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PRODUCTIVITY AND MEASUREMENT OF PRODUCTIVITY IN THE
PUBLIC SECTOR
A CANADIAN EXPERIENCE

BY
Michael O. Adibe

A thesis submitted to Carleton University in
partial fulfillment of the requirements for the
degree of
Master of Arts in Economics

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ABSTRACT

Since 1970, the Efficiency Evaluation Division of the Treasury Board has been assisting federal government departments in developing measures of performance, embracing productivity and effectiveness measures. One of the departments for which such measures have been developed is National Revenue - Customs and Excise.

This thesis discusses the principles of developing productivity measures for government functions. Drawing from the experience in Customs and Excise, the thesis demonstrates how these principles have been applied to develop productivity measures for a specific function of the department, namely, the Excise Tax Audit. Productivity measures for seven years, 1967 to 1973, are calculated and presented. The implications of the measures in terms of savings in resources, and how they can be used in the forecasting of future resource requirements are also pointed out. Relevant topics for further research such as the application of economic analysis to the function in order to determine the optimal amount of resources needed to attain its objectives, are also discussed.

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CHAPTER 1 - INTRODUCTION

Productivity Measurement - Progress and Uses

The measurement and analysis of productivity for the economy as a whole or for certain segments, particularly the industrial sector of the economy, is not new. The measurements are usually carried out by government departments such as Statistics Canada (SC) [1] in Canada and the Office of Business Economics (OBE) in the United States, as well as by individual researchers or research organizations. [2]

Productivity, as used in this paper, is the ratio of output to input. It is a concept which is related to that of economic production. It is thus applicable only to producers or to the productive sector of the economy, and not to consumers. The government sector has been implicitly treated as a consumer in the calculation of national income. Thus, in the aggregate demand equation, $Y = C + I + G$, (where Y represents gross national product, C personal consumption expenditure, I investment, and G government expenditure on goods and services) government is considered a consumer or a purchaser of final goods and services produced in the economy. If government is regarded solely as a consumer, the concept of productivity for the government sector becomes irrelevant. However, on the income or supply side of the equation $Y = W + I + R + P$, (where Y represents gross national product, W wages and salaries, I interest, R rent, and P profits including dividends) the government sector is also considered, and rightly so, as a producer of factor inputs (primarily labour) and, therefore, as a producer. There-

fore, the concept of productivity is validly applicable to the public sector, and as in the case of the private sector, the measurement of productivity of the public sector or components of it is appropriate.

Productivity measurement for the general economy and for the government sector in particular is undertaken for a number of reasons. These include:

- (a) establishment of a basis for making decisions for productivity improvement. Productivity improvement, particularly in the private sector is a useful means of combatting inflation and counter-acting its effects, fostering economic progress and thus increasing income per capita and general human welfare, ensuring a country's competitiveness in foreign markets, and using the nation's resources more efficiently;
- (b) assessment of economic progress;
- (c) adjustment of national accounts figures;
- (d) appraisal of the performance of government departments and agencies;
- (e) normative and behavioural analysis of government.

The importance of measuring productivity of the government sector is further highlighted by the fact that the percentage of the government's share of the national income and the proportion of labour and other factors of production employed by the government sector are sizeable. In Canada, the expenditure of all levels of government on goods and services accounts for about a quarter of the total G.N.P. Therefore, the

distortion in economic analysis created by failing to measure productivity of the government sector can be substantial.

The measurement of productivity of the public sector has been lagging behind that of the private sector, particularly the goods-producing industries. This lag is due to the fact that the measurement of government output presents some difficult conceptual, technical and statistical problems.

Efforts have been, and are still being made to measure government output and productivity. Attempts along these lines have been made in Canada by such government departments as Statistics Canada and the Treasury Board Secretariat. In the U.S., the Office of Management and Budget (the counterpart of Canadian Treasury Board Secretariat), the Government Accounting Office and the Civil Service Commission have been carrying out joint studies to measure and enhance productivity in the U.S. Government.

Statistics Canada began a very modest program of pilot probes into measuring total outputs and productivity for selected federal departments and programs in 1968. To date, the pilot studies have covered about eight federal government departments utilizing approximately 10% of the non-defence man-years. Although the studies cover somewhat different time periods, the average number of years for which data is available is about 6 years and annual changes in measured productivity have ranged up to nearly 8%, indicating that the variation is substantial.[3] These studies[4] by Statistics Canada show that the productivity index of the federal government, is not unity as assumed in the present system of national accounts. However, it is more

difficult to generalize as to whether the levels of productivity are low relative to the private sector as many have assumed.

Historical Background

The present scale of involvement of Treasury Board in productivity measurement can be linked to the introduction of the Planning, Programming and Budgeting System (PPBS) in the federal government, and a positive effort by the government, in response to one of the Glassco Commission recommendations, to improve the efficiency and effectiveness of federal departments and agencies[5]. The specific responsibility of the Board in this area is spelt out in the Financial Administration Act.[6]

PPBS was adopted by the federal government largely because of its output orientation. It was hoped at the time of its introduction that the objectives and outputs of the various programs and departments would be made visible along with the cost of producing those outputs. However, in practice, PPBS has tended to result in little more than a re-classification of expenditures by activities and sub-activities which nonetheless is a considerable improvement over classification simply by type of input. While departments have identified objectives for their activities and sub-activities, only a few were able to identify and quantify their outputs, and even fewer have attempted to relate outputs to inputs.

Exhortation by the Treasury Board Secretariat failed to generate the required information. In 1970, the Efficiency Evaluation Division of the Planning Branch was created with the

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objective of assisting departments to develop and implement what are now known as Operational Performance Measurement Systems (OPMS). These systems are designed for measuring the efficiency and operational effectiveness of departmental programs and their component activities and sub-activities. They provide the crucial measures of outputs of these programs and their components, their costs and efficiency.

Scope and Objectives of the Thesis

OPMS has been developed and implemented in a number of departments [7]. One of these departments is National Revenue - Customs and Excise. The writer was a member of the team that helped to develop the system in that department.

Using largely the experience from the Treasury Board's studies, particularly from the study of Customs and Excise Department, and concentrating mainly on one function or sub-activity, namely the Excise Tax Audit, the thesis attempts to show how output and productivity measures can be and have been developed for a specific government function.

The objectives of the thesis are:

- (a) to illustrate how output measures for government activities can be determined by showing how they have been developed for the Excise Tax Audit function of Customs and Excise department;
 - (b) to develop productivity measures for the function, and in the process to demonstrate how diverse outputs of the function have been weighted, aggregated and used in the calculation;
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- (c) To investigate the possibility of applying economic analysis to the Excise Tax Audit sub-activity in order to determine the optimal amount of resources that should be allocated to it;
- (d) To examine some of the pertinent variables which affect the excise audit's revenue output (assessments) and to assess whether and how they might be used to make decisions on the amount of resources to be channelled to the function;
- (e) To provide a brief summary of productivity, efficiency and related measurements in the federal government of Canada.

In the next section of this chapter, the conceptual evaluation framework used by Treasury Board Secretariat, and on which OPMS is based, is very briefly described. In chapter 2, the objectives, organization and responsibilities of the Excise Tax Audit function are described and discussed. This is followed by Chapter 3 which deals with the selection of measures and classification of outputs.

Chapter 4 discusses the various types and measures of inputs and the problems associated with their measurement. It also discusses the particular input measure used in the calculation of productivity for the Excise Tax Audit function.

In Chapter 5, with the output and input measures selected in Chapters 3 and 4 respectively, productivity measures for the function are calculated and charted for 7 years. The use of these measures in forecasting audit

labour resources is discussed. Furthermore, relevant topics for further studies were examined. These include:

- development of reliable estimates of program output measures which reflect the extent of achievement of the Excise Tax Audit objectives,
- use of economic analysis to determine the optimal amount of resources to be allocated to the function,
- determination of how some of the major factors which affect the amount of revenue generated by audit should be taken into account when making decisions on resource requirements of the Excise Tax Audit function.

Chapter 6 concludes the thesis by providing a summary of findings and conclusions as well as a resume of suggestions for further research.

OPMS and Treasury Board's Conceptual Framework for Program Evaluation

OPMS can be looked at as a component of an overall framework for program evaluation. In the Planning Branch of the Treasury Board Secretariat the conceptual framework used in its work of evaluation of government programs is depicted by figure 1 on the following page. This framework was largely synthesized under D.G. Martle who was the Deputy Secretary of the Planning Branch between 1969 and 1973, and who described it in his paper

Figure 1 - A CONCEPTUAL FRAMEWORK FOR PROGRAM EVALUATION
A. Sharma, Bangalore

"Operational Performance Measurement in the Federal Government". [8]

The illustration is based on the premise that the overriding objective of every government activity is to enhance the well-being of individuals and families. Social preferences of individuals are expressed in various forms such as voting, demonstrations, publications in the press, lobbying in the Parliament, etc. The wishes of individuals are then translated by the Cabinet, where it is deemed appropriate, into policy decisions. On the basis of decisions made by Cabinet, enabling legislation is tabled, and if passed, the departments and agencies of government administer the legislation.

Government decisions and activities, besides affecting the household sector directly, also affect it indirectly through other sectors of the economy, such as the business and the non-profit sectors.

