EFFECTIVENESS MEASUREMENT

FOR THE

CONSUMER FRAUD PROTECTION BRANCH

A FINAL REPORT

Robert H. Andras

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PREPARED FOR
THE BUREAU OF CONSUMER AFFAIRS
BY
ROBERT H. ANDRAS
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SUMMARY CONCLUSIONS and RECOMMENDATIONS

Conclusions

A Preliminary Report recommended estimated economic loss and compliance with regulations as the indicators which could best answer management requirements for an effective-ness measurement system. Reaction to the Preliminary Report favoured, in general, the use of these two indicators as the basis for effectiveness measurement. Several problems not-withstanding, it is clear that effectiveness indicators which go beyond the measures now in place are desirable and feasible.

Previous studies support the view that measure-ment of economic loss is basic to the assessment of program effectiveness in the Consumer Fraud Protection field, and that economic loss can be determined on a survey basis by FOS inspectors.

From survey data, and with supplementary information, the following indicators can be calculated:

- pre-inspection, post-inspection and no-inspection violation rates;

- potential and actual "dollars-at-risk" to the consumer, as well as reductions in dollars-at-risk due

to Branch activity;

- economic loss prevented by direct and indirect actions of the Branch;

- economic loss to the consumer which occurs in spite of Branch activity.

      The different indicators which are available can be grouped into options according to the data requirements implied:

i) Operating data, no survey - Estimates of violation rates and dollars-at-risk can be produced from operating and supplementary data alone. These estimates will be of limited reliability because of biases in the operating data.

ii) Operating data, with an economic loss estimate - A small sample, to determine the average economic loss associated with violations, can be carried out in the course of regular inspections. This will permit calculations of the indicators "potential economic loss to consumers before violations found have been corrected", "loss directly prevented by inspection activity", and "loss to the consumer after violations found have been corrected"; in addition to the indicators in option i. The same caution applies here however respecting limited reliability of these

indicators.

iii) A full-scale survey - will allow all of the calculations
proposed herein to be made.

The additional cost of a full scale survey
is not unreasonable in light of the completeness, usefulness
and reliability of indicators which it makes possible. This
is the most attractive of the available options.

Recommendations

It is recommended that:

i) an effectiveness measurement system should be
implemented for the Consumer Fraud Protection activity
based on the following indicators:

- violation rates
- "dollars-at-risk"
- economic loss prevented
- economic loss to the consumer,

the necessary data to be obtained through regular surveys
conducted at retail by FOS inspectors (option iii described
herein);

ii) the provisional statement of Consumer Fraud Protection
objectives adopted in the Preliminary Report, that is

"to reduce the incidence of economic loss
to the consumer;
to increase the breadth and effectiveness
of consumer choice, and;
to promote the interest of the consumer in
the market place and in the formation of
government policy;

should serve for the next stages (detailed design and implementation) of the development of the effectiveness measurement system;

iii)   the requirements of senior management should be stressed during the final design and implementation stages, although continued recognition will be given to the information needs of operational managers;

iv)   Planning and Coordination should assume immediate responsibility for overseeing further development and implementation of the system, to ensure a senior management orientation, and to facilitate the eventual extension of the system throughout the Standards Directorate and the Bureau of Consumer Affairs;

v)   this task will require a quantitative analyst, reporting to the Director, Planning and Coordination, and working with CFPB and FOS personnel to complete design and implementation of the system;

vi)   the quantitative analyst should concentrate initial efforts on the following tasks:

- assisting CFPB personnel in selecting the group of violations and products to be tracked by the effectiveness measurement system;

- designing the effectiveness measurement
survey, including determination of the data to be obtained,
development of a procedures manual and a training strategy,
and selection of a data-processing format;

- developing estimates of total sales for
products selected;

- designing a reporting system for operating
data as required.

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1.   INTRODUCTION

This is the second of two reports on effectiveness measurement for the Consumer Fraud Protection Branch.

A Preliminary Report[1] considered the effectiveness measurement needs of managers at different levels, and evaluated the usefulness of various indicators in meeting those needs. Estimated economic loss and compliance with regulations were proposed as the indicators which could best answer management requirements for an effectiveness measurement system.

This Final Report examines the needs of management in light of reactions to the Preliminary Report, gives additional explanation of the proposed indicators, provides guidance toward the construction of an effectiveness measurement system, and suggests extensions of the system which might eventually be implemented.

The Report does not offer a fully realized effectiveness measurement system. The detailed work of

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[1] ANDRAS, R.H., "Effectiveness Measurement for the Consumer Fraud Protection Branch - A Preliminary Report", August 1976.

design and implementation can only be carried out with the help of those who have operational responsibility for the activities of the Consumer Fraud Protection Branch. Problems and issues will arise during the implementation stage which are not foreseen here. It is hoped however, that the important issues are dealt with, and that possible obstacles to implementation of the system are neither underestimated nor overlooked. The Report should permit managers to make an informed choice as to the effectiveness measurement system which will serve them best, and will allow them to take the initial steps necessary to put that system into place.

2. BACKGROUND

The need for an effectiveness measurement system for Consumer Fraud has long been recognized. Two major studies of effectiveness measurement have preceded this present Report. These studies focussed on agricultural retail product inspection, rather than on the whole range of Consumer Fraud Protection activities. However the concepts developed are easily extended to other activities in the fraud area.

The first of the studies was carried out for the Department of Consumer and Corporate Affairs by Operations Research Industries (ORI) Ltd. of Ottawa in 1968, and was titled "Benefit-Cost Analysis of Retail Food Inspection Activity".[1] The study was a "one-shot" evaluation, not intended to provide operational guidance on the basis of regular program effectiveness measurement. It did however develop much of the methodology which any effectiveness measurement system will rely on.

