control or preventative maintenance issues involving fareboxes.
- Develop employee sensitivity to revenue control as an important aspect of the company's activities. The more money collected by the revenue department means more funds for the firm, with resulting benefits to the employees.
- If applicable, eliminate the reputation of some revenue jobs as last chance, dead-end jobs. In fact, corporate culture should be amended to cure this condition, if it exists, since it is not prudent to place the fiscal health of a firm with the last chance crowd.
- Enhance the self-esteem of the employees through intra-departmental contests or posting of departmental performance statistics.

Through implementation of basic management tools, such as training, communication and job enrichment, a firm can achieve extensive returns through enhanced employee morale. In light of the importance of the employees to the success of a revenue operation, costs incurred in the development and implementation of such activities can create extensive benefits.

Treatment of employees with distrust and abusive management tactics can only create a breeding ground for mishandling of revenue. Conversely, by implementing a cooperative effort with employees to improve the revenue process with mutual respect and mature interaction with the firm's adult employees an atmosphere will be created in which individual will think before stealing—that will sway the vast majority of the population bell curve.

Organizational Structures

In order to assist in the focusing of corporate attention and resources on the revenue issues, a goal for every transit property should be the formation of a segregated revenue department, which should have full and sole responsibility related to this important area.

Responsibility Centers

The location of revenue responsibilities within a transit organization structure is an essential ingredient to successful achievement of revenue control goals.

An inability of revenue supervision to capture the attention of management in an atmosphere where revenue issues must compete with transportation or vehicle maintenance issues can create serious morale problems at all levels of revenue personnel. One method to develop a level of necessary specialization, expertise and management focus on revenue within a transit organization is through the creation of a centralized revenue department, segregated from all other operational responsibilities, with sole responsibility for all revenue issues.

Figure 3 presents one form of a revenue department, which holds responsibility for a variety of areas.

Some recommended duties for each branch of the revenue department are presented below. It should be noted that the sales department is well suited to serve as the agency's central clearing house for all customer transactions, including the training of customer service agents and other employees who may have interaction with the customers on a regular basis.

Sales

- Station management of rapid rail stations, light rail stations and commuter rail stations, including management of collectors and station agents.
- Third party sales program oversight, including management of distribution and reconciliation functions as well as policy formulation and expansion of all third party sales activities.
- Management of on-board sale and collection of revenue instruments.
- System wide revenue training of all employees and third party contractor employees, including vehicle operators in issues related to fare collection and control.

Revenue Control

- Development of revenue control sensitive practices for handling cash resources and revenue instruments.
- Control over all revenue system security, including access locks and key control.
- Ongoing analytical reviews of receipts to identify potential anomalies in the levels of receipts.
- Design and servicing of revenue sales machines, including fareboxes, token, transfer and ticket dispensers.

Revenue Operations

- Transport and reconciliation of pass, token and railroad ticket inventory to all sales points.
- Farebox vault pulling at bus and light rail districts.
- Turnstile pulling at rapid rail locations.
- Transportation of receipts from collection points to central cash room and from central cash room to bank.
- Maintenance of all revenue sales and collection equipment, including sales machines, fareboxes, turnstiles and cash room equipment.
- Operation and maintenance of parking lot facilities, including fee collection and control measures.

Cash Room Operation

- Distribution and reconciliation of pass, token and railroad ticket inventory to all sales points.
- Operation of central cash facility.
- Preparation of bank deposits and sales agent banks.

Control Considerations

In forming a revenue department, basic consideration must be given to the presence of internal controls in the structure. Through installation of a pattern of segregation of duties between parties involved in a transaction, adequate protection of revenue can be installed into the transaction flow.

Each transaction should be carefully evaluated to ascertain the applicable control points in the process. As the example presented in Figure 4 demonstrates, a sales transaction involves an inventory control feature, a sales reporting feature and a bank deposit feature. Persons performing these functions should be located in different departments or sections, when possible. Accordingly, in the proposed organization, Revenue Operations personnel would be responsible for the inventory of passes, sales department personnel would perform sales and produce sales reports, and Cash Room personnel would perform revenue counting and bank deposits.