The objective of evaluation is to determine the extent to which each government program generates the desired effect or contributes towards the improvement of individual and collective well-being. But, as is well known, the measurement of social well-being is very difficult. Generally, economists use income per capita as an indicator of general well-being for any given economy, but there are other facets to well-being which should also be taken into account, e.g. health, freedom, social justice, individual fulfillment, education, housing, etc. Aggregate measures of these other facets have in recent years been called "Social indicators". In the absence of a single

measure of well-being of individuals, the next best thing is to measure the particular socio-economic effects produced by each program. Such a measure would at least indicate the extent to which each program is able to produce its intended effects. It is a measure of program effectiveness and is the closest approximation or proxy of the measure of a program's contribution to well-being. It is labelled proxy level 4 and may well be the closest one can ever come to measuring well-being. Even proxy level 4 measures are extremely difficult to develop because of conceptual, technical and statistical problems, and in particular because of spill-over problems. For instance, no single government program can be assumed, or can claim, to be solely responsible for the attainment of its objectives.

If the program effects cannot be specified or quantified, then on the assumption that the outputs of each program would contribute towards the attainment of its objectives, the program output measure, designated as proxy level 1, may be used as the next best measure of a program's contribution to well-being. Program outputs are the goods and services which are directly related to the program objectives. Even if the program outputs cannot be measured, one may go further down this conceptual framework to measure the outputs of the various processes or operations of the program. These are the operational outputs or proxy level 2 measures. In the absence of operational output measures one falls back to the measurement of inputs on the assumption that the costs of government operations are equal or proportionate to their outputs.

Figure 2 - THE MEASURING HIERARCHY

and contributions to social well-being. The measure of inputs is thus the lowest and the least acceptable proxy of government contribution to the well-being of individuals. Nevertheless, input measures provide a good indicator of scale of government commitment.

Looked at differently, inputs are the means to an end which is the production of operational outputs. The latter in turn become the means of generating another end, the program outputs. These in turn serve as the means of producing the desired ends, program effects, which are directed toward the improvement of well-being. This means-end hierarchy is illustrated in figure 2 on page 11.

Based on this framework, OPMS develops and provides measures of outputs at the operational level, relates them to the corresponding inputs to yield measures of efficiency or productivity. It also provides, where feasible, measures of operational effectiveness which indicate the extent to which government operations attain their objectives. OPMS therefore advances evaluation from proxy level 1 stage to at least proxy level 2, and in some instances to proxy level 3.

FOOTNOTES TO CHAPTER 1

- [1] Statistics Canada has published productivity statistics for a number of years in "Aggregate Productivity Trends" Catalogue No. 14-201, Statistics Canada, Ottawa. These statistics are for the total private economy, or to use the Canadian term, the commercial industries. BC has also calculated productivity measures for the non-commercial industries, i.e., those industries that are not profit motivated, such as education, hospitals, welfare and religious organizations, and public administration, but has not published them because of the inadequacies of available conventional real output measures for productivity purposes.
- [2] As an example of work done by individuals, see "The Explanation of Productivity Change" by D.W. Jorgenson and Avi Griliches, Survey of Current Business, May 1969, pp. 31-64, reprinted from The Review of Economic Studies, Vol. XXXIV(3) No. 99, July 1967.
- [3] An account of the work done by Statistics Canada and findings related to productivity changes for those federal departments are contained in a paper presented by G. Garston, Director, Industry Products Division, Statistics Canada, at the session on "Productivity in the Public Sector" at the North American Conference on Labour Statistics, Miami Beach, Florida, June 12, 1973.
- [4] Unpublished data on productivity obtained from these studies and the list of departments studied are available in the Industry Products Division of Statistics Canada.

- [5] In fact, the terms of reference of the Glendon Commission called for recommendation of changes in the management of government departments and agencies which "best promote efficiency, economy and improved service in the dispatch of public business". See "The Royal Commission on Government Organization", Volume 1, Management of the Public Service, Published by the Queen's Printer, Ottawa, July 1972, pp. 24-25.
- [6] The Financial Administration Act stipulates that the Treasury Board has the responsibility for allocation, and efficient and effective utilization manpower resources within the public service. See Revised Statutes of Canada, 1970 Vol. III, Chap. P-10, pp. 3068 and 3070.
- [7] Appendix B which has been included with the permission of the Acting Director of the Efficiency Evaluation Division, Planning Branch, Treasury Board, shows the departments for which OPMS have been developed, and those where it is currently being developed, as well as their man-year utilization and man-years covered by OPMS.
- [8] See D.G. Hartle "Operational Performance Measurement in the Federal Government", Optimum Volume 3, No. 4, 1972 pp. 5-15. See also D.G. Hartle "Evaluation of Effectiveness of Government Programs" The Canadian Tax Journal Vol. XIX, No. 6, November-December 1971 pp. 538-544. For further details see also "Operational Performance Measurement, Vol. 1, A Managerial Overview" recently issued by Treasury Board, Ottawa.

CHAPTER 2 - EXCISE TAX AUDIT

In order that the reader may have an appreciation of the Excise Tax Audit sub-activity which is the object of this study, in this chapter, the organization, objectives, responsibilities and the nature of the operations of the sub-activity including audit process, audit cycle, types of audit, refund claims verification, and investigations are briefly described. It should be pointed out that while the following descriptions are accurate for the period to which the study relates, the organizational structure has changed slightly since then, and the operational procedures are currently being reviewed and modified with a view to improvement.

Organization

The Excise Tax Audit is the largest sub-activity in terms of numbers of employees of the Excise Tax Activity of the National Revenue - Customs and Excise Program[1]. The function[2] is carried out by a policy and co-ordinating Audit section at the departmental headquarters in Ottawa, and sections in the regional[3] and district offices across the country. Each Audit section at the regional offices is sub-divided into two units, namely a Quality Control Unit which is responsible for checking the quality of the work of the auditors, and an investigative unit which looks into difficult, or exceptional cases.

The bulk of the employees are operational auditors in the district offices. The large district offices have Audit

supervisors. In total, the sub-activity utilized about 600 man-years and \$8 million during the fiscal year 1970/71.

Objectives and Responsibilities

Objectives may be defined as the main purposes or aims, while responsibilities are assigned tasks which must be performed and which generally are the means of achieving the objectives.

The main objectives of the sub-activity are:

- (a) to protect sales and excise tax revenue,
- (b) to detect evasion of sales and excise taxes,
- (c) to deter licensees and others from such evasion of sales and excise taxes, and
- (d) to detect and rectify errors in sales and excise tax liabilities reported and refund claims submitted by firms, and thus ensure that all taxes payable are remitted and that there are no over-claims or over-payments.

In order to attain the above objectives, the sub-activity undertakes the following responsibilities as described in the Program Review and Main Estimates(4).

- (a) the periodic audit of records of manufacturers and wholesalers licensed under the Excise Tax Act to verify the accuracy of the tax liability reported by each firm, and
- (b) the verification of refund claims submitted by persons who have paid sales and excise taxes and subsequently exported, sold or used the goods under exempt conditions.

The consideration of the responsibilities and the extent to which the objectives are accomplished will be a good starting point in the determination of output and productivity measures for the sub-activity.

It is also seen that all the objectives are compatible in relation to the means (audit and verification) employed for their achievement. Thus the more audits that are undertaken, the more errors and evasions will be detected, the more licensees will be deterred from such evasions, and consequently the more excise and sales tax revenue protected. It should be noted, however, that an increase in audits is not necessarily accompanied by a proportionate increase in the amount of dollar assessments, or errors detected.

Audit Process

Instructions, directives, guidelines and explanations of audit procedures are formulated, promulgated and revised as necessary by the Headquarters Audit Section(5). Following these directives, the operational auditors in the regional and district offices carry out their duties.

Types of Audit

There are six different types of audits to be performed as follows:

- (a) Regular Audits. Audits that have been done in the past and are usually re-scheduled at the end of the regular audit cycle.
- (b) First Audits. These apply to firms that have not been audited under their present license.

- (c) Final audit. Refers to cases where the licence is cancelled and no further audit will be conducted.
- (d) Special Audit. This pertains to audit action only with respect to specific purchases, sales or other types of error, and usual audit coverage is not undertaken.
- (e) Branch Audit. This pertains to branches or subsidiary companies where audit action is required under the Branch Audit Procedures as outlined in the Audit Manual.
- (f) Hospital Audit. All audits covering the operations of a hospital.

A number of factors influence the amount of effort required to complete an audit. These include the type of licence (e.g., manufacturer's or wholesaler's), the nature of product, characteristics of the licensee, e.g., form of organization, volume of annual sales, yearly volume of tax, accounting systems and book-keeping procedures used, method of computing tax, past record of compliance (i.e. integrity) etc.

Audit Cycle

The Excise Tax Act requires licensees to maintain books and records and to make them available for inspection by the excise tax auditors and other officers. The Excise Tax Act implies that these records be audited periodically, but the periodicity is not clearly specified. However, where licensees file for a refund of excise taxes, the Act limits the period of the refund to two years prior to the date the claim is filed. Since refunds are also detected in the process of audit, and

because the audit is intended not only to protect revenue but also to protect the interest of taxpayers (who after all have incurred considerable costs in order to maintain the required records). It follows by implication that if all interests are to be served, all licensees should be audited at least once every two years.