A second study was done over several years (1972-1975) by the Department's Management Consulting Division.[2] The study was carried out under the general

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[1]OPERATIONS RESEARCH INDUSTRIES (ORI) LTD., "Phase III: Benefit Cost Analysis of Retail Food Inspection Activity", July 1968

[2]MANAGEMENT CONSULTING DIVISION, Department of Consumer and Corporate Affairs, "Retail Products Agricultural Information System", August 1974

title "Agricultural Products Information System". Most of the work involved the design of effectiveness indicators for the retail inspection activity.

The two studies are summarized later in the Report. It is worth noting however that, although both were costly, thorough, and acknowledged to have been well done, they do not appear to have had much impact on the Branch. The methodology was appropriate to a regular effectiveness measurement system. No such system has been developed.

It is idle to speculate on the reasons for the lack of impact of these studies. Looking at the performance measurements which are now in place however, it appears that inspection and other data produced by day-to-day activities in the field are considered to be sufficient for operational managers, who have not been motivated therefore to take a comprehensive approach to the development of an effectiveness measurement system. Since operational managers control, in large part, the flow of all information from the field to the senior levels of the Department, their willing or unwilling cooperation must be obtained if the interests of senior managers are to be respected and their information needs met.

3. The PRELIMINARY REPORT

The main points made in the Preliminary Report[1] are:

i) Some performance measurements are in place for the Consumer Fraud Protection Branch. However, indicators have not yet been established to answer the needs of senior management. An effectiveness measurement system to do this is desirable and feasible;

ii) There are a number of competing statements of the objectives of the Consumer Fraud Protection activity. The following statement of Branch objectives is adopted provisionally for the purpose of designing an effectiveness measurement system:

"to reduce the incidence of economic loss to the consumer; to increase the breadth and effectiveness of consumer choice, and; to promote the interest of the consumer in the marketplace and in the formation of government policy";

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[1] ANDRAS, R.H., op. cit.

iii) Possible indicators to measure effectiveness against these objectives are economic loss, compliance with regulations, consumer complaints, and a composite index incorporating different aspects of the fraud problem.

It is recommended that the level of attainment of the "reduction of economic loss" objective can be measured directly. Compliance is the best indicator of attainment of the "consumer choice" objective. The "consumer interest" objective cannot be expressed or evaluated quantitatively, but is necessary to a complete statement of the concerns of the Branch.

iv) Both economic loss and compliance should be assessed by survey at the retail level using FOS personnel. Economic loss to the consumer can be expressed as the product of the rate of occurrence for a given violation in a particular good, the average economic loss (per unit or per dollar of sales) for that violation, and the total sales (units or dollars) of the good, yielding estimated economic damage for each type of violation in each good, and then in aggregates as required. The effect of the Consumer Fraud Protection activity in bringing about reduction in economic damage and in violation rates can then be assessed from period to period.

Worst drawback to this is the fact that inspectors could control the data - verification is not possible.

4. <u>REACTION to the PRELIMINARY REPORT</u>

Reaction to the Preliminary Report favoured, in general, the conclusion that reduction of economic loss to the consumer and compliance with regulations are the best available indicators of program effectiveness. Managers at the operating level were sceptical that economic damage to consumers could be estimated with sufficient reliability to be useful. Senior managers suggested that the compliance indicator does not go far enough in conveying the nature and extent of fraud damage resulting from violations not directly associated with economic loss, and that an attempt should be made to estimate dollar losses in these areas as well.

More specifically, the following problems were identified in consultations on the Preliminary Report (brief comments are offered, and some of the issues will be dealt with in detail further on in this Report):

i) Practicability - "It is not possible to measure economic loss with any accuracy".

Most operational managers expressed support for the idea of measuring economic loss in principle, but questioned the accuracy of results which could be obtained in practice. The indicator, as proposed, does not relate

the total, exact amount of damage suffered by the consumer
as a result of fraud in the economy. It is designed to
capture, with <u>reasonable</u> accuracy, changes in economic
loss due to particular violations in a selected group
of products over some base period. The computations
involved are simple. The data required is available
through surveys. The feasibility of collecting this data
has been demonstrated in a pilot study[1] which will be
discussed later. With reasonable care in sample design,
economic loss data can be obtained without undue difficulty.

ii) Time - "It will take too long for inspectors to measure
economic loss and compliance on a survey basis. Time spent
surveying is time lost for enforcement".

A Pilot Project[2] carried out by MCD in 1974, described later
in the report, found that survey measurement of economic loss
added to normal inspection time by only about 10%. Since
surveys are themselves inspections, and since they would be
carried out quarterly at most, the reduction in time available
for regular enforcement would be small. The system requires
little of the operational data now gathered and processed.
To the degree that the new system could eliminate or replace
some of this data, its net cost in terms of enforcement
time would be further reduced.

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[1] MANAGEMENT CONSULTING DIVISION, op. cit.

[2] ibid

iii) External Factors - "The economic loss and compliance indicators are affected by so many factors beyond the control of the Branch, that it is not fair to use them as the basis for evaluating program performance".

Among external factors cited are the actions of other agencies and levels of government, cyclical and seasonal fluctuations in product quality, distance from producers to markets, and the proportion of imports to domestically produced goods.

It is true that the indicators, as proposed, do not immediately allow for isolation of the Branch's impact on fraud. Two comments can be made. The first is that, with time and effort, evaluators can focus on measurable changes effected by the Branch. Experience in using the indicators, together with appropriate analysis, will reveal "normal" levels of economic loss and compliance to be expected, and will permit the attribution of abnormal changes in the indicators to Branch actions or to external causes.