The Control department would assess the various documents produced during these steps of the process to ensure that the figures reported are in agreement.

Many agencies do not have sufficient resources to implement a complete system as defined. In these cases, great care must be taken to create some form of independent verification of relevant documentation on a regular basis. Where available, data produced from automated sales or collection equipment can be used to confirm the accuracy and completeness of bank deposits.

Interaction with Operating Departments

In managing a specialized revenue department, the development of mutually beneficial interactions with the operating departments is essential to the success of the organization's efforts.

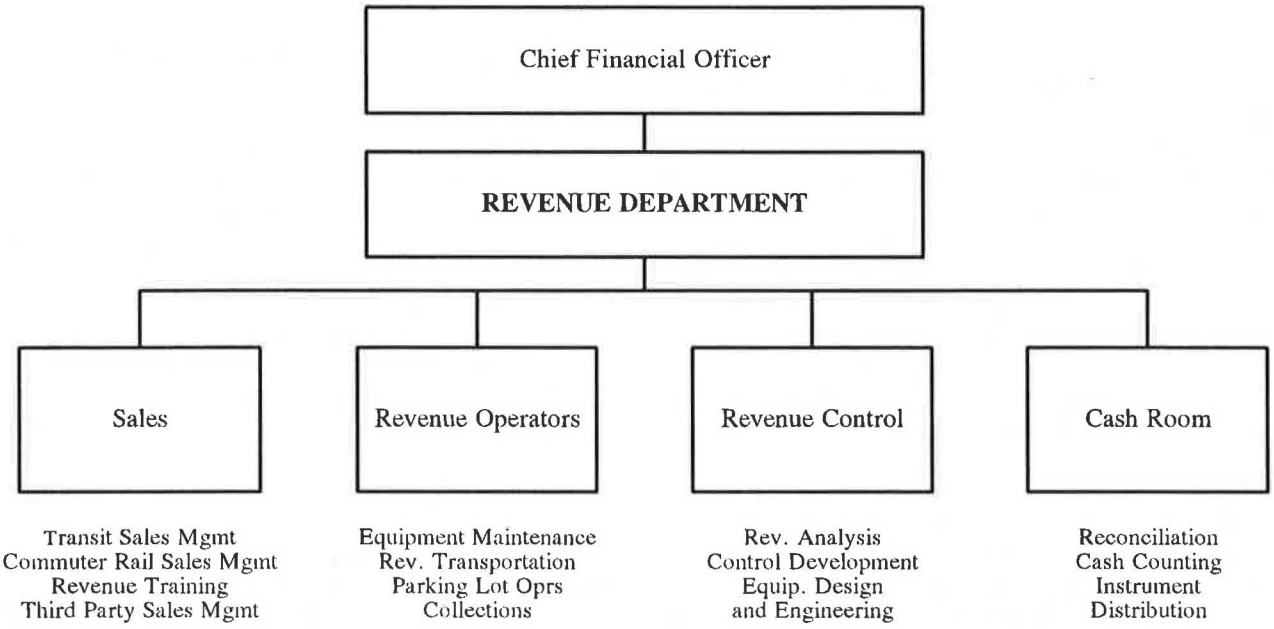

FIGURE 3 Specialized revenue department organization structure.