However, the Excise Tax Audit Branch has found it virtually impossible to do all the audits within such a time frame with its existing auditor resources. It has, therefore, devised an audit cycling system whereby the frequency of regular licensee audits is established on the basis of a 2, 3 and 4-year cycle. The grouping of licensees into such cycles depends on their potential dollar assessment value and the complexity of audit. The complexity of audit depends on those factors listed earlier which affect the amount of effort required to complete each audit. Thus in selecting licensees to be audited each year, the branch takes one-half of the 2-year audits, plus one-third of the 3 year audits, plus one-quarter of the 4-year audits. Even with the cycle approach, the branch finds it difficult to complete all audits scheduled for any given period. If for any reason an audit is not done during the year in which it is scheduled, it drops out of its regular cycle. It is then classified as 'out of cycle' audit and half of these are done each year. Because of the increasing number of such audits, the cycle is being extended to even 5 and 6-year cycles.

Refund Claims Verification

In addition to audit, the Excise Tax Branch also verifies and processes refund claims. A refund claim is a claim

submitted by a licensee for sales taxes previously paid on goods that were sold under tax-exempt conditions; and by a non-licensee who has sold taxable goods under tax-exempt conditions. The verification procedures are provided to field auditors by headquarters, but on the whole a thorough investigation is marked by a meticulous examination of details, and requires experience as to what should be further looked into and what should be ignored. The verification of some refund claims may involve special investigations where the more experienced auditors are called in; but on the whole, the average time required to audit refund claims is fairly constant (about 3 hours).

Investigations

For a number of reasons, field auditors also undertake investigations. Such investigations may be made at the request of another district or regional office. They include investigations into formulae or methods used in computing deductions from sales price, of such items as freight, cash discounts, installation or erection costs, and investigations on apportionment of sale price, and valuation. Generally, the mix of the various types of investigation does not vary significantly from year to year, with freight investigations accounting for over 70 percent of all.

Resource Utilization of Each Sub-Function

Of the total annual man-year or dollar resources utilized by the Excise Tax Audit sub-activity, between two-thirds and three-quarters are devoted to audit; between one-quarter and one-third to refund claims. In the two regions (N.W. Ontario and Prairie) where investigations occur most

frequently, they absorb only about 3 percent of the total resources. Thus, in developing output and productivity measures for the sub-activity, emphasis should be on audit and on the processing of refund claims.

FOOTNOTES TO CHAPTER 2

[1] Customs and Excise is one of the oldest and most well-established departments of the Federal Government. During the financial year 1970/71, the Department employed 8,200 people located in Ottawa and in the various ports and centres across the country, and spent \$81.4 million.

Its responsibilities are fairly generally known and include: the control of international movement of goods and persons; the assessment, collection and control of duties and taxes on imported and domestically produced goods; the prevention of smuggling, undervaluation of goods, and other fraudulent or evasive practices involving Customs and Excise revenue.

In the Planning, Programming and Budgeting (PPB) sense, the Department is a program consisting of four activities: Excise Tax; Customs Operations; Tariff, Program and Appraisal; and Departmental Administration. Each activity comprises a number of sub-activities which may be further divided into sub-sub-activities.

The Excise Tax activity is divided into four sub-activities: Administration, Excise Tax Collection, Values and Classification, Excise Duties and Excise Tax Audit which is the subject of this study.

[2] In this paper, the terms "function" and "sub-activity" as applied to Excise Tax Audit are interchangeable.

- [3] There are 6 Excise Tax regions - Atlantic, Quebec, Central Ontario, S.W. Ontario, Prairie and Pacific Regions.
- [4] Main Estimates, Customs and Excise 1971/72.
- [5] These procedures, directives, and guidelines are issued in the following publications: General Audit Program; Audit Manual; and Circulars to Auditors (AT series) all by the Audit Section of the Excise Tax Branch of the Department of National Revenue - Customs and Excise.

CHAPTER 2 - OUTPUT

Productivity has been defined in Chapter 1 as the ratio of output to input. It follows, therefore, that the important variables in the measurement of productivity are output and input. In this chapter, output will be discussed. This will include the concept and definition of output as used in this paper, the procedures used for selection of measures of output for the function under study (or for any other government function), the various ways in which outputs can be classified and the implication of each of these for measurement purposes, and the criteria to be met by output measures used in the calculation of productivity. In particular, it will include discussion of the output measures for the Excise Tax Audit function which were considered and the rationale for their rejection or acceptance, as well as the different methods of valuing, weighting and aggregating diverse outputs.

What is Output?

Output is the end product of a production process. Production, as an economic concept, and as used in this paper, means any process which converts or transforms commodities or services into different commodities or services, tangible or intangible. Output may therefore be defined as the goods or services produced by an organization through the use and transformation of inputs.

Although examples of outputs of government functions[1] include such tangibles as documents processed, people cleared,

pieces of mail delivered, and permits issued, a large proportion of government outputs consist of intangibles such as advice or guidance provided, protection, prevention, administration and provision of public goods such as defence.

Procedures for Selection of Output Measures

Where outputs are visible, tangible, physical products, their measurement is relatively easy to undertake. For example, if an organization or an economic unit is engaged in the production of shoes one may need only to count these - though differences in the types of shoes may require counting each type separately. However, in the case of service industries in general, and the government sector in particular, there is the problem of identifying and measuring outputs simply because of their intangible or partially intangible nature.

The procedures which can be followed in the determination of output measures for any government function in general, including those adopted in the selection of measures for the Excise Tax Audit function in particular, are discussed below.

Review of Objectives: One starting point is the review of the objectives or the mission of the organization. This review will generally assist in understanding what the organization is doing, as well as in formulating an opinion as to what the output measures might be. Thus in Chapter 2, where the objectives of the Excise Tax Audit were reviewed, it was noted that one of the objectives was to protect sales and excise tax revenue. This objective would suggest that an output of the sub-activity might be the amount of sales and excise tax revenue "protected".

Review of Responsibilities: Another process in the selection of output measures is the review of the responsibilities of the organization.

The responsibilities of government agencies are assigned to them by the Cabinet and Parliament. They specify what the organization is or should be doing. Where they are clearly identified and defined, they will generally suggest what the outputs or output measures might be. For example it was seen that one of the responsibilities of the excise audit function is to verify refund claims for sales and excise taxes. This immediately suggests that a possible measure of one of the outputs of the function might be the number of refund claims verified.

Similarly, if the responsibility of a government licensing agency is to issue licences or permits to qualified applicants, this responsibility will suggest that the output measure could either be the number of licences or permits issued, or the number of applications for licences processed.

The responsibilities of an organization should preferably be reviewed simultaneously with, and examined against its objectives in order to ensure compatibility, and that the organization is doing the right things for the attainment of the objectives. For example, it was noted in Chapter 2 that audit of licences' records and verification of refund claims are very appropriate for protecting excise tax revenue.

On the contrary, the review may suggest that the responsibilities are not the most appropriate means of attaining the objectives. For instance, if the government has as an objective for one of its agencies(2), the encouragement of technological innovation, one must consider whether the issuing of patents of invention will encourage innovation sufficiently or whether other means such as research grants should be used.

The review of responsibilities against the objectives will also indicate if a possible output measure represents the final output or only an intermediate output. Thus, if one of the responsibilities of the Examine Audit sub-activity is to produce interim reports at various stages of an audit, the use of the number of audit reports may not be appropriate as a measure of "final" output, as it represents only an intermediate product in the process of producing an audit. The requirement for interim reporting might change from time to time thus necessitating a change in the audit process, yet the final output, the audit itself, remains unchanged.

Examination of Tangible Products: Just as in the case of a goods-producing industry, the outputs of some government functions are tangible products. Therefore, one of the procedures in determining output measures is to look at tangible products of the function. These include such things as reports written or issued, documents (e.g., applications) processed, items issued etc. These provide some indication of what the

output measures might be. They should therefore be examined to determine whether they meet the criteria for output measures as discussed in a later part of this chapter.

Examination of Work Procedures: A review of the work process will help in many instances in determining:

- what is being produced by an organization,
- which of the products are intermediate and which are final outputs,
- whether the products are homogeneous or whether they consist of different or heterogeneous items,
- whether or not the outputs can be measured.

As well, an examination of the work procedure will (by revealing the relative amount of effort or time expended on each process or output) assist in determining relative weights (or values) to be assigned to each output where more than one output is being produced.

As a side benefit, a review of work procedures may also indicate to management where improvements might be introduced.

In the process of reviewing the objectives, responsibilities, tangible products and work processes of an organization, some idea of possible measures of output of the function would have been formulated. These should be listed, the pros and cons of each articulated and reviewed. On the basis of this review, output measures can be selected and proposed to management of the function for review.

Review of Proposed Measures with Management of Organisation The proposed output measures along with the rationale for their selection should be reviewed with management. Since a major purpose of developing output and productivity measures is to determine how efficiently an organisation and its management are performing, it is of utmost importance that management agree with the proposed measures. Management should be able to see and agree that the selected output measures do faithfully reflect the products of the organisation.

Such a review by management will also ensure that the knowledge and on-the-line experience of management are brought to bear in the output-measure selection.