The second comment is on management in general. Managers must not be too ready to accept any division of their working world into "external" factors, and factors which they can control. Managers may safely assume that they are responsible for consumer welfare as it is affected by

fraud, with only such general boundaries as are implied by the programs they administer. If external factors affect the indicators, and if indicators and objectives are correctly related, then such steps should be taken as are necessary to bring the external factors progressively under the direct or indirect control of the Branch. Indirect measures include consultation and cooperation with producers, distributors and other government agencies. Levels of tolerance will be accepted where the Branch can have only a small impact on a factor which causes fraud (e.g. seasonal deterioration in the condition of agricultural products), but managers cannot absolve themselves of their responsibility to look for new ways to increase control over factors affecting the success or failure of their programs. The indicators will suggest whether the mandate of the CFPB should or should not be expanded, whether direct or indirect actions are most productive of results, and which external factors should be brought under some control.

iv) Compatibility - "How can these indicators be used as a basis for comparing effectiveness among Branches".

Not all of the objectives of activities of the Bureau of Consumer Affairs will be measurable in dollar terms. How will the compliance indicator relate to measurements in other branches? What if some indicators are more reliable

than others? These kinds of concerns can only be
met as the system is implemented, refined, and related
to other similar systems over time. A start must be
made. However, it is likely that the system proposed for
Fraud will be compatible at least with effectiveness
measurement elsewhere in the Standards Directorate,
where basic concerns also are with either economic damage
to the consumer (Electricity and Gas, Weights and
Measures Divisions), or compliance with regulations,
appropriately weighted to take account of the varying
seriousness of violations (Product Safety Branch).

v) Products - "There are an infinite number of products
on the market. Which ones should the indicators be based
on?"

Some reasonable group of products will be selected
arbitrarily. Each Division might select 50 products on
the basis of ongoing importance. The work of the Consumer
Fraud Task Force, discussed elsewhere, should aid Divisions
in making their choice.

vi) Previous Attempts - "Similar systems proposed for
activities of the Consumer Fraud Protection Branch have
not been accepted".

Several operational managers suggested that the attempt
had been made to implement measurement of economic loss

by "ramming it down our throats". This complaint is difficult to deal with. It must be recognized that the information requirements of senior management may be different than those perceived at other levels. What senior managers consider to be useful, operational managers may not. In stating their preferences for a particular system, and after reasonable discussion and explanation, senior managers must finally be taken at their word.

vii) Compliance - "As proposed, the compliance indicator does not permit comparisons to be made between programs and products".

For some kinds of programs (especially in the areas of marking, labelling and advertising), it is difficult to estimate economic impact. With research, it might be possible to assess the economic impact of some of these violations. However it would be dangerous to produce a dollar-indicator too hastily. As a beginning, all violations can be converted into a "dollars-at-risk" indicator, which expresses the upper limit of direct economic damage due to fraud. This will be explained in greater detail further on in the report.

viii) Objectives - "The objectives proposed for the Branch in the Preliminary Report could be better stated".

Alternative statements of the objectives were suggested, but none of these alter materially the Branch's goals as expressed in the Preliminary Report. The Preliminary Report's provisional statement of objectives will serve for the next stage of development of the effectiveness measurement system.

One important observation was made however, concerning an implicit producer-oriented objective of the Branch. Many regulations in grading, marking and labelling, advertising and other fraud areas have, as a primary or a secondary purpose, the effect of fostering fair competition among producers and sellers. Fair competition is to the economic advantage of the consumer. Measurement of the Branch's economic impact in terms of a "fair competition" objective is a fascinating and difficult problem, but one which is beyond the scope of this Report, particularly since producer-oriented action is secondary to the Branch's accepted role.

5. OTHER APPROACHES

Because effectiveness measurement for the
Branch has been studied carefully, it is worth examining
previous efforts which have been made in this area.

A. The ORI Report[1] - In 1968, Operations Research Industries
(ORI) Ltd., under contract to the Department, evaluated
the benefits and costs of the retail food inspection
activity. The stated objective of Retail Food Inspection
at that time was "to increase the confidence of consumers
in Canadian agricultural products". ORI interpreted this
to mean that consumers should be protected from economic
loss. ORI recognized the occasional detection of health
hazards as a by-product of the inspection activity. Their
method involved measuring the benefits of preventing economic
damage to consumer, weighed against the direct or indirect
costs of the inspection activity. No attempt was made to
quantify the health contribution, though this was assumed
to enter positively as a benefit.

Using operating and survey data, ORI calculated benefits
and costs as follows (some of the procedures are simplified
for expositive purposes):

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[1] OPERATIONS RESEARCH INDUSTRIES (ORI) Ltd., op. cit.

i) Direct benefit - An estimate was made of the economic loss resulting from different violations in products. The likelihood of occurance of a violation in a product, and the total volume of that product inspected in a given period, were obtained from operating data. An estimate of the potential economic loss to consumers which is prevented directly through the inspection activity is obtained by multiplying these three data elements. Direct benefit for each violation and product type is

$$V_{ij}^a T_i L_{ij}$$

with

    i - type of product

    j - type of violation

V_{ij}^a - violation rate for the jth violation in the ith product at the prevailing frequency of inspection

T_i - total of the ith product inspected (dollar value)
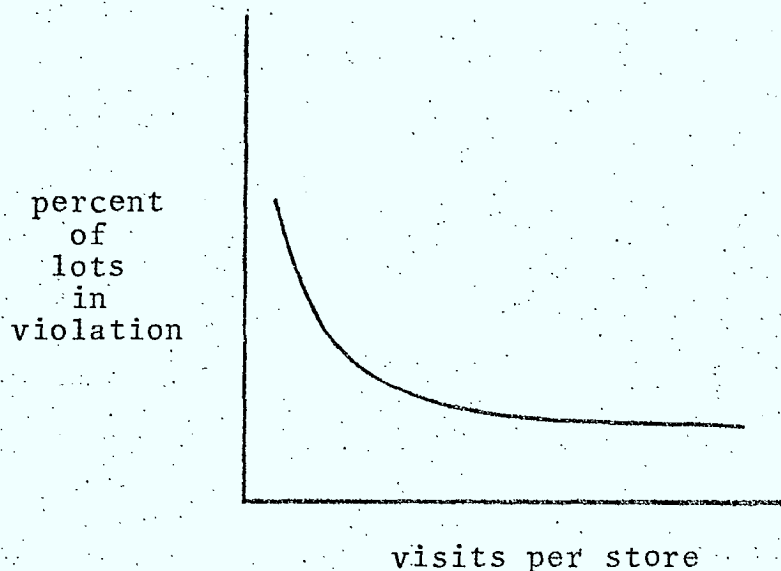
L_{ij} - average economic loss caused by the jth violation in the ith product (per dollar value in violation)

