

## INDEPENDENT MEASUREMENT OF PERFORMANCE TO USPS CUSTOMERS

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### INTRODUCTION

In 1990, the U.S. Postal Service introduced external, independent service performance measurement systems for First-Class Mail and household customer satisfaction. These two measurement systems for the first time measure USPS performance from the customer's viewpoint.

A 1990 ASA paper introduced these customer-based measurement systems. This paper provides updates about the systems, called the External First-Class (EXFC) Measurement System and the Customer Satisfaction Index (CSI). It provides national results to date, and also describes how financial incentives to USPS management and labor have been associated with improvements in independently-measured performance and customer satisfaction.

One of the three facets of the USPS 1990-1995 Strategic Plan is to "increase the level of customer satisfaction with postal services." The operation of customer-based service performance measurement systems are among the strategies being used to meet this objective.

The Consumer Affairs Department at USPS Headquarters is responsible for measuring the service USPS provides its customers and the satisfaction of its customers. It is also responsible for providing means for customers to express their concerns, make suggestions, request information, and/or compliment employees. Finally, it is responsible for educating consumers about postal services and products and for educating employees about customers' expectations.

### EXTERNAL FIRST-CLASS (EXFC) MEASUREMENT SYSTEM

The creation of EXFC grew from then-Postmaster General Anthony M. Frank's desire to develop an independent, external slot-to-slot service performance measurement system; that is, to measure First-Class performance from the time it is entered into the mailstream by the customer until the time

it is delivered to a household or small business. EXFC measures First-Class Mail service performance from a customer perspective and produces accurate, independent, externally generated results.

EXFC is designed to provide quarterly estimates of destinating First-Class Mail service performance for 86 cities from their overnight, two-day, and three-day service commitment areas. These 86 cities, together encompassing 271 3-digit ZIP Code areas, account for about 60% of the nation's destinating First-Class Mail volume.

In February 1990, the USPS awarded a three-year contract to the internationally known accounting firm of Price Waterhouse to manufacture and induct First-Class Mail and monitor its service performance quarterly. The contract also gives the Postal Service the option of extending the contract one year at a time for up to two additional years. To date the USPS has received eight quarterly reports of service performance from Price Waterhouse.

Twenty-four different types of First-Class Mail are manufactured for EXFC including letters, flats (large envelopes), post cards, and double post cards. Various sizes of envelopes are among the 24 types, as are several address styles (handwritten, machine addressed), return address styles, envelope colors, weights, and types of indicia (stamped and metered). About 90 percent of the test mail is letters, about 5 percent is large envelopes, and the remaining 5 percent is post cards and double post cards.

Approximately 65% of the test mail has metered postage, reflecting real-life proportions. About one-third of the test mail is hand-addressed, also reflecting the proportions found in collection mail.

EXFC mail is shipped weekly to the 86 cities to be entered into the mailstream. Price Waterhouse has hired "droppers" in the 86 cities to induct bundles of test pieces into the mailstream via collection boxes or mail chutes according to a predetermined time schedule. Induction of mail occurs 6 days each week. No mail is inducted on Sundays or postal holidays.

Each "drop" in an origin city contains mail for cities in the overnight, two-day, and three-day commitment area of the origin city. For each destinating city and service commitment, the allocation of mail seeded in various origin cities during the course of a postal quarter is in proportion to mail volumes between these cities obtained from USPS surveys which measure First-Class Mail volume.

Pieces are dropped into a collection box or mail chute 40 or fewer pieces at a time, rather than one piece at a time, for administrative convenience. As a result, the sampling scheme is a cluster sample of mailpieces. This design is reflected in the estimated variance of the on-time performance.

Each USPS facility maintains its own list of collection box locations. USPS Headquarters requires that each city in EXFC notify Price Waterhouse whenever there are changes to the list. The USPS contract with Price Waterhouse requires that induction points be varied each quarter. USPS Headquarters occasionally audits the variation of drop points to ensure it is adequate.

The flow of seeded EXFC pieces through the mailstream is transparent to USPS employees; no data collection for EXFC is done by the Postal Service. Mail for EXFC is fabricated to look like "normal" mail. No designation of "USPS," "Price Waterhouse," "test mail" or any other markings are on the mail covers which could prompt preferable handling by postal employees and bias service performance results. Return addresses, which are either handwritten or typed in one of a variety of type fonts are routinely changed as well.

A separate panel of "reporters" has been recruited by Price Waterhouse across the country to receive seeded mail. When reporters receive seeded pieces, they call a toll-free number to report their reporter ID, the ID number(s) on the piece(s) received, and the date(s) of receipt.