Classification of Outputs

In measuring government outputs, an attempt should be made to measure the consumer satisfaction generated by those outputs. Therefore, output measures should reflect the contribution of a socio-economic activity, (in this case, a specific government function) to human welfare. However, not all outputs produced by the government can be directly related to human welfare. Some may even be viewed by particular individuals as contributing negatively to their welfare. For example, a personal income tax collection function may be thought of as reducing personal disposable income and thus of lowering individual welfare. It is therefore necessary, for the purpose of measurement, to consider the characterisation of each type of output selected as there will dictate how each output should be treated. One way of ensuring that the essential characterisation

are considered in to classify outputs into various categories and to bear in mind the implication of each classification with respect to the measurement of performance which embraces both efficiency and effectiveness.

Four major types of classification of outputs will be discussed, namely, hierarchy or level, the use, the origin and the diversification of outputs. Other types of classification which are also related to the type of operation producing the outputs, e.g., according to measurability, and frequency of production will also be discussed briefly.

Hierarchy/Level. It is important for the purpose of measuring performance to distinguish between those outputs which have an impact on human welfare and those which are produced as part of the processes or are utilized again within a government department or agency to generate and attain the desired ends or objectives for which program has been designed. Those outputs which can be seen to be directly related to the objective of a program may be defined as program outputs. They are useful for the measurement of effectiveness.

In the work of TBO[1] two levels of outputs are identified namely, program outputs and operational outputs. Program outputs are closely related to outputs of enterprises in that they reflect or are related to the objectives of an organization. Thus if the objective is to issue permits or licences to those who qualify for them, the program output is the number of licences issued. Revenue from fees for licensees may be compared to revenue from sales of products of a private enterprise. Operational outputs, on the other hand are the

outputs of processes and are more representative of the work done. Thus using the same example, the operational outputs of an organisation which issues permits to those who qualify will be the number of applications processed. Applications processed but not approved do represent work done which is not reflected in the program output, namely the number of licences issued.

The lack of an identifiable program output for a large number of government activities may indicate (or may result from) one or more of the following:

- nature of output; e.g. public good such as defence, police protection, and information
- lack of articulated objectives
- lack of clarity of stated objectives
- unquantifiability of the objectives
- the objectives are shared by other activities or agencies, i.e., the objectives cannot be attained solely or independently by the organisation concerned.

For macro-economic studies, e.g., the measurement of a government organisation's or activity's contribution to human welfare, and for assessing how effective the activity or operation is in attaining its objective, program outputs are the outputs to be measured. However, for the purpose of measuring managerial performance and for determining resource requirement, the measurement of operational outputs is more appropriate.

Use Outputs can also be classified according to whether they are used within the organisation or outside the organisation. Those outputs which are used within the

organization, or which constitute part of the ultimate product are designated as intermediate outputs.

Those which are produced for use outside the organization are called final outputs. It should be noted that what is a final output for a part of an organization (e.g., a section) may be only an intermediate output for the organization as a whole (e.g., division). For measurement of productivity or efficiency, only final outputs should be measured and utilized at any particular functional or organizational level. However, for management control of operations, the measurement of intermediate outputs is also important.

Where the final output is difficult to measure, and the purpose of measurement is to assess the performance of an organization, a combination of the intermediate outputs may be used as a proxy for the final output under certain conditions. For example, if a given proportion or number of each intermediate output must be produced in order to obtain the final output, then a weighted aggregate of the intermediate outputs may be used as a measure of the final output. In general, this procedure may be followed if it can be assumed that the final output is directly correlated with the intermediate outputs.

Origin of Work Classification of outputs according to the origin of work which generates the output is of particular importance where the purpose of measurement is to determine performance and resource requirement for an organization.

Those originating from outside an organization, usually demand-generated, are termed non-discretionary outputs. In other words the organization or its management has no discretion over

what should be produced and how much, although it may have some discretion as to how they can be produced.

Work originating from within an organization, and hence outputs resulting from such, are discretionary. As in the case of intermediate and final outputs, what may be a non-discretionary output for a lower-echelon component of an organization, may be a discretionary output for the organization as a whole. Non-discretionary outputs should be carefully scrutinized periodically by management to ensure that they continue to contribute significantly towards the achievement of the objectives of the organization.

Diversification: Outputs of an organization may be homogeneous or diversified, although it is not necessary to classify them as such. Where the outputs are not the same, i.e., are heterogeneous, each should be properly weighted and aggregated to obtain a measure of the total output. If the outputs are the same, aggregation is not necessary.

If the nature of production is such that the mix (or proportion) of the output remains constant, or that the outputs are mutually interdependent, then an unweighted count of one of the outputs will provide a proxy measure of the period-to-period changes in the real output of the organization.

Frequency of Production: Where outputs and productivity are measured for the purpose of resource allocation, it is necessary to determine whether they are produced repetitively or whether they are produced on an ad hoc basis. If the production is non-repetitive, then the measurement of productivity from year-to-year, and the forecasting of future workload

and hence the resources required, become almost impossible. If the operation and the outputs are repetitive, measurement is comparatively easier. If an organization is engaged in both repetitive and non-repetitive operations, an effort should be made to identify and segregate the inputs into each type of output.

Measurability of Output: Although the objective is to measure the outputs and hence the efficiency of government operations, it is not always possible to measure all the outputs at a reasonable cost. Thus one of the basic questions to be answered is whether the outputs of an organization are measurable or not. It may well be that some outputs are measurable while others are not. If so, the proportions of the organization's input going into the production of each type of output should be determined. Suppose the proportions of inputs consumed in the production of the measurable and unmeasurable outputs are respectively 80% and 20%, then a decision could be made to base the measurement of productivity on the measurable outputs only. This type of decision will of course depend on other factors such as the relationship or interdependency between the measurable and unmeasurable operations, the relative constancy of the mix or proportions of each type of output, etc.

Considerate of Output Measures

Measures of output to be used in the calculation of productivity should be selected or accepted only if they satisfy certain requirements. They should be:

representative of work performed,

- repetitive and reasonably uniform over time,
- mission oriented,
- mutually exclusive, and
- definable.

Representativeness of Work Performed: In view of the variety of goods and services produced by government agencies, it is important that the measure of output be representative of the work performed by the organization, and not work performed elsewhere. This requirement is essential for valid comparisons of output and productivity of the same organization over time, or for such comparisons among otherwise similar organizations. Thus, if for any of a variety of reasons, a government agency decides to purchase services outside, or as is most common, to hire consultants to perform work which it would have otherwise done, both the output produced (or work performed) by the outside agency and the cost to the organization should be segregated in computing the organization's output and productivity.

It may be argued that when total factor productivity[4] is to be calculated, both these outputs and inputs should be included. However, where the intention is to measure the efficiency of operations as in the case of the studies being undertaken by Treasury Board, they should be excluded.

Repetitive and Reasonably Uniform Over Time (Consistency of Output Definitions): Where an organization is engaged in a non-repetitive operation, it is difficult, if not

impossible to compare quantitatively the efficiency of doing work in one time period with its efficiency in another time period. This difficulty stems from the fact that the output in one period is different from the output in another period. For the purposes of measuring output and productivity, it is important that the output be defined or measured in terms of comparable units. When the nature or quality of service produced changes, or when new services are introduced or old ones dropped, all the various types of services should be counted as separate outputs because they have different values to the user and also because they require varying amounts of inputs. Therefore, in selecting output measures, attempt should be made to ensure that such changes in the various types of outputs are reflected in the measures, and that the measures represent uniform, consistent and comparable units from period to period.

Mission Oriented: Each government organization, or organizational unit, has an essential mission or a set of missions to perform. These are either prescribed by the Cabinet or established by policy or organizational practice of the parent or a central agency such as the Treasury Board. The outputs selected for an organization should reflect its mission. If they do not, they cannot truly be regarded as a service produced for consumption outside the agency. The government or cabinet which prescribed the mission of the organization may be viewed as the consumer of the services produced by the organization. Alternatively, the Cabinet, in prescribing the mission,

may be looked upon as representing the general public in specifying the goods and/or services which the organization should produce.

Where the objective is to measure program outputs and program efficiency, it is very important that the selected outputs be mission-oriented. Even if only operational outputs and efficiency are being measured, the selected outputs must be seen as contributing directly or indirectly to the accomplishment of the mission of the organization. If not, the outputs are not of value to the organization, to the government or to the general public, and as such should be dropped, and should not be counted for productivity measurement.

Mutually Exclusive: In selecting measures of outputs of an organization, care must be taken to select only those outputs which are mutually exclusive. If not, there is the danger of counting an item more than once at various stages of the operation or process. The danger of double counting is eliminated if only final outputs are selected.

The difficulty of selecting only mutually exclusive items is encountered most where the outputs of the components of an organization are to be aggregated to yield a composite output measure for the whole organization.

Definable: Unless the goods and services produced by an agency can be defined, effort should not be expended to select measures of output of the organization. In fact, before measures of output can be selected, the products should first be

defined and described. This will suggest whether the outputs can be measured, and what the appropriate measures might be.

Selection of Output Measures for the Excise Tax Audit Sub-Activity

On the basis of a review of the objectives, responsibilities and work procedures of the Excise Tax Audit sub-activity, two levels of output measures were considered for the purpose of these thesis. These are, proxy level 3 or program outputs which are related to the objectives of the sub-activity, and proxy level 2 or operational outputs which are the means of generating the program outputs.

(Refer again to Chapter 1, figure 2, The Means/End Hierarchy.)

It should be pointed out that the measures selected and used to calculate productivity measures in this paper are not the same as those used by the Customs and Excise department.