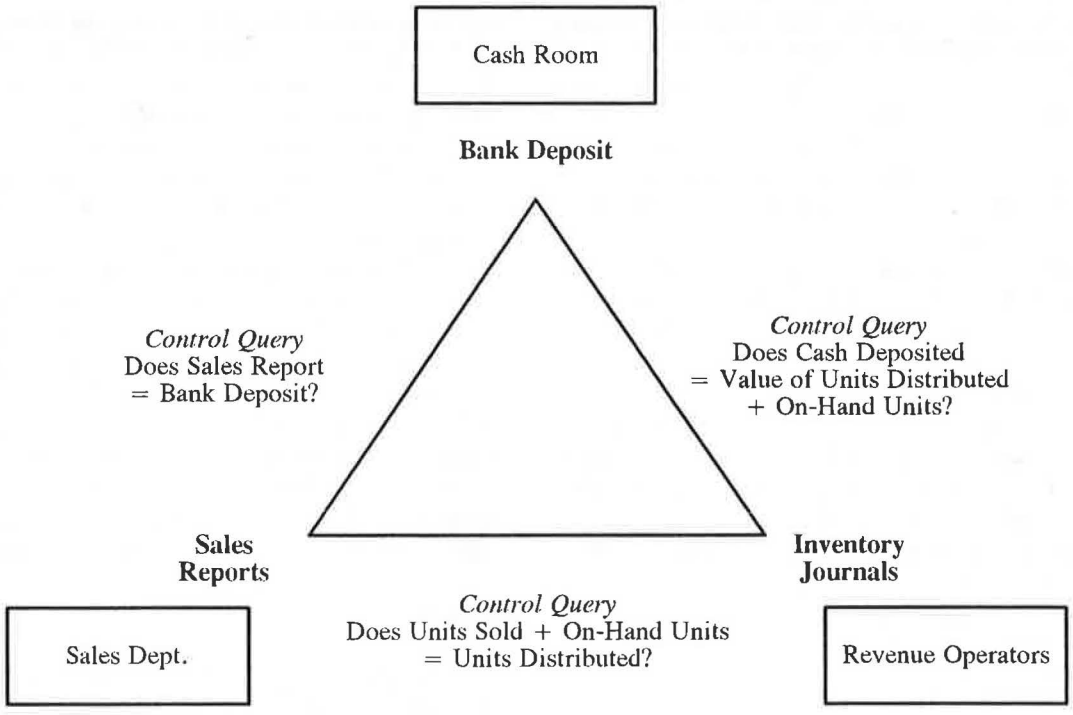

FIGURE 4 Sample control analysis sales transaction controls.

In the area of training, the revenue department should play an important role in the development and implementation of ongoing revenue training programs for the benefit of those operating personnel who are included in the revenue stream.

Personnel such as bus drivers and rail vehicle crews should be frequently reminded of their responsibilities concerning the collection of revenue from passengers. These employees should receive continuing instruction and assistance in issues related to the fare structures of the company, as well as in developments of new fare systems.

Due to the variety of their daily experiences, vehicle personnel can often provide more accurate information regarding passenger concerns involving fares than any number of analysts, supervisors or passenger focus groups. Such information should be sought and acknowledged by the revenue department.

Operating management and supervision should be consulted in the development of revenue schedules for activities such as vault pulling and farebox maintenance. Their comments should also be solicited in the evaluation of revenue personnel performance within the operating environment, particularly in areas directly related to the provision of service to the firm's passengers.

Transaction Structures

Transaction Types

Two basic types of transactions exist in the transit environment—those that can be reconciled and those which cannot be reconciled. Clearly, the efforts of revenue management should be focused on the formation of the former and the elimination of the latter.

Reconciled transactions are those which are related to the sale of an inventory of product, with pre-defined quantity and value. Through control of access to the product inventory and through comparison of bank deposits and distribution logs to reported sales, the amount of expected receipts can be clearly identified and adequately protected.

Unreconciled transactions, which unfortunately are a major part of the transit revenue business, are related to the sale of a product or service in a quantity which can not be pre-defined. Accordingly, the level of expected receipts can not be identified with certainty, thus precluding the ability to protect them with confidence.