and for all violations and product types is -

$$\sum_i \sum_j V_{ij}^a T_i L_{ij}$$

ii) Induced benefit - Stores in areas with varying inspection coverage were evaluated, to relate inspection frequency and fraud violation rates. From this data, an

"infraction curve" was estimated, e.g.:

Induced benefits were then calculated as the product of the decrease in the violation rate as inspection frequency goes from zero to its actual level, the total sales of a commodity, and the economic loss per violation.

Induced benefit for each violation and product type is

$$(V_{ij}^o - V_{ij}^a) S_i L_{ij}$$

with

V_{ij}^o — violation rate for the jth violation in the ith product when the frequency of inspection is zero (i.e. intercept of the infraction curve)

S_i — total of the ith product sold (dollar value)

and for all violations and product types is:

$$\sum_i \sum_j (V_{ij}^o - V_{ij}^a) S_i L_{ij}$$

iii) Total benefit - Direct and induced benefits are then summed.

iv) Direct cost was calculated as the sum of costs associated with the inspection function, department-allocated administrative costs, other government-allocated costs, and private sector costs (the latter consisting of time and commodity values lost in correcting violations found by inspectors).

v) Induced (private sector) costs were assumed to be a constant proportion of induced benefits.

vi) Total cost is the sum of direct and indirect costs.

vii) Net benefits were then calculated.

B. The MCD Study[1] - Between 1972 and 1975, the Bureau of Management Consulting (DSS), and then the Management Consulting Division of the Department of Consumer and Corporate Affairs did work on the design and implementation of an Agricultural Products Information System. The MCD work relating to effectiveness (which was the major

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[1] MANAGEMENT CONSULTING DIVISION, op. cit.

part of the study) started from the observation that

"There is a lack of functional information which
can relate the output of the activity to the program
goal in order that effectiveness can be monitored...

The consequence is that little in the way of meaning-
ful information flows to senior management levels.
This means that it is extremely difficult for these
levels to properly administer or support the activity
in the achievement of its goal...

To resolve this present lack of functional information
it is proposed that an indicator of the potential
economic impact to the consumer be developed".[1]

MCD went on to design a method for measuring economic loss
which closely resembled the one developed by ORI. A pilot
project was carried out in Manitoba in February, 1974.
Field inspectors determined the incidence of different
types of violations in agricultural products. They estimated
the economic loss associated with each violation in each
product type. Violation rates were compared for an area
with a high frequency of inspection (Winnipeg) and for
areas not subject to regular inspection (Dauphin and

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[1] MANAGEMENT CONSULTING DIVISION, "First Progress Report, Agric-
ultural Products Information System", July 1973, pp. i, ii.

Thompson). With these data, direct and induced benefits were derived as in the ORI study.

Two MCD findings are of general importance:

i) "From the information gathered during this pilot project it can be concluded that it is possible to have field personnel gather data during the inspection process...upon which the potential economic loss associated with infractions can be calculated".[1]

ii) "The additional time required to provide the data sought in the pilot was found to be about 10% of the time normally required to complete an inspection report. This can be translated into about .7% of the total time spent by inspectors on activities under the program".[2]

C. The Consumer Fraud Task Force - The Consumer Fraud Task Force takes a different approach to the determination of priorities and the measurement of program effectiveness. The objective, "to optimize consumer welfare" is identified.

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[1] MANAGEMENT CONSULTING DIVISION, op. cit. p.9.

[2] ibid, p.9.

This single, overall objective suggests a single
indicator to measure attainment of the objective. An
index is constructed which rates "product categories"
according to areas of concern to the Branch. The com-
ponents of the index for product categories are:
consumer needs (essentially, percent of total consumer
expenditure on that product category); consumer wants
(areas of concern as perceived by consumers themselves);
market-place environment (aspects of market structure
which contribute to the likelihood of fraud); consumer
demographics (income characteristics of purchasers);
consumer effectiveness (reported difficulties weighted by
unit cost); and consumer representation (priorities
according to the Consumers' Association of Canada). The
index is well constructed and will accomplish a useful
ranking of product categories by priority.

However, it is difficult to see how the index can be used
for effectiveness measurement. The Task Force proposes
that effectiveness measurement be based on the rate of
compliance, multiplied by a product category's index
number. There are several problems with this:

- except for the rate of compliance, no distinction is
made among the different types of violations. One violation
is of greater consequence to the consumer than another.

To reflect differences in the seriousness of violations, a new index would have to be constructed.

- the index is ordinal. It conveys the ranking of products. If factors which affect the index change evenly for all products, or for any two products being compared, the relative positions of the products will not change. Consumer expenditure might increase in every category by 50%, and the index numbers would remain the same, although for a given compliance rate, dollar damage to the consumer would presumably have also increased by 50%. Similarly, if for example, complaints from consumers or from the Consumers' Association of Canada doubled for all products, the index numbers would not change;

- the index number sweeps a large amount of information "under the rug", information which managers can use to assess effectiveness directly before so much processing has taken place. If compliance and economic loss do not go far enough in providing managers with effectiveness information, the index may go too far in replacing managers' judgement with a single, all-encompassing measurement.