The following were considered as possible measures of the sub-activity's outputs:

Program Output

- level of voluntary compliance on the part of licensees
- dollar value of assessments or unvolunteered revenue
- dollar value of rejected claims
- net revenue

Operational output

- number of licensees on record
- number of claims submitted
- number of errors discovered

- number of audits completed
- number of claims verified
- number of investigations completed

Each of the above were then reviewed against the type of criteria discussed in the preceding section. The rationale for rejecting or accepting the measures is briefly described below.

One of the objectives of the Excise Tax Audit is to deter licensees from tax evasion, i.e. to increase their voluntary compliance of the excise tax laws and regulations. As such, the level or degree of voluntary compliance was considered as part of the program output of the function.

One potential measure of the level of voluntary compliance is the dollar value of assessment, which is also considered in its own right and discussed next as a possible output measure. The amount of assessment is a function of audit work done in the same time period, but the degree of compliance is the result of work done by the audit sub-activity as well as by the other sub-activities of the Excise Tax Branch in previous years.

A true measure of the degree of compliance is the ratio Y_v/Y_p where Y_v represents the amount of tax voluntarily paid, and Y the total potential amount of tax payable. But the denominator Y_p , i.e. the potential amount payable, is not known with sufficient degree of precision, although estimates can be derived by sampling, or on the basis of number of licensees, volume of sales and production, and tax rate. Effort should be made to estimate Y_p , and to use it for calculating the degree of

compliance each year. As reliable estimates could not be calculated, the level of voluntary compliance was therefore considered for the purpose of this thesis as unmeasurable. It was also rejected because it is not representative of work done solely by the Excise Tax Audit in the same time period. Voluntary tax payment or compliance is also the result of work done by the Valuation and Classification sub-activity of Excise Tax Branch.

Since one of the major objectives of the Excise Tax Audit function is to protect revenue by determining and assessing for recovery all such revenue due to the Crown, the dollar value of assessments was seriously considered as an output of the function. Although it is definable, mission-oriented, and may well be a program output of the sub-activity, it was found unsuitable as a basis for computing productivity measures. The amount of dollar assessment is not entirely dependent on the volume of audit work done but may reflect skill in selecting targets for audit. It does not vary in direct relationship with audit resources expended. It depends also on such external factors as changes in excise tax legislation, tax rate, tax base, general economic climate and degree of voluntary compliance. In fact, if the audit activity results in increased voluntary compliance, dollar assessments will decline, hence productivity based on revenue as output will appear to decline, an unacceptable result since productivity may in fact have increased.

Rather than use such dollar value as an output measure, the possibility of using it for an economic analysis for determining the optimal resource allocation to the function (if net revenue maximization is the objective) was discussed as a topic for further research. (See Chapter 5)

The dollar value of rejected refund claims was similarly rejected because it does not depend entirely on verification work done. Moreover, in the process of verifying refund claims, it may be found that a claim is less than what it should be. Should such additional payments or refunds be deducted from the value of rejected claims?

Net revenue, or revenue less costs was also found to be an unacceptable measure because it does not vary with the amount of work done and is beset by external factors. A more serious shortcoming is that efficiency measures based on net revenue will always suggest that a cut-back in resources will increase efficiency if, as suspected, the law of diminishing marginal returns applies to the Excise Tax Audit function.

If the law of diminishing returns applies, the net revenue curve will be as illustrated in the following diagram.

At X level of input, i.e. where marginal revenue equals marginal cost, net revenue is at a maximum. At this point, productivity is YX/OX . To the left of X , say at X' , productivity is $Y X' / OX'$. This is greater than productivity at point X , because the slope or tangent of the line drawn from the origin, O , to point X' is greater than that of the line from O to X . This would spuriously suggest that maximum productivity is achieved when only one unit of resource input is committed to the audit function.

Consideration was also given to the use of net revenue for the calculation of marginal productivity (an ideal measure for economic analysis of the audit function), but because of statistical and data problems encountered, as discussed also in Chapter 5, the use of net revenue was discarded.

No suitable program output measure was found, and the selection process shifted down to the potential measures of operational outputs.

The number of licensees is only a workload determinant. Since every licensee is required by law to be audited periodically, the total number of licensees reflects work to be done. It is, however, not representative of work actually done in any given period, especially since not all licensees are audited annually. Therefore, it was rejected as a measure of output, although it is useful as a basis of determining future workload[5].

The number of refund claims submitted was also rejected as not reflecting work actually done, but only what should be done.

One of the aims of audit is to detect and rectify errors in sales and excise tax liabilities reported and refund claims submitted by firms as a means protecting revenue and deterring tax evasion. Therefore, the number of errors discovered was also considered as a possible measure of output. Although definable and mission-oriented, such a measure does not satisfy two important criteria. It is not representative of the work done. It is also not homogeneous or uniform, as one error discovered is not equal to another either in terms of their values to the government or in terms of the costs incurred in discovering them. The number of errors discovered was therefore rejected as a valid output measure for the sub-activity.

Visible and tangible products of the function exist in the form of audit reports. These reports are produced as part of the audit process and are an integral part of the audit. In other words, the reports are not mutually exclusive from the audits, nor do they reflect the entire workload involved in audits. Another factor which militated against the use of reports as an output measure is the lack of homogeneity of such reports, in content, volume, quality, etc. Since they do not meet those important criteria, audit reports were judged not to be valid measures of output of the Excise Tax Audit sub-activity.

The number of audits completed would at first appear to be a suitable measure of the output of the Excise tax sub-activity. However, it does not truly represent all the work done by the function excluding, as it does, the verification of claims. Moreover, such a measure assumes that one audit is equal to another, i.e. that the criteria of uniformity be

satisfied). But this is not so since the relative amount of effort required to complete each audit varies, and hence so does the cost or value to the government.

With weights assigned to the pertinent factors which determine the amount of effort required for an audit, as discussed in Chapter 2, the Excise Tax Audit Branch has been able to classify audits according to their complexity.

One measure of the audit output which was selected for this study is the number of audits, by type and class, weighted according to the relative amount of effort that each type consumes. It was observed that the mix of the various types of audit is not constant from year to year. If it were, there would have been no need to weight them.

An examination of the number of refund claims verified shows that as in the case of a simple count of audits, such a measure is not representative of the entire work done by the function. On the other hand, it was found that although the verification of some refund claims may involve special investigations, on the whole, the average time required to audit refund claims is fairly constant. In particular, the mix of the difficult, average and easy-to-verify refund claims has been found to be stable from year to year. Thus, the number of claims verified was selected as part of the output of the sub-activity.

Investigations undertaken would appear to meet all output measure desiderata except that of homogeneity or uniformity. It appeared, however, from a cursory review undertaken by the management of the sub-activity, that the mix of the various types of investigation did not vary significantly from year-to-

year. As such the number of investigations completed was selected (6) as one of the output measures of the function.

From the discussion above, it is seen that audits classified by type and class, refund claims verified, and investigations completed are all outputs of the function. Therefore, to obtain a composite measure of the output, they should be weighted and added. The selected output measure for the function is therefore defined as the weighted aggregate of

- number of audits completed by type and complexity class,
- number of refund claims verified, and
- number of investigations.

Work in Progress

At the end of any period selected for measurement, certain audits, refund claim verifications, and investigations are in progress. The amount of audit work in progress at any point in time was found to be fairly constant. Moreover, since the time-period selected for measurement is long (12 months), the proportion of work in progress to total output in one year is relatively insignificant and was therefore ignored. If the measurement period were short and if the amount of work in progress varied significantly from time to time, an attempt should be made to estimate the value of that portion which has been accomplished.

Weighting

Where an organization produces more than one kind of output, as in the case of the Excise Tax Audit sub-activity, it is necessary to value or weight each before they can be aggregated.

Weights may be defined as measures of relative importance used to bring measures of different units to the same basis. In the private sector the weight or the relative importance attached by society to each commodity is determined in the market. This is simply the price. However, in the case of government, whose outputs are not sold in the market place, the unit cost of producing each output is used.

The unit cost, or input per unit of output may be considered as an absolute weight since it can be applied to the quantity or volume to yield an absolute value or cost. If, however, the volume of each type of output is indexed relative to the volume in a selected base year, in order to obtain an aggregate index of all outputs, each output volume index should be weighted by relative weights. These relative weights represent the proportion or percentage of inputs or costs used to produce each type of output to total inputs utilized in producing all outputs in the base period.

In order to aggregate the selected heterogeneous output of the Excise Tax Audit sub-activity, the unit cost system of weighting was selected because it was considered easier to understand, and does not require the indexing of output volume. Furthermore, the use of unit cost weights permits the expression of the outputs of the Excise Tax Audit sub-activity as well as those of the other activities of the Customs and Excise department in terms of a common unit, and hence facilitates their aggregation without cumbersome or complex computations.

In deriving the unit cost weights for the sub-activity, the national average time spent on each type of output in the

selected base-year has been used[7]. Although the Management Analysis Branch of the department has developed time standards[8] for each major work process of the sub-activity, the actual time has been chosen in favour of the standards since performance (production, efficiency, or productivity) in other years will be compared to the actuals observed in the base year. Actual total and average time spent on each task is recorded on the branch's Schedule 1, Analysis of Work Performance (see Annex A). On this form, time spent on work in progress, non-audit work and non-productive time are also recorded.