Revenue Modals

Among the controls which can be used to protect unreconciled receipts is the development of a revenue modal to be used in identifying variances from the norm. Using standard statistical techniques, a control analyst should develop trend analyses, by instrument, location, date and transaction type which can be used to detect aberrations. Such aberrations can then be investigated fully to ascertain the propriety of the variance. Factors which would be considered in the formation and evaluation of revenue modal data include:

- Holidays
- School holidays
- Weather conditions
- Equipment conditions
- Traffic conditions

Control Standards

Prior to the development and evaluation of revenue transaction processes, management should develop baseline control standards which should be evidenced at each step of a procedure. Such standards should reflect the fare policies and service requirements of the particular agency. Potential baseline standards include:

- Cash handling must be minimized throughout the chain of transactions; cash should be handled in a "sealed pathway" from the customer to bank.
- The use of "reconcilable" transactions should be maximized.
- Revenue instruments must be treated in the sales stream as cash; passes, transfer, tokens and tickets should be handled in a "sealed pathway" from printer/manufacturer to cash room to seller to customer.
- Fare structures should be simplified to avoid customer confusion and to reduce the level of subjectivity at the collector level.
- The particular responsibility for sales shortages should be ascertained at each transfer point through activities such as field sales reconciliations performed by properly trained supervisors.
- The number of unreconciled transactions should be minimized through the use of discount pricing and expanded availability of pre-paid revenue instruments.

Sales Collection and Control Equipment Issues

Equipment failure can be demonstrative of a wide spectrum of related system weaknesses, such as inadequate maintenance due to poor workmanship, inadequate training, inadequate facilities or lack of parts. Such failures create a host of problems, such as revenue loss from passenger "free fares," travel delays, theft due to frequent access to failed equipment and poorly controlled cash vaults. Passenger annoyance at difficulties encountered with unreliable fareboxes or entry gates can adversely affect ridership over time.

Equipment management is a major issue facing all revenue managers as new computer technologies become increasingly available to transit fare applications. Although these technologies can greatly enhance the levels of control by providing expanded reconciliation capabilities, as well as extensive data on revenue and ridership, managers must assess the cost of the equipment and the associated operating costs in the context of potential revenue loss.

New types of equipment can be designed in a fashion which can greatly reduce overall incident maintenance expense, however, preventive maintenance becomes increasingly important as the delicacy of the technology is tested by the harshness of most transit environments. Furthermore, in order to derive the full benefits of data collection and control which these machines can provide, it is necessary to assign extensive analytical resources to the process. Otherwise, the extensive volumes of reporting and control features, for which the agency has paid, will quickly overwhelm management.

Understanding these issues, it remains clear that the application of new technology is a desired long term goal for the industry. In order to maximize the benefits available from existing and newly acquired equipment, several areas should be of concern to revenue management.

Preventive Maintenance and Controls

The maximum return from an agency's investment in equipment can only be achieved through the performance of a thorough preventive maintenance (PM) program. Such programs in the revenue context are unique, in that technological issues must be applied within the constraints of revenue control and security.

Different levels of PM activity should be developed by management, with assignment of individual tasks to employees at the appropriate level of expertise. In this way, a PM farebox cleaning could be performed by a third-class maintainer or vault puller, while more complex electronic component replacements can be assigned to a specialist or first-class maintainer. The varying levels of expertise can also serve as a *de-facto* apprenticeship program.

A PM program should provide for the replacement of parts before they fail, in order to minimize service disruptions to the passengers. Assessment of failure incident data, such as primary cause, life of failed unit, repeat repairs and service conditions should be performed in order to generate a PM replacement policy for each individual part. Appropriate unit scheduling can then be developed.

Installation of quality control programs and continual shop enhancements should be a part of the overall program. Statistics such as "pullouts between failures" or "transactions between failures" should be developed and continually monitored by management to ascertain levels of quality control and shop performance. Problematic conditions should generate manufacturer assistance, as appropriate.

Control issues involving any revenue sensitive maintenance activity, particularly in the field, should be developed in the design phase of the equipment acquisition. However, such considerations as access control and inventory control can be implemented at any time in the life cycle.

For proper security over the maintenance function, it is essential that control be maintained over tools, keys and equipment parts. Documents such as manuals, designs and programs should also be stored and accessed in controlled fashion.