The index proposed by the Task Force is a useful tool for examining, periodically, the priority which different categories of products should have. It is difficult to see, however, why this index should be used as the basis of effectiveness measurement when more exact and straightforward indicators are available.

6.   The METHOD

        The Preliminary Report proposed measuring

economic loss and compliance with surveys, carried

out regularly by FOS inspectors at the retail level.

FOS inspectors themselves must do the survey, because

they alone are trained in the technical aspects of

fraud detection and are otherwise equipped and mandated

for this task. Surveys are conducted at the retail level

because the measured incidence of fraud is then the same as

for the consumer.

        Why is it necessary to conduct a survey?

Operating data is too easily biased by inspection pro-

cedures. Controlled survey results are required to

overcome the following kinds of problems:

- operating data will over-report the incidence of fraud,

because inspectors respond to known problems and complaints.

At the same time, violation rates based on operating data

are downwardly biased because regularly inspected

stores   will have lower rates than stores in areas which

are not inspected at all. The net effect of these two

sources of bias will vary. To establish real violation

rates as typically experienced by consumers, data must be

obtained for a store population suitably controlled for

inspection frequency, but random with respect to any

particular fraud problem.

- since performance is being evaluated, inspectors may tend to operate in such a way as to under-report fraud which occurs and to over-report fraud prevented.

The steps in the measurement process are:

i) Selection of products and violations to be measured. Divisions are confronted with an infinite number of products. Some arbitrary choice of products is made for effectiveness measurement purposes. The products selected must be regularly available and must be of ongoing importance to the Branch.[1]

ii) Selection of a store sample. For each survey, a group of retail stores is selected, reflecting the size and frequency-of-inspection characteristics of the actual store population.

iii) FOS inspectors then conduct inspections in the selected stores to determine violation rates for given regulations and products, and to estimate the economic loss associated with each violation. Inspectors record the units inspected for each type of product, and the number of units found in violation overall and for each kind of violation.

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[1] The index being developed by the Consumer Fraud Task Force can be very useful here.

Where there are violations, the value of an appropriate unit of product is recorded before any violations have been corrected, and then an estimate is made of its value after it has been reconditioned to correct the infraction. This estimate is made for each type of violation, and for violations overall in each product type. Since violations occur simultaneously, adding up the loss caused by individual violation types overstates total economic damage. On the other hand, a measure of the loss due to each type of violation is desirable.

There are a number of detailed questions which will have to be answered before surveys can be carried out. What if, after regrading, a product is in a category which is not marketed, and therefore for which no price is established? How should various marking violations be dealt with? To ensure consistency of results, a manual must be prepared and training sessions conducted to set procedures for surveying and for estimating economic loss. (After a training session, there were no serious difficulties encountered by inspectors during the Pilot Project in Winnipeg in 1974).

The necessary frequency of surveys will have to be determined. To capture emerging problems quickly, quarterly surveys are advisable. In the system's first year, both economic loss and violation rates should be surveyed quarterly. If it is found that average economic loss per unit in violation does

not change greatly over time for a given violation in a given product (as would be expected), it might be reasonable to survey economic loss annually rather than quarterly.

iv) Individual survey reports provide the following information:

- store size, location, etc.
- frequency of inspection
- units inspected in the survey
- units in violation in the survey
- economic loss per violation

From other sources, data is also obtained for:

- total sales (Statscan, trade information)
- units inspected in regular inspections (FOS operating data)
- units in violation in regular inspections (FOS operating data)

v) The "infraction curve" for a particular type of violation is estimated from the "frequency of inspection" and "units in violation/units inspected in the survey" data, as in the ORI Report.[1]

vi) With the above information, the following effectiveness indicators can be calculated (to simplify the notation,

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[1] ORI, op. cit. p.64. ORI selected for the infraction curve the equation form $\log Y = a + bX$

with   Y - percent of lots in violation

and   X - visits per store

it can be assumed that all indicators are initially for the jth violation and i^{th} product, or aggregated as necessary):

A. Violation Rate

At the risk of confusion, there are three violation rates which must be dealt with.

V^o - violation rate when the frequency of inspection is zero (ie. intercept of the infraction curve)

V^a - violation rate found in regular inspections (ie. units in violation in regular inspection/units inspected in regular inspections)

V^b - violation rate as surveyed (ie. units in violation in the survey/units inspected in the survey)

V^a is the violation rate which prevails before violations have been corrected, is thus a pre-inspection rate.

V^b is the rate found in the survey. The point of view implied by the method is that the survey is only randomly related to inspection activity. Some products will have

been reconditioned before the survey, some will not. V^b is a <u>post-inspection rate</u>, reflecting any reconditioning of products which has been done. So in general

$$V^a > V^b$$

The difference between V^a and V^b will be significant in some markets, less so in others depending on the extent of inspection coverage.[1]

B. <u>Dollars-at-risk</u>

Dollars-at-risk is the dollar value of product in violation. <u>Potential</u> dollars-at-risk (ie. with <u>no</u> inspection activity) is

$$V^o S$$

with   S - total product sold (dollar value)

<u>Pre-inspection</u> dollars-at-risk (before any corrections to violations have been made) is

$$V^a S$$

<u>Post-inspection</u> dollars-at-risk (<u>actual</u>

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[1] See p.29

dollars-at-risk to the consumer for the prevailing level of inspection activity) is

$$V^b S$$

C. Economic Loss Prevented

The potential economic damage to consumers which is corrected by FOS inspector (ORI's "direct benefit") is

$$V^a TL$$

with   T - total product examined in regular inspections (units or dollar value)

and   L - average economic loss (per unit in violation or per dollar of product in violation)

Potential economic damage which does not occur because of the deterrent effect of the inspection activity (ORI's "induced benefit") is

$$(V^o - V^a) SL$$

Together these give the total potential economic loss prevented

$$V^a TL + (V^o - V^a) SL$$

There is an alternative calculation for economic

loss prevented, based on the <u>overall</u> improvement in the violation rate due to both deterrence and correction

$$(V^o - V^b) SL$$

Equating the two calculations gives

$$V^a TL + (V^o - V^a) SL = (V^o - V^b) SL$$

from which

$$\frac{V^a - V^b}{V^a} = \frac{T}{S}$$

This says that the percent change (reduction) in the violation rate as a result of correcting violations, is equal to the percent of total product inspected (assuming that V^a is in fact the <u>real</u> pre-inspection violation rate, that V^b is the <u>real</u> post-inspection rate, and that inspectors correct perfectly all violations found in T).