In order to calculate the unit cost, either in terms of man-years, personnel dollar costs (i.e. salaries and wages) or total dollar costs (excluding capital expenditures), all actual costs must be used. In other words, not only the productive time should be used. For instance, in the case of the Excise Tax Audit, all non-productive time (sick, annual, special and other leaves, language training, etc.) must be used in the calculation of unit cost of each output. The reason for including non-productive time is that such time is paid for by the government and therefore constitutes part of the cost of producing the outputs. If it is desired to assess the impact on productivity of the nonproductive time or a particular kind of it, e.g. sick-leave, two measures of productivity, one based on total paid time and another based on productive time, should be calculated.

The objective in computing unit costs should be to allocate the actual total cost to the various outputs in such a way that the resulting relative unit costs are equal to the

relative effort (as measured by average time) used to produce each output unit. In other words, the objective is to superimpose the average time ratios on the actual costs.

Where there is no time recording and the average time cannot be computed, time standards may be used to calculate unit costs in the base year. If time standards are not available either, it becomes necessary to rely on informed estimates of experienced line managers as to the relative amount of time spent in the production of each type of output. If this is done, it would be necessary to review these estimates from time to time, e.g., by a sample study.

Where a government function is geographically dispersed as in the case of the Excise Tax Audit, it may be necessary to calculate output and efficiency by regions or districts. If this is the case, a decision must be made as to whether the national unit costs or whether the unit costs applicable to each region should be used. The decision as to which unit cost would be used will depend on variations in the mix of outputs produced in each region, geographic, economic and other factors which affect costs, the purpose of measurement, etc. Where there are significant differences among regions or districts, individual unit costs should be used.

Algebraically, the mechanics of computing unit cost are given in the following Table 3.1. This approach is also used in computing actual Excise Tax Audit unit costs in Tables 5.1a and 5.1b of Chapter 5.

Let the quality of the various outputs of a sub-activity be represented by..... $X_1, X_2, X_3, \dots, X_n$
the average time; (time standard or estimated relative amount of effort required to produce the outputs by)..... $t_1, t_2, t_3, \dots, t_n$
the actual cost (expressed either in terms of paid man-time, salary costs or total costs) of producing these outputs by..... C

Then the unit costs of each output is calculated as in the table on the following page 50.

To summarize, in this chapter, the concept of output, the principles and procedures of output measure determination, and the output measures selected in this study for the Excise Tax Audit function as well as the rationale for choosing them have been discussed. In addition, the method of calculating unit costs for the weighting and aggregation of diverse outputs were described. The output measures selected and the weighting techniques described in this chapter are used in Chapter 5 to compute productivity measures for the Excise Tax Audit sub-activity.

DERIVATION OF BASE PERIOD UNIT COSTS

OUTPUTS	QUANTITY OF OUTPUT	THIS STANDARD OR ORIGINAL OR AVERAGE THIS APPLIED TO PRODUCT ONE UNIT OF EACH TYPE OF OUTPUT	OUTPUT VALUED AT THIS STANDARD	PROPORTION OF VALUE OF OUTPUT (IN THIS STANDARD) TO TOTAL VALUE	ALLOCATION OF ACTUAL OVERHEAD COSTS TO BOTH TYPES OF OUTPUT	UNIT COST
(1)	(2)	(3)	Col. (2) x Col. (3)	Col. (4) / Total Col. (4)	Col. (5) x C	Col. (4) / C = (6)
1	1	1	1.00	1.00 / 1.00	1.00	1.00
2	2	2	2.00	2.00 / 1.00	2.00	2.00
3	3	3	3.00	3.00 / 1.00	3.00	3.00
4	4	4	4.00	4.00 / 1.00	4.00	4.00
5	5	5	5.00	5.00 / 1.00	5.00	5.00
6	6	6	6.00	6.00 / 1.00	6.00	6.00
7	7	7	7.00	7.00 / 1.00	7.00	7.00
8	8	8	8.00	8.00 / 1.00	8.00	8.00
9	9	9	9.00	9.00 / 1.00	9.00	9.00
10	10	10	10.00	10.00 / 1.00	10.00	10.00
Total	55	55	55.00	1.00	55.00	1.00

FOOTNOTES TO CHAPTER 3

- [1] These are examples of outputs of government functions identified in various Operational Performance Measurement System (OPMS) Studies carried out by the Efficiency Evaluation Division, Planning Branch, Treasury Board Secretariat, Ottawa.
- [2] Although the objective of the Patents division of the Intellectual Property program of the Department of Consumer and Corporate Affairs is "to provide a basis for those who incur the once-and-for-all costs involved in the invention and introduction of successful new products and processes to secure a greater return for their efforts than they would otherwise obtain", the ultimate purpose is to encourage technological innovation as reflected in the overall objective of the Intellectual Property Program of which Patent is a component activity, namely: "to increase the potential for optimum innovation and product identification" - Consumer and Corporate Affairs Department 1974/75 Program Forecast.
- [3] In the "Operational Performance Manual, Vol. 1, Managerial Overview" recently issued by the Treasury Board Secretariat, the various levels of measures are considered as proxies of a program's contribution to human welfare or well-being. The further removed from well-being, the less suitable or appropriate are the measures. Inputs are proxy level 1 measures, operational outputs, level 2, and program outputs, level 3.

The program effects of the outputs are proxy level 4 measures and are the closest to the measure of well-being.

- [4] Total Productivity Measure (TPM) is the ratio of all outputs which can be attributed to efforts of an organisation, including purchased services, to all factor inputs including costs of purchase of outside services. This concept is more acceptable to private industry where TPM is seen to be closely correlated to profit. The concept of TPM is explained by J.P. Paraday in "The Management of Productivity" Management Publications Ltd., London 1971, pp. 19-22.
- [5] It should be pointed out that the departmental management uses the number of licences as an overall measure of the output of the whole Income Tax Activity embracing all the components: Audit, Collections, Values and Classification.
- [6] The TRA study-team in selecting investigations as an output measure, suggested that a brief study be undertaken to determine the extent to which the mix of the various types (easy, average, difficult) of investigations vary from year to year.
- [7] However, where efficiency measures are to be calculated for each region or district, the specific unit cost weights applicable to each location should be used.
- [8] A time standard is the optimal duration of time determined by special studies and set by management, during which a specific work can be efficiently completed. Time standards may be calculated or derived through work measurement

studies, time-motion studies, methods time measurement (MTM) or other techniques, or they may be arbitrarily set by management. They are the basis or standards against which work performance are compared. For more detailed information on time standards, see "Engineered Time Standards on Depot Maintenance Operations at Naval Supply Depot, Bayonne, N.Y." prepared by Management Engineering Division, Bureau of Supplies and Accounts, Washington 25, D.C.

CHAPTER 4 - INPUT

Another important variable in the measurement of productivity is input. In this chapter, inputs, their types, their measurement and associated problems are discussed. As well, the input measures chosen for the calculation of productivity measures of the Excise Tax Audit sub-activity and the reasons for their selection are discussed.

Inputs are the resources utilized in the production of outputs. Data and information on the various types of input used in an operation are important not only for the calculation of productivity, but also in determining the role, behaviour and contribution of each in the production process, all of which are important for efficient operation and control.

Types and Classification of Inputs

There are three basic types of input: labour or manpower, capital (including land and natural resources) and material.

Inputs of labour and capital are distinguished as primary inputs while all other costs e.g., costs of materials, fuel, transportation etc. are intermediate or secondary inputs. They are intermediate because they are the outputs of other production units in the economy. This distinction is particularly important with respect to the purpose of measurement. Where, as in the case of the Treasury Board, the intention is to determine the efficiency with which government operations are carried out, this distinction is not significant. However, where, as in the case of studies by Statistics Canada, the aim is

to measure real domestic product and productivity, it is necessary to make such a distinction, and to use only the primary inputs in the measurement of productivity.

Input costs may be direct or indirect. Direct inputs are those directly related to and usually vary with outputs. The indirect inputs have no direct relationship with the outputs of an organization. They are mostly overhead costs and generally include all the fixed costs.

Measurement of Inputs

The quantity and value of labour used may be measured in terms of man-time (man-years, man-months, or man-hours) or in terms of the dollar costs of labour, i.e., salary and wages, or personnel costs. The value of materials used is best measured in terms of dollars. The value of capital used is also measured in terms of dollars.

While it is not easy to determine the value of capital used in any time period, this may be assumed to be equal to the value of capital depreciated during the accounting period. However, the present accounting system used in the federal government does not provide for the amortisation of fixed assets, and consequently does not permit the estimation of the value of capital utilized in any given period. In addition, such costs as rentals of buildings or imputed rents are not available since the Department of Public Works (DPW) provides most of federal government offices. It is interesting to note that DPW is in the process of establishing shadow rental prices for government buildings which may help improve accounting for facilities utilized by government departments.

In the federal government, labour is the single most important input, accounting for between eighty and ninety percent of most departmental or program operating and maintenance (O&M) expenditures excluding transfer payments and capital expenditures[1]. As such, in the studies carried out by or with the support of Treasury Board, prominence is given to the relationship of output to labour input.

The measurement of labour input in terms of man-time assumes that the quality and mix of the various types (age, sex, skill, training, motivation, etc.) of labour remain constant from period to period. Thus, efficiency measures calculated on the basis of man-time would be affected to some extent by changes in the mix of labour used.