Reporters, who are almost entirely volunteers, are screened by Price Waterhouse in advance to ensure no one in their household is employed by the Postal Service, by competitors of the Postal Service, or by media organizations. Reporters must also confirm during the screening process that they are able to identify the exact delivery day of mail. Between 90 and 95 percent of the reporters are household reporters. The remainder are small

business reporters. A small percentage of the reporters have Post Office Box addresses. USPS requires that reporters be geographically dispersed in each of the 86 cities.

The burden on reporters to report EXFC test mail is low. Reporters receive 3 - 4 pieces of test mail per week on average, and the reporting process for each call takes less than one minute. Operators are available 24 hours a day, 7 days each week to receive phone calls from EXFC reporters.

Reporters cannot report receipt of test pieces on Sundays or postal holidays, pieces which were not intended for them as recipients, nor receipt dates prior to the dates the pieces were entered into the mailstream. Operators repeat receipt information to reporters for confirmation before it is entered into the data base. Transmission of all receipt information to Price Waterhouse central computers occurs nightly.

Each month reporters return test mail pieces to Price Waterhouse, whereupon they are organized by destination city and archived. From time to time, archived pieces are retrieved for USPS diagnostic analysis.

The dedication and accuracy of the droppers and reporters is critical to the success of EXFC. Price Waterhouse and USPS use numerous quality control procedures to detect droppers who do not drop mail on the scheduled date and/or reporters who do not report receipt of seeded mail accurately. A 1991 paper describes many of the EXFC quality control procedures in detail.

For droppers, Price Waterhouse quality control checks include monitoring response patterns of test pieces within bundles. If all pieces in a bundle are reported received after the service standard, for example, the dropper will be contacted by Price Waterhouse to ensure the drop was made at the time reported on documentation they completed at the time of the drop. Also, droppers are not paid until two weeks after their scheduled drop dates to ensure the pieces have been reported.

For reporters, Price Waterhouse quality control checks include monitoring reporter responses to detect unusual or irregular patterns. To detect irregularities, reporting patterns are compared to the expected reporting dates of seed pieces mailed to them. Irregularities are also detected by comparing reporting patterns to other reporters in the

same city. Further, a sample of reporters are checked by USPS each quarter by handing USPS letter carriers pieces addressed to reporters, requiring that they be delivered to the reporters on specific delivery days, and monitoring the reported receipt dates for accuracy.

Typically, only a few of the 86 cities have an overnight service commitment to a particular destinating city. This fact, along with the restrictions on the maximum number of pieces per bundle and the restriction that bundles contain mail for all commitment areas, forces more overnight commitment pieces to be in bundles than two-day or three-day commitment pieces. Due to the increased clustering of overnight pieces, more overnight pieces than two-day or three-day pieces are needed to assure that service performance estimates for all three commitments have the same precision.

In the summer of 1991, a joint effort between USPS and Price Waterhouse was conducted to improve the sample design of EXFC. Modelling work concerning sample size, configuration of bundles, allocation of mail pieces to destinating cities, and variance estimation was included in the joint effort. From this work the current USPS requirements call for a minimum of 3079 pieces to be reported for each city from its overnight commitment area each postal quarter. A minimum of 711 pieces must also be reported in every city from each of its two and three-day commitment areas. As a result, service performance on about 1,800,000 seeded pieces of First-Class Mail is reported annually.

Through Price Waterhouse's continuous attention to and communication with EXFC reporters, the percentage of test mailpieces whose service performance is reported is very high, about 90%. As a result, quarterly performance scores for EXFC cities are reported unweighted.

The quarterly estimate of on-time performance from an s-day commitment area (s= 1, 2, or 3) to city c is:

$$P_{sc} = \frac{\text{\# of pcs. reported received on-time in city c from the s-day svc. commitment area}}{\text{\# of pcs. reported received in city c from the s-day service commitment area}}$$

The variance of this estimate is

approximated by:

$$v(p_{sc}) = \frac{\sum_{k=1}^{B_{sc}} m_{sck}^2 (p_{sck} - \bar{p}_{sc})^2}{B_{sc} (B_{sc} - 1) \bar{m}_{sc}^2} \quad (1)$$

In formula (1),

$B_{sc}$  = Number of bundles which contain pieces for city c from its s-day commitment area.

$m_{sck}$  = Number of pieces destined for city c in bundle number k.

$\bar{m}_{sc}$  = Mean value of  $m_{sck}$  over all  $B_{sc}$  bundles.

$p_{sck}$  = Service performance of the  $m_{sck}$  pieces destined for city c in bundle number k.