D. <u>Economic Loss to the Consumer</u>

The economic loss which occurs in spite of Branch activity is total potential economic damage, less damage deterred, less damage corrected.

$$V^o SL - (V^o - V^a) SL - V^a TL$$

or

$$V^a L(S-T)$$

Alternatively, economic loss to consumers can also be calculated on the basis of the post-inspection rate of violation

$$V^b SL$$

The two calculations are equated

$$V^a L(S-T) = V^b SL$$

which gives the result

$$\frac{V^a - V^b}{V^a} = \frac{T}{S}$$

as obtained previously from the "economic loss prevented" calculations.

7. PROBLEMS with the METHOD

There are two principal weak points to be
dealt with (or at least taken account of) if the preceding
calculations are to be used as effectiveness indicators.

i) Finding good total sales information (S) is the most
difficult problem for the proposed system. There are a
number of existing sources for this data, all deficient
in one way or another for what is required here. The
requirements to be met are:

- that sales data be sufficiently detailed to conform
to the "products" defined for the effectiveness measure-
ment system;
- that sales data be current and accurate. Ideally, the
data is needed quarterly. The currency and accuracy of
sales data will determine the currency and accuracy of
the economic loss estimates.

It should be possible to convert sales data
from existing sources into the necessary form, but this
will require serious effort by a quantitative analyst. It
must be said that total sales data is equally a problem
for the ORI-MCD and Consumer Fraud Task Force proposals,
since they too require the data in some form. Both
ORI and MCD were successful in estimating total sales in

the form required for their calculations.

ii) The infraction curve is not likely to be very
reliable, at least according to the ORI report, although
the data is available and there are no difficulties with the
method. It is important to get a good estimate of V^o
because induced benefits generally make up a large part
of total benefits (in the ORI study, 99.5 percent of the
total benefits of inspection are found to be induced[1]).
If V^o cannot be estimated reliably, neither can induced
benefits.

These difficulties suggest that the use of S
and V^o should be avoided, where possible, in making cal-
culations.

There are several less significant problems to
be noted.

iii) Average economic loss (L) is probably a function of
inspection frequency. Not only does the rate of violation
decrease as inspections become more frequent, but the
seriousness of the average violation may also decrease.

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[1] ORI, op. cit. p. vi

However, average economic loss as surveyed is an acceptable proxy for actual loss, at least as a point of departure for the system.

iv) Similarly, total sales (S) are no doubt affected by consumer expectations of fraud, which are reflected in the violation rate (V^b) and in average economic loss (L). This is a very difficult relationship to deal with, and is probably not too important here.

v) Possible sources of bias will have to be identified, particularly where overestimates or underestimates are perceived as self-serving by inspectors.

vi) It may be necessary to add "average price of product" to the list of data requirements, to convert average economic loss and sales data into dollar terms.

8. Which INDICATORS?

   After this long discussion, which indicators are most reliable and practical? Because the data requirements are about the same for all of the indicators (at least for those dealing with economic loss), calculating all of the preceding list is probably reasonable in terms of incremental cost.

A. Violation Rates

   Violation rates are the basis of the whole system for both economic-loss-related and other violations. V^a and V^b are equally reliable, in light of their meanings and the uses made of them. V^o is less so, but with appropriate caution is also useful.

B. Dollars-at-risk

   "Dollars-at-risk" is the violation rate weighted by the dollar importance of a product to consumers. It adds nothing to effectiveness information available for economic loss violations where "economic loss prevented" or "economic loss to the consumer" is measured. It is however, the first step beyond compliance in the search for an indicator of the impact of violations where economic loss is not immediately measurable. Pre-inspection dollars-at-risk

$$V^a S$$

and post-inspection dollars-at-risk

$$V^b S$$

are, as above, quite reliable if total product sold, S, can be made reliable. For reasons stated (unreliability of the estimated infraction curve), the total potential dollars-at-risk calculation

$$V^o S$$

is less reliable.

Note that the reduction in dollars-at-risk produced by Branch activity can easily be obtained. The induced reduction in dollars-at-risk is

$$(V^o - V^a) S$$

The direct reduction in dollars-at-risk is

$$V^a T$$

or

$$(V^a - V^b) S$$

and the total reduction in dollars-at-risk is

$$(V^o - V^a) S + V^a T$$

or

$$(V^o - V^b) S$$

Of these, the most reliable, if not the most useful calculation is for direct reduction of dollars-at-risk

$$V^a T$$

if V^o and S are acknowledged to be the weak elements in the system, as discussed earlier.

The dollars-at-risk indicators are all useful. However, if one were to choose a single indicator from among

these for tracking Branch performance, it would have to

be <u>actual dollars-at-risk to the consumer</u>

$$V^b S$$

This indicator does not focus specifically on inspection or on any other single activity of the Branch, but expresses overall Branch performance relative to the existing problem. Changes in Branch activity can be measured against changes in the indicator, taking external factors into account, to determine the impact of different levels and deployment of CFP resources. (The most obvious external factors to deal with for <u>all</u> of the dollar indicators are changes in sales and changes in price levels).