Each component of equipment, should be cataloged by serial number, and the movement and specific assigned location of each component should be carefully monitored through a data base system. Security sensitive devices, such as farebox vaults should be repaired or maintained only in a secured environment, such as the cash room, where appropriate keys should be secured. No vault keys, such as "teardrop devices" should ever be allowed to leave secured areas.

Access to the equipment in the field by maintenance personnel should be carefully monitored, as well. Through development of strict scheduling of equipment maintenance, entry into units can be restricted through daily key assignments, parts inventory usage or tool target systems. Perhaps a cleaning assignment requires no keys, whereas a feeder belt replacement action may necessitate access only to the top of a unit. The most secure arrangement might entail the movement of the entire unit from the field into a secured facility with no on-site access needed, however, this type of control process may generate greater costs that the funds protected.

Of course, with the implementation of new technologies, card access controls can identify each entry into a unit for the most effective control on this area.

Security and Alarm Processes

The security of revenue equipment is another issue which can be best addressed at the design stage of the equipment's life cycle, however, many concepts can be implemented at any time.

Security of revenue equipment must be viewed not only from the perspective of protecting the revenue from internal mishandling, but also from the aspect of vandalism, burglary and robbery.

Internal mishandling of revenue is primarily addressed in hardware terms through control over access to the machine itself as well as to the vault component, in place or in transit. Processes as discussed earlier, such as

scheduling and tool and part inventories can assist in this effort. Key security, even under the most controlled systems, can hinder but not prevent improper access through key loss or duplication, particularly by technically competent personnel.

Issues such as vandalism and burglary can be addressed with the assistance of police personnel, as well as with the installation of covered hinges and locks, sloped machine tops and graffiti resistant surfaces. The prospects of robbery of servicing personnel must be carefully considered by management in decisions related to the placement and positioning of equipment, as well as in the scheduling of maintenance and revenue servicing activities. The use of teams for performing such duties may be a valuable option.

Equipment alarm systems, whether for security or for servicing needs, are only useful if response to a call is achieved in a prompt fashion. On-site alarms and sirens are of minimal use, except in those locations where employee reaction can occur. Computer generated alarms are also useless unless police or appropriate operating personnel have immediate notice of the alarm in order to assign response. One solution to this requirement is the placement of a revenue control center in close proximity to operation and police control units. Through this mechanism, immediate response to standard and emergency maintenance, inventory or police requirements can be assigned quickly.

A revenue control center can also address the needs of any revenue servicing vehicles which may be in service. Continued radio communication with each vehicle is helpful in addressing assignment, schedule and security issues. Mechanical breakdowns or security problems can be immediately communicated by radio to the center, with appropriate response provided efficiently.

Equipment Acquisition Considerations

In formulating any revenue equipment acquisition project, control concerns should be of paramount concern. All aspects of the design should address security, and reporting requirements, as well as operational concerns. A primary concern of the designers should be the requirements of the customers, who in many instances are unable to communicate in common fashion, due to language barriers or illiteracy. Equipment operation procedures should be developed to ensure simplicity in operation and ease of use. For employee safety, door opening processes and ease of access to components by servicing personnel should be designed to prevent injury and deter robbery.

For security and control purposes, access and involvement in all design activities should be carefully monitored and controlled. Control of keys, alarm codes and security passwords in the possession of the manufacturer should be monitored continually, both during the project implementation as well as continually through system operations. In the implementation of the procurement, it is also imperative that all programs and manuals related to the equipment be provided to the transit operator in the early stages of the project.

In the interest of project efficiency and warranty concerns, the manufacturer should be held responsible for installing the equipment as a primary task within the procurement.

Dramatic cost savings and improvements in performance can be achieved through the use of existing equipment designs, which have been proven in similar applications. In addition, opportunities may exist to work with the manufacturer in a joint Research & Development project, in which the cost of the equipment is significantly reduced in return for installing test equipment which the manufacturer may be developing for its general product lines.