To compute performance scores for higher geographic levels such as regions and the nation, additional weighting factors must be included. For a particular service commitment area, the EXFC sample design requires the same minimum number of reported pieces in each of the 86 cities. For a service performance estimate of, say, a region to reflect all mail in the region, it must account for the variation in destinating mail volumes among cities in the region.

The estimated variance of a higher level geographic estimate incorporates the weighting factors representing the different mail volumes. It also accounts for the covariance of performance of pieces in bundles destined for two different cities in the same higher level geographic area which have the same service commitment.

By illustration, for a regional estimate to the Northeast Region from its three-day commitment area, the variance estimate includes the sample covariance of service performance for bundles dropped in Los Angeles which contain pieces for, say, both Boston and Albany.

Generally, the service performance estimate from a service commitment area s to a geographic roll-up area r is:

$$P_{sr} = \sum_{c \in r} W_{sc} P_{sc}$$

where the summation is over all cities  $c$  in roll-up area  $r$ , and the value  $W_{sc}$  is the First-Class Mail volume, derived from USPS volume estimation surveys, which destinate in the postal division represented by city  $c$  from its  $s$ -day service commitment area.

The estimate of the variance of the service performance for  $p_{sr}$  is:

$$v(p_{sr}) = \frac{1}{(\sum_{c \in r} W_{sc})^2} \left( (\sum_{c \in r} W_{sc}^2 v(p_{sc})) + (\sum_{c \in r} \sum_{c \neq d} W_{sc} W_{sd} \text{cov}(p_{sc}, p_{sd})) \right)$$

In this formula,  $\text{cov}(p_{sc}, p_{sd})$  is the sample estimate of covariance of service performance for cities  $c$  and  $d$  in the geographic roll-up area, and  $v(p_{sc})$  is as defined in formula (1).

The current EXFC measurement system provides sampling margins of error averaging about 3 percentage points on quarterly estimates of on-time delivery for each city/service commitment area combination. Sampling margins of error on quarterly regional estimates are less than 1 percentage point; for national level estimates they are less than one-half of one percentage point.

Table 1 provides national quarterly estimates of service performance from the EXFC measurement system for each postal quarter since system implementation in summer 1990.

TABLE 1  
EXFC NATIONAL SERVICE PERFORMANCE  
Percent Reported Received On-Time

	Service Commitment		
	Overnight	Two Days	Three Days
Summer 1990	81	74	81
Fall 1990	81	74	81
Winter 90-91	80	73	77
Spring 1991	83	80	83
Summer 1991	83	78	82
Fall 1991	83	77	81
Winter 91-92	83	74	76
Spring 1992	84	76	81

CUSTOMER SATISFACTION INDEX (CSI)

The EXFC measurement system provides the

USPS data on how often it delivers First-Class Mail to its customers within USPS service standards. However, it does not indicate how customers perceive the quality of that service, of service for other classes of mail, and of service from an overall perspective. In order for the USPS to become a more effective service organization, it needs to know its customers' expectations in mail delivery and in all other aspects of the services it provides. To determine these expectations, the USPS implemented the Customer Satisfaction Index (CSI).

The CSI is a mail-out, mail-back opinion survey of household postal customers designed to provide USPS field managers the ability to assess customer satisfaction at an operational and actionable level each postal quarter. The CSI is conducted for USPS by Opinion Research Corporation (ORC), which was awarded a three-year contract to measure household customer satisfaction with the USPS in April 1990.

The CSI asks household customers for their opinions on specific aspects of USPS operations such as mail delivery, post office lobby and property, telephone experience and window clerks. Other questions are more global in nature, such as value for the price and overall performance. In total, household customers are asked to provide their opinions on overall satisfaction and up to 37 additional questions. Household customers provide their opinions using a seven point numeric scale which corresponds to a five point adjective scale; Excellent, Very Good, Good, Fair, and Poor.

The CSI questionnaire asks customers for opinions based on their experiences with USPS from the past three months. This is done to ensure customer responses reflect recent experience with USPS and to allow the CSI to be more effective as a tool for measuring change.

Data from the CSI survey are provided quarterly to USPS by ORC for each Management Sectional Center (MSC). An MSC, one of the hierarchical structures of the USPS, covers all post offices with specific three digit ZIP Code prefixes. There are about 170 MSCs which together account for every three-digit ZIP Code prefix in the continental U.S., Alaska, Hawaii, Puerto Rico, and the Virgin Islands. The MSCs are grouped into 73 Divisions, the Divisions into 5 Regions, and the Regions into the

Nation. (Note: Although current in summer 1992, this hierarchical structure changed in late 1992 due to a USPS reorganization.)