The potential use of this indicator is greater than its immediate value, given certain refinements which might be made to it. These are discussed later in the report.[1]

C. <u>Economic Loss Prevented</u>, and

D. <u>Economic Loss to the Consumer</u>

Much the same line of argument applies to these two indicators as has been developed for dollars-at-risk. Both kinds of calculation are useful. Neither overcomes

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[1] See "Extensions to the System", p. 44

all of the difficulties which have been discussed.

There are several problems with the "economic loss prevented" calculation:

- The figure which results is not related to the size of the overall fraud problem. We learn how much fraud is prevented, but we are not told how much fraud there is;

- The calculation relies on operational data (units in violation in regular inspections, and units inspected in regular inspections). One objective of a survey measurement approach should be to eliminate day-to-day reporting where possible, to permit time and resource savings;

- The infraction curve is a dubious construct, as has been discussed. The use of V^o is unavoidable in calculating economic loss prevented;

- The measurement focuses on the effect of the inspection activity, rather than on the programs and policies of the Branch generally;

- The measurement is ambiguous in its implication. If
the amount of loss prevented (direct and induced benefits)
increases, is the Branch doing a better job (correcting and
deterring more fraud) or a worse job (more fraud is occurring
throughout the distribution chain and reaching the retail
level)?

On the other hand, the calculation is a direct
expression of the benefit of Branch inspection activity.
External factors are not very important. Total benefits
are calculated in each period. The relationship between
benefits and resources is clear. The calculation fits into
any general (Department-wide) cost-benefit scheme. And
most important, the relative advantages of deterrent and
indirect actions can be assessed against the value of
direct action.

If a choice must be made however, economic loss
to the consumer is the preferable economic loss indicator,
calculated as

$$V^b{}_{SL}$$

This calculation avoids the need for an infraction
curve. In focussing on the "economic loss to the consumer"
indicator, Branch policies and programs aim at reducing
or controlling total economic damage (and it is recognized
that this is not the sole objective of Branch activity).
The indicator does not then, at least from the policy point

of view, focus on inspection. The effects of any activity which serves to reduce fraud damage (e.g. inspection, prosecution, education of producers and distributors) should show up in the indicator, and policy can then be guided by the relative effectiveness of different approaches as indicated.

The amount of fraud prevented by the Branch is not expressed but is, to be cold-blooded (and apolitical) about it, irrelevant. The methodological fiction employed during the survey is that all of the fraud detected by the survey has already got past the net of inspection and other prevention activities of the Branch, and therefore reaches the consumer, which is true to the extent that, had the survey not been carried out, the consumer would have suffered the measured economic loss. The survey purports to measure fraud after any corrective measures have been taken. The indicator focusses only on the problem which remains to be solved, which is all that really concerns the consumer.

In summary, the proposed calculations are all feasible and useful. On criteria of reliability and importance however, the essential indicators are those based on the survey:

- actual violation rate faced by the consumer,

$$v^b$$

- actual dollars-at-risk to the consumer,

$$v^b S$$

- actual economic loss to the consumer

$$V^b_{SL}$$

9. OPTIONS and COSTS

The indicators can be grouped into options according to the data requirements implied:

i) Operating data, no survey - Compliance data for a reasonable group of products from operating data, as well as sales data from existing sources, can be used to produce the indicators:

- pre-inspection violation rate[1]

$$V^a$$

- pre-inspection dollars-at-risk

$$V^a S$$

However, the reliability of these indicators is limited. They will reflect any biases in the inspection data.

ii) Operating data, with an economic loss estimate - An analyst could organize a small-scale survey, wherein FOS inspectors would estimate economic loss, perhaps during regular inspections. With economic loss data,

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[1]Recall that $\frac{V^a - V^b}{V^a} = \frac{T}{S}$

Where T is very small relative to S, the pre-inspection rate V^a is a good proxy for the post-inspection rate V^b (ignoring biases in the inspection data which give rise to V^a). This situation is probably true for a large number of products inspected by FOS.

the indicators

- loss to the consumer before correction of violations
  found

$$V^a{}_{SL}$$

- loss directly prevented by inspection activity

$$V^a{}_{TL}$$

- loss to the consumer after correction of violations
  found

$$V^a{}_{L(S-T)}$$

can be produced, in addition to the indicators in
Option i.

iii) <u>A full-scale survey</u> - A survey of selected retail
stores, as described previously, will provide the
information necessary to produce all of the proposed
indicators.

The options all require a full-time quantitative analyst
at the development stage. They all involve data processing
costs. The important cost differences among the options
are in terms of FOS inspectors' time. If it is acceptable
that some time be devoted to surveys, and if a reduction in
day-to-day reporting is possible, then option iii is attrac-
tive because of the imrpoved effectiveness indicators
provided.

10.   IMPLEMENTATION and MANAGEMENT

Whichever option is adopted, the system should be designed, implemented and managed by Planning and Coordination, a full-time analyst to be hired for this purpose. Planning and Coordination can assert the effectiveness measurement needs of senior management. Planning and Coordination will be able to tolerate, initially, levels of generalization and unreliability which would not be acceptable to operating personnel, in the interest of making a start on effectiveness measurement. The system can then be improved as experience is gained and as circumstances permit.

Lessons learned in designing and implementing the system will be applicable in other Divisions and Branches. Planning and Coordination would become the repository of this knowledge and experience, and therefore the appropriate center for carrying out the extension of effectiveness measurement to other Branches of the Consumer Affairs Bureau.

11. EXTENSIONS to the SYSTEM

There are several ways in which the proposed system can eventually be extended:

i) To include the comprehensive measurement of economic loss. Research would be carried out to determine economic loss resulting from violations where the loss cannot be estimated by inspectors in the field. For example:

- economic damage might be estimated over a range of values on the basis of experts' "best guesses".