The quality and security of communication links are particularly important in the use of newer technologies which provide reporting capabilities. The transit agency should consider the opportunity to upgrade its telecommunications network in the context of a revenue equipment project, with potential assistance and mutual benefits from local telephone or cable television firms in the event that fiber optics technology can be useful to the purpose.

Reporting systems for equipment systems should be designed in a fashion which allows security and consistency in all applications, with the intent of consolidating reporting programs for all sales, collection and counting equipment to fully automate the reconciliation and control processes of the agency.

Financing Activities

Revenue management can use private sector financing mechanisms to assist in the acquisition of technological improvements to the revenue process. Virtually any capital equipment, such as fareboxes, dispensing machines or turnstiles can be funded on a "pay as you go" basis rather than on a pay at delivery basis through leasing transactions or vendor financing. In this way, transit operators can leverage the use of scarce capital grant resources by disbursing only small periodic payments each year, rather than larger acquisition payments in the year of delivery of these rather expensive systems.

Another alternative to consider involves the formation of partnerships with third party firms, such as banking institutions, to participate in the acquisition of capital equipment. Several examples of such transactions have occurred, in which banking institutions have acquired automated teller machines, converted the equipment to sell transit passes or tickets and placed the equipment into

transit sales points. In return for a commission on sales, the bank maintains and services the machines with transit revenue instruments. The bank's customers may also use the machines to obtain cash withdrawals as in standard ATM machinery. In a transaction of this nature, the transit operator receives the benefits of a dispensing machine without incurring capital costs of acquisition.

Privatization Opportunities

In transit circles today, many efforts are underway to identify methods for private sector firms to assist in the delivery of transit services. Revenue activities can offer many such opportunities for public transit operators to benefit from the administrative and management mechanisms employed by private firms in the performance of similar activities.

Private, for-profit entities clearly have the expertise to capture and collect revenue in a controlled environment on behalf of the transit operator.

Through development of partnerships or service contract arrangements with private entities, the public transit industry can gain valuable knowledge as well as operating cost savings.

Private-Public partnerships can be used to implement "turnkey" design and build programs to acquire new revenue sales or collection equipment. Such partnerships can address financing issues as well. In addition, many opportunities exist for the use of private firms in the performance of revenue duties. The privatization opportunities for consideration by transit operators—many of which are already in practice at public agencies in the United States—include:

Sales

- Off-site pass/ticket/token sales offices
- Rapid rail station management
- Commuter rail station management
- Pass/token/ticket vending machine mgmt.
- Pass/ticket/token mail sales programs

Revenue Operations

- Currency processing
- Revenue equipment maintenance
- Revenue instrument distribution
- Transportation services
- Vault pulling and cash room operations

Control

- System engineering and equipment design
- Analytical reviews

Conclusions

The management of revenue in the transit industry has become a growing concern of operating agencies. The need to develop sales programs, implement new technologies and collect greater levels of fare revenue to meet spiraling operating costs are issues faced by every transit firm.

Only through the use of private sector management techniques involving marketing, accounting controls, finance, statistics and personnel management, can public transit operators achieve the levels of revenue development and protection which are the lifeblood of every private company.

With enhanced sensitivity to customer needs, responsible treatment of personnel issues, and application of basic operating methods involving inventory and access control, the revenue streams of transit entities can become a reliable factor in the funding of mass transportation.

Potential Research Issues

Among the areas of revenue management which should be considered as review issues, the following recommendations are presented:

Assess psychological studies related to theft and tendencies to steal, as affected by the transit work environment.

Develop a uniform mechanism to assess appropriate and recommended educational levels of employees involved in the revenue process.

Develop a uniform mechanism for assessing the educational levels of passenger customers within the service area, for use in the development of revenue policies and equipment designs.

Develop a standardized system for reconciliation and revenue instrument inventory control.

Identify features of banking institution control systems which may be directly applicable to transit revenue processing.

Evaluate the costs and benefits of vehicle journey "transfer" fare structures, with consideration to control issues.

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