In contrast to EXFC in which all 86 cities were included in the system from the outset, the CSI was phased in over time. In the first postal quarter of implementation, summer 1990, 40 MSCs were included. In fall 1990, 45 more MSCs were added to the CSI. In winter 1990-1991, 35 more MSCs were included. In spring 1991 all remaining MSCs were added.

CSI data are used by local managers to determine what changes are needed in their operations to improve the level of customer satisfaction in their area. In order to provide CSI data to local managers in a meaningful way, several phases of data analysis are conducted.

First, during the pilot test of CSI, factor analysis was conducted on the CSI response data to determine groups of questions which represent shared variation and to increase the interpretability of the factors. Ten factors were determined. These represented questions related to window services, carrier services, lobby services, P.O. Box services, telephone experience, complaint handling, responsiveness, Post Office property, reliability, and forwarding/change of address. These ten factors have been kept constant for each MSC every postal quarter.

Principal component analysis is conducted each postal quarter using the output of the factor analysis. The principal component analysis produces scores which are mutually independent, and from which meaningful multiple regressions can be conducted. Multiple regressions are performed on the principal component scores to determine how the factors, and the individual questions which make up the factors, correlate with overall satisfaction. Finally, a measure of "improvement potential" for each question is developed using the standardized weight derived from the regression of that question and its parent factor with overall satisfaction, and the satisfaction level of customers for that question.

For example, if two questions were equally correlated with overall satisfaction and customer satisfaction with the first question was lower than the second, the improvement potential would be higher for the first question than for the second. The relative values of the improvement potentials provide

local managers information they can use to allocate resources with the purpose of increasing overall satisfaction.

For the first three postal quarters that MSCs are in CSI, not enough MSC-specific data are available to develop stable improvement potentials. During this time, national data are used to develop improvement potentials. Once MSCs have been in CSI for four postal quarters, improvement potentials are developed using MSC-specific responses.

In CSI, address lists form the sampling frame. Addresses are randomly selected from the frame each postal quarter. USPS requires that ORC not include the same address in CSI more than once per year.

The precision requirement which determines the sample size for each MSC for CSI is that the 95% confidence interval around any estimate of satisfaction be no wider than three percentage points. A standard calculation indicates that at least 1067 responses per MSC per quarter are needed to meet this requirement. In addition to this MSC requirement, USPS requires that at least 50 usable responses be obtained from each three-digit ZIP Code area within an MSC. With all MSCs in CSI, USPS obtains customer opinions of the service it provides from over 720,000 households per year.

As in most mail-out, mail-back surveys, the non-response rate in CSI is high. This has two effects. First, sufficient questionnaires must be mailed in each MSC to ensure 1067 usable responses. Second, non-response follow-up is required.

ORC conducts non-response follow-up and analysis in each quarter for a sample of MSCs. ORC uses ANOVA procedures to detect and monitor changes in non-response differences across MSCs and across postal quarters. A small amount of demographic information is solicited on the CSI questionnaire. To detect non-response effects due to population demographics, USPS has purchased a tape of census demographic data, and plans to conduct chi-square analyses of response-demographic contingency tables.

In addition to MSC level estimates, CSI estimates are generated for geographic roll-up areas. Roll-ups to higher geographic levels are derived by weighting the MSC data by estimates of household counts in each MSC. Table 2 provides the percentage of households which rated the overall performance of the USPS

as Excellent, Very Good, or Good as measured by the CSI.

TABLE 2  
CUSTOMER SATISFACTION INDEX NATIONAL SCORES

Percentage of Households Rating USPS Overall Performance Excellent, Very Good, or Good

Fall 1990	87
Winter 90-91	88
Spring 1991	85
Summer 1991	85
Fall 1991	85
Winter 91-92	87
Spring 1992	87

#### FINANCIAL INCENTIVES AND EXFC, CSI

Measurement programs do not produce customer satisfaction; people do. The USPS must use data from external measurement systems to improve customer satisfaction with postal products and services. To help achieve this, the USPS has developed financial incentives for management and labor which reward improvements in independently-measured performance and customer satisfaction.

On the management level, improvements in EXFC and CSI scores are now among the factors on which directors of field offices are rated. On the labor level, a new program called Striving for Excellence Together (SET) was instituted in 1992. About 221,000 members of the National Postal Mail Handlers Union,

National Rural Letter Carriers' Association, and several USPS management associations are participating in the SET program nationally. In the SET program, every participating employee receives an annual payment between \$0 and \$1190 based upon three factors; the national financial performance of the USPS, the ranking of their division among the 73 USPS divisions in CSI overall satisfaction, and the amount of improvement in CSI overall satisfaction their division experienced compared to the previous year.

The U.S. Postal Service is, more than ever, listening to the voice of its customers. It is confident that by continuing to do so it will become the best all around provider of mailing services.

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