- consumers might be surveyed to determine the cost of a violation, or the value of a correction to them. It might be found that, for example, consumers would be willing to pay 5¢ additional per unit of clothing purchased for an accurate care label, or perhaps 1% of the value of the article. With this kind of information, the calculation of economic loss could be extended to serve as an effectiveness indicator for all or most regulations and programs administered by the Branch.

ii) To produce a cost-benefit analysis of Branch inspection activity. Adopting the ORI method, regulations would be evaluated in terms of economic loss prevented. Costs would also be determined, permitting a full cost-benefit analysis of inspection activity. The proposed system is immediately compatible with this approach.

iii) To measure <u>effectiveness for other activities of</u>
      <u>the Standards Directorate</u>. As has been mentioned, the
      proposed methods of effectiveness measurement are
      easily extended to other areas involving economic loss
      (Electricity and Gas, Weights and Measures Divisions)
      or compliance in some form (Product Safety Branch),

12. CONCLUSIONS

A Preliminary Report recommended <u>estimated economic loss</u> and <u>compliance with regulations</u> as the indicators which could best answer management requirements for an effectiveness measurement system. Reaction to the Preliminary Report favoured, in general, the use of these two indicators as the basis for effectiveness measurement. Managers are concerned however, with the practicability of measuring economic loss. They are also concerned that some factor beyond compliance is required to express program effectiveness where economic loss is not directly measurable. Several problems notwithstanding, it is clear that effectiveness indicators which go beyond the measures now in place are desirable and feasible. The system must be designed, first of all, in light of the needs of senior management, but can also meet the requirements of operational managers.

Previous studies support the view that measurement of economic loss is basic to the assessment of program effectiveness in the Consumer Fraud Protection field, and that economic loss can be determined on a survey basis by FOS inspectors.

From survey data, and with supplementary information, the following indicators can be calculated:

- pre-inspection, post-inspection and no-inspection violation rates;

- potential and actual "dollars-at-risk" to the consumer, as well as reductions in dollars-at-risk due to Branch activity;

- economic loss prevented by direct and indirect actions of the Branch;

- economic loss to the consumer which occurs in spite of Branch activity.

The two important problems in making these calculations are to determine total sales, and to find violation rates when there are no inspections, by estimating an "infraction curve". These problems do not jeopardize the feasibility of the system. They will however limit the reliability of some of the indicators.

If a choice has to be made among the indicators proposed, several are preferable on grounds of reliability and usefulness. These are the indicators based on the rates of violation obtained from survey data:

- actual violation rate faced by the consumer,

$$V^b$$

- actual dollars-at-risk to the consumer,
$$V^b_S$$

- actual economic loss to the consumer,
$$V^b_{SL}$$

The different indicators which are available can be grouped into options according to the data requirements implied:

i) <u>Operating data, no survey</u> - Estimates of violation rate,
$$V^a$$
and dollars-at-risk,
$$V^a_S$$
can be produced from operating and supplementary data alone. These estimates will be of limited reliability because of biases in the operating data.

ii) <u>Operating data, with an economic loss estimate</u> - A small sample, to determine the average economic loss associated with violations, can be carried out in the course of regular inspections. This will permit calculation of the indicators "economic loss to consumers before violations found have been corrected",
$$V^a_{SL}$$
"loss directly prevented by inspection activity"
$$V^a_{TL}$$
and "loss to the consumer after violations have been corrected"
$$V^a_{L(S-T)}$$

in addition to the indicators in option i. The same caution applies here however respecting the limited reliability of these indicators.

iii) <u>A full-scale survey</u> - will allow all of the calculations proposed herein to be made.

Each of the three options requires that a quantitative analyst be hired to complete design and implementation. All three involve data-processing costs. The important cost differences among the options result from the different demands they make on time normally available for inspection. Results of a pilot study done in Manitoba in 1974[1] suggest however that even under option iii, the additional time required for surveying economic loss and compliance is not a substantial percentage of total inspection time. It is possible too, that a well-established <u>survey</u> measurement system may obviate the need for some day-to-day reporting. This will reduce somewhat the net time demand imposed by the effectiveness measurement system.

Since the additional cost of a full scale survey is not unreasonable in light of the completeness, usefulness and reliability of indicators which it makes possible, this is the most attractive of the available options.

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[1] MCD, op.cit.

13. RECOMMENDATIONS

It is recommended that:

i) an effectiveness measurement system should be implemented for the Consumer Fraud Protection activity, based on the following indicators:

- violation rates
- "dollars-at-risk"
- economic loss prevented
- economic loss to the consumer,

the necessary data to be obtained through regular surveys conducted at retail by FOS inspectors (option iii described herein);

ii) the provisional statement of Consumer Fraud Protection objectives adopted in the Preliminary Report, that is,

"to reduce the incidence of economic loss to the consumer;
to increase the breadth and effectiveness of consumer choice, and:
to promote the interest of the consumer in the market place and in the formation of government policy",

should serve for the next stages (detailed design and implementation) of the development of the effectiveness measurement system;

iii)   the requirements of <u>senior management</u> should be stressed during the final design and implementation stages, although continued recognition will be given to the information needs of operational managers;

iv) Planning and Coordination should assume immediate responsibility for overseeing further development and implementation of the system, to ensure a senior management orientation, and to facilitate the eventual extension of the system throughout the Standards Directorate and the Bureau of Consumer Affairs;

v)   this task will require a quantitative analyst, reporting to the Director, Planning and Coordination, and working with CFPB and FOS personnel to complete design and implementation of the system;

vi)   the quantitative analyst should concentrate initial efforts on the following tasks:

- assisting CFPB personnel in selecting the group of violations and products to be tracked by the effectiveness measurement system;

- designing the effectiveness measurement survey, including determination of the data to be obtained, development of a procedures manual and a training strategy,

and selection of a data-processing format;

- developing estimates of total sales for products selected;

- designing a reporting system for operating data as required.