Usually, the quality and type of labour is assumed to be correlated to salary scales and wage rates. Hence measures based on man-time should be supplemented by those based on salary costs. If, for instance, the efficiency index based on man-time shows an increase, while that based on salary costs shows a drop, this may indicate that the labour used is being over valued. However, there may be an improvement in quality to offset this trend. The use of man-time as a measure of real labour input has the advantage of being stable over time and does not require any further measuring as in the case of salary costs which should be adjusted for price changes.

Problems of Measurement of Inputs

Unavailability of Data One problem which may not be suspected initially is the unavailability of input data. It is true that each government department keeps accounting records, but in some departments[2] cost data are maintained at much an

aggregated level that input costs of specific functions (which are necessary to determine the unit costs of outputs of the functions) are not readily available. In such cases, one may have to resort to estimation. In particular, capital costs (e.g., rents) and costs of intermediate inputs (e.g., material, transportation and fuel) are not usually charged against individual functions, sub-activities or even against responsibility centres but against the department as a whole.

Identification: Even if input data were available, the most common and perhaps the most serious problem usually encountered is the identification of the inputs of a function. As stated earlier, some costs are charged to common services.

Associated with this is the problem of identifying the "true" cost to the society of producing certain government outputs. For instance certain costs are borne by other departments such as Department of Supply and Services (DSS) and Department of Public Works (DPW) which provide what are generally termed common services. These costs are not usually identified with the costs of specific government operations or functions.

Even more difficult to identify are the costs borne indirectly by individuals and enterprises in, for instance, completing survey questionnaires for the government, maintaining records for the sole use of government etc. For instance, in the case of excise tax audit, licensees who are being audited spend their time and money to, provide and maintain the required records of pertinent data and information. This undoubtedly increases the true cost (beyond the cost to the audit function) to the economy as a whole of conducting these audits.

This type of problem is particularly brought into the limelight where program outputs (i.e., those outputs which are related to the objective of an organization) are to be related to inputs. In a large number of cases, the attainment of the objectives of particular government functions is not accomplished solely by the responsible organizations. Other agencies, e.g., agencies of other levels of government, non-profit organizations or the public at large contribute more or less to the achievement of the objectives or the production of the program outputs. For instance, "the number of people placed in jobs", which is a program output for one of the activities of the Manpower and Immigration program, is not solely affected by the efforts of the activity but also by the work of provincial and local governments, expansion in business, the general economic climate etc. Can the costs incurred by these other economic units be identified? This is hardly an easy problem.

Allocation If all or a major portion of inputs of an organization can be identified, there may also be a problem in allocating these inputs to specific outputs if the organization produces more than one output. In the federal government accounting system, cost data by responsibility centres or by activities and sub-activities are available, but the costs of each type of output are not. Hence, a way must be found to allocate the costs of a function (sub-activity or responsibility centre) to each output. This is particularly important for the base period, for without such allocation, the unit costs or weights of each output cannot be determined.

One of the ways of allocating inputs is through time reporting whereby the actual time spent by each employee in the production of each output is recorded. Usually this is best achieved where there is a cost-accounting system which requires that the time spent on each operational process be recorded. A system of time reporting not only permits the allocation of inputs in the base period, but also allows for the continuous monitoring of unit costs of each type of output.

Another method of allocating input costs is through the use of time standards or management estimates of the relative amount of time or effort used in the production of each type of output. This is the same procedure used for determining unit cost weights as illustrated in Tables 3.1, 3.1a and 3.1b. In those tables, data in column 6 represent the allocation of actual total input or cost to the various outputs in the base period.

Where all inputs can be seen to be directly related to the outputs of an organisation, allocation can be accomplished by any of the above methods. However, there is also the problem of allocating the indirect costs, particularly the overhead costs. In the government, the bulk of overhead costs are those of management or staff functions. Where line managers are solely concerned with the management of an operation or operations producing only one type of output, allocation of overhead costs is easy. Where, as is generally the case,

management is concerned with administration and control of operations producing many outputs, some decision must be made as to how much overhead costs should be treated.

One approach is to adjust the real value of total output (derived by multiplying the physical volumes or quantities by the base year unit costs) by the ratio of total costs including overhead to total direct costs in the base period. If two separate efficiency indexes are calculated, one based on only direct costs and another based on total costs including overhead, then the impact of overhead on efficiency can be monitored.

Another way of handling overhead costs is to apportion them to the various outputs in the same proportions as the direct costs. In this way the relative costs of producing a unit of each type of output is maintained while all the costs are utilized in the calculations. Both methods of treating overhead will yield the same value of total output in real terms.

It should be mentioned that for the measurement of productivity per man, all costs (direct and indirect) should be used and it does not really matter which method is used to allocate overhead costs. However, where the objectives of measurement include that of assisting management, then it is preferable to calculate two separate efficiency indexes, one based on direct inputs and another based on all inputs including overhead. In addition to these, it has been found valuable to

maintain as well the overhead ratio, i.e., the ratio of overhead costs to total costs as a useful indicator for management control of costs.

Comparability Over Time Just as it is important in the case of outputs to maintain comparability over time, it is equally important that the inputs as represented by the measures remain comparable over time. Generally, this is not the case, and it is necessary to adjust the data in order to maintain comparability.

It has been stated earlier that where labour inputs are measured in terms of man-time, the assumption is generally made that the quality and mix of labour remains constant. Although this may be generally true in many government operations, there are instances where the mix will change. Changes in the mix of labour usually occur where there are major changes in the production process and consequent factor input substitution. For instance a government operation responsible for issuing of cheques may initially be employing a large number of clerks. If it computerizes the operation, it is likely that a large number of the clerks will be replaced by a few computer programmers and punch card operators. Can the man-time spent by a large number of clerks in periods before computerization be validly compared to the man-time of a few programmers and punch card operators? The answer is of course "NO", and if efficiency indexes are computed using man-time, the probable result will be an increase in efficiency after the introduction of computer. However, if such a measure is supplemented by efficiency indexes based on salary costs, and

on total costs including the rental costs of the computer, then management can see the true impact of the change in production technique on the efficiency[3] of the operation. Where the change is a substitution of one type of labour e.g. lower paid employees in a particular classification, by a group of higher paid employees in another classification or pay scale, adjustment could be made to the man-time figures. This adjustment may be achieved by multiplying the figures after the change by a factor representing the relative worth (which can be assumed to be reflected by the pay scale) of the new type of employees to those employed in the base period. In any case, where the mix of labour changes, efficiency indexes based on man-time should always be supplemented by indexes based on salary cost.

The problem of comparability is even greater where inputs are measured in dollars because the value of the dollar is changing from period to period. For calculation of efficiency, the dollar costs must be expressed in real terms or constant dollars. To derive constant dollar value, the current dollar value of periods other than the base period must be adjusted to eliminate the effect of price changes. This can be achieved by deflation[4] i.e., by dividing the current dollar value of each resource input by the appropriate price index (also referred to as price deflator).

Constant dollar estimates of labour can also be obtained by multiplying the number of employees in each category by the average salary for each in the base period.

Inputs Used in the Calculation of Productivity
of the Income Tax Audit Function

Various types of inputs utilized by the Income Tax Audit function were considered for use in the calculation of measures of productivity. It was found that the most appropriate and accurate measure is man-time as measured in man-days. Figures are available for actual man-days spent on each type of audit by the operational auditors, the standard time and the non-productive time of the auditors as well as the total paid man-years.

In determining the man-days, the total man-years paid for is multiplied by 248 which has been estimated as the average number of working days in a year. In recent years, it is considered that a more realistic factor is 224 days per one year because of increased number of non-working days resulting from annual, sick, study and special leave, language and other training, and statutory holidays. Nevertheless, as long as the conversion factor remains constant the resultant productivity measures will not be affected.

In addition, the total man-years utilized by the sub-activity, including those of audit supervisors in the regions, as well as headquarters overhead, are available. Salary dollar costs were also used in the calculation so that the impact on efficiency of shifts in the pay classification, quality and skill of labour might be ascertained. However, separate personnel cost data for the operational auditors were not available. The total salary costs of the activity were therefore used. The

costs in the base period were allocated to each type of output on the basis of the relative amount of man time expended on each.

It was not possible to obtain a specific price deflator to be used in deflating the salary costs of Quar personnel engaged in the audit function. Consideration was given to the use of the overall deflator for government salaries and wages calculated by the deflation section of the National Accounts division of Statistics Canada. However, based on directives (which provided upper limits which salary increases should not exceed) from TDB to departments, it was considered more appropriate to assume an annual average increase of 6% in the salaries of auditors over the period covered. On that basis, the constant dollar estimates of the salary costs were derived.

As stated earlier, data on capital used during any time period are not maintained nor are capital costs specific to each function available. This is a general problem with respect to the accounting of capital expenditure in the government. With respect to material costs and other operating and maintenance costs, those portions of the overall departmental costs pertaining to the Excise Tax Audit function could not be isolated because the costs of material such as paper, pencils, etc. used are all budgeted in total for the whole department without an attempt to allocate or to charge the usage to each function or sub-activity.

The non-availability of capital and material costs is not a serious consideration, for labour alone accounts for over 95% of the Excise Tax Audit sub-activity operating costs.

Three types of input measures were therefore selected for calculation of productivity. These are: man-days of the operational auditors, total man-days used by the sub-activity including those of supervisors and staff at headquarters, and total salary cost. These are used with the output measures selected in Chapter 3 to calculate productivity measures for the Excise Tax Audit function in the following Chapter 5.

FOOTNOTES TO CHAPTER 4

- [1] Notable exceptions are the departments of National Health and Welfare and U.I.C. where a large proportion of their expenditures are in the form of welfare and unemployment payments.
- [2] A typical example is the Department of National Defence (DND) where salary costs and man-year data are maintained centrally by commands, and not by specific functions or specialities e.g., Medical; Transportation, Maintenance, Supply, etc. Similarly, other costs such as transportation, cleaning and laundry, etc. incurred by these functions are not charged against them but to other common services. In such cases where actual input cost data by functions are not available, estimates have to be made.
- [3] It should be mentioned that besides efficiency, quality aspects of the service e.g., accuracy, timeliness, reliability etc. are and should also be examined by management before and after such a change in technique. An example of the impact of computerization in the US division of disbursement, Treasury Department, is given in "Measuring Productivity of Federal Government Organizations" Bureau of the Budget, 1964 pp. 14 - 15 and 28 - 29.
- [4] The process of deflation is explained in "Operational Performance Measurement, Vol. 2, Techniques", Treasury Board, to be issued.

CHAPTER 5 - PRODUCTIVITY

Productivity Measurement

Having selected the measures of output of the Excise Tax Audit sub-activity and having decided that labour input is the most appropriate as well as being the most meaningful available data on resource utilization, in this chapter these data are used to calculate productivity or efficiency measures. In addition, the use of productivity measures in determining future resource needs are discussed, as well as relevant topics requiring further research.

The first step is to determine the weights to be assigned to each type of output in the base year. This is achieved (as discussed earlier in Chapter 3) by apportioning the total paid labour time in the same proportion as the actual time spent in the production of each type of output in the base period. The department uses 1970 as the base year in calculating its productivity measures. The same year was also chosen as the base year for this study after checks for sensitivity and representativeness showed it to be a normal year. Comparison of the average time spent to produce each type of output in that year with those of other years revealed no significant shifts in the unit cost weights.

In Tables 5.1a and 5.1b which follow, the derivation of the unit cost weights is shown. As an illustration, in Table 5.1a, the quantities of each type of output produced in 1970 are shown in column 2, and the average man-days expended by the operational auditors to produce one unit of each type of output

ESTIMATION OF BASE YEAR (1970) UNIT FIRM-WAY COSTS OF

EXCISE TAX ADULT OUTPUTS

EXCISE TAX ADULT OUTPUTS	QUANTITY	RELATIVE EFFICIENCY	EXCISE TAX COST	PROPORTION OF EXCISE TAX COST TO TOTAL	UNIT FIRM-WAY COST	EST. EXCISE COST
(1)	(2)	(3)	(4) = Col. (2) x Col. (3)	(5) = Col. (4) / Total Col. (4)	(6) = Col. (5) x 117,000	(7) = Col. (6) / Col. (2)
1. 8-15 Regular Adult	10,300	1.11	11,433	.091	14,469	1,397
2. 16-27 Regular Adult	11,800	2.12	24,816	.204	29,708	2,521
3. 28+ Regular Adult	2,400	6.74	16,176	.134	20,338	8,516
4. First Adult	8,400	1.89	9,204	.075	11,636	1,374
5. Branch Adult	100	1.48	1,480	.012	2,131	2,130
6. Apprentices	1,000	1.63	1,713	.014	1,533	1,534
7. Special Adult	100	1.38	138	.001	473	4,730
8. Refused Customs	60,000	0.31	18,600	.157	27,300	4,550
9. Departmental	100	4.80	1,668	.014	4,226	4,226
10. Total			85,308	1.000	117,000	

Source: Appendix A, "Analysis of Unit Excise Costs"

Notes: (a) Figures in this column may not correspond with those in column 7 of Appendix A due to rounding.

(b) Shaded from departmental records and not from Appendix A.

**DERIVATION OF BASE YEAR (1970) UNIT SALARY COSTS OF
SINCE 1970 UNIT SALARY COSTS**

ITEM	QUANTITY	UNITARY COST	SINCE 1970	SINCE 1970	PERCENTAGE OF RECENT ADJUST IN UNIT	CAL. (3) x 6.37	CAL. (3)	CAL. (3)	CAL. (3)
1. 1-15 Regular Audit	10,301	1.17	11,936	11,936	1.17	75,700	11,936	11,936	11,936
2. 16-22 Regular Audit	11,208	1.17	13,108	13,108	1.17	71,700	13,108	13,108	13,108
3. 23 - Regular Audit	1,348	1.17	1,576	1,576	1.17	9,600	1,576	1,576	1,576
4. First Audit	8,448	1.17	9,874	9,874	1.17	59,200	9,874	9,874	9,874
5. Branch Audit	489	1.17	572	572	1.17	3,680	572	572	572
6. Inspection	1,178	1.17	1,368	1,368	1.17	8,800	1,368	1,368	1,368
7. Special Audit	312	1.17	365	365	1.17	2,320	365	365	365
8. Defect Claims	69,375	1.17	81,100	81,100	1.17	518,000	81,100	81,100	81,100
9. Investigations	895 (b)	1.17	1,057	1,057	1.17	6,800	1,057	1,057	1,057
10. TOTAL			119,258	119,258		757,000	119,258	119,258	119,258

Source: Appendix A, "Analysis of Unit Performance"
 NOTE: (a) Figures in this column may not correspond with those in column 7 of Appendix A due to rounding.
 (b) Obtained from departmental records and not from Appendix A.

are shown in column 3. These figures are obtained from Schedule 1, "Analysis of Work Performance", an example of which is shown in Appendix A.

Column 4, weighted output, shows the values of outputs in terms of actual man-days spent on their production by operational auditors. These figures are derived by multiplying the quantity data of column 2 by the relative weight figures of column 3. For example, the value 11,414 man-days of the first type of output (8-15 Regular Audits) is obtained by multiplying the quantity 10,301 shown in column 2 by the relative weight 1.11 of column 3.

Total column 4, or total man-days spent in the production of the outputs is 89,268. In column 5, the proportion of the total man-days expended in the production of each type of output is shown. The figures are arrived at by dividing those of column 4 by 89,268. Thus for the first type of output, the figure 0.1281 is the quotient of 11,414 divided by 89,268.

The total man-days paid for, including supervisory and management man-time is 112,806 as shown in column 8, row 10. The next step in the calculation is to distribute this total of 112,806 man-days amongst the various outputs in the same proportions as shown in column 5. This is obtained by multiplying the figures in column 5 by 112,806. For example, the figure 14,449 of row 1, column 6 is the product of 0.1281 multiplied by 112,806.

Finally, the unit man-day costs of column 7 are obtained by dividing the man-day cost figures of column 6 by the quantity data of column 2, e.g. 1.4027 (of row 1, column 7) = 14,449 divided by 10,301.

25-26

[illegible]

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----

3

There is nothing to report for the month of September 1941. The only thing to report is that the weather was very good.

[illegible]

The values of α and β are not constant but are dependent on the frequency of the signal. The values of α and β are given in Table 1. For example, the value of α is 0.5 for a signal frequency of 100 Hz. The value of β is 0.5 for a signal frequency of 100 Hz. The values of α and β are given in Table 1. The values of α and β are given in Table 1. The values of α and β are given in Table 1.

(2) There is value of interest not obtained from column 1 of Schedule I the end of the year covered. (See Appendix A.)

SECRET

DESCRIPTION	UNIT OF MEASUREMENT	1967	1968	1969	1970	1971	1972	1973
EXPENDITURES AT CONVENT								
BALANCE YEAR (12/31/66) - \$11,000.00								
1. Direct Non-Steps	Non-Steps	79,467	83,437	101,385	111,806	111,347	111,462	111,255
2. Total Non-Steps (a)	Non-Steps	79,467	83,437	101,385	111,806	111,347	111,462	111,255
3. Total Salary Cost	Salary	110,138	115,338	143,812	154,736	158,361	157,876	166,111
4. Total Salary Cost	Salary	110,138	115,338	143,812	154,736	158,361	157,876	166,111
5. Total Salary Cost	Salary	110,138	115,338	143,812	154,736	158,361	157,876	166,111
6. Total Salary Cost	Salary	110,138	115,338	143,812	154,736	158,361	157,876	166,111
EXPENSES FOR 1973								
1. Direct Non-Steps	Non-Steps	85,432	87,358	106,463	111,806	111,741	111,863	119,736
2. Total Non-Steps	Non-Steps	85,432	87,358	106,463	111,806	111,741	111,863	119,736
3. Total Salary Cost	Salary	131,923	136,152	158,308	164,736	164,736	164,736	164,736
4. Total Salary Cost	Salary	131,923	136,152	158,308	164,736	164,736	164,736	164,736
5. Total Salary Cost	Salary	131,923	136,152	158,308	164,736	164,736	164,736	164,736
6. Total Salary Cost	Salary	131,923	136,152	158,308	164,736	164,736	164,736	164,736
RECURRING EXPENSES								
1. Expense per Direct Non-Step	Non-Steps	85.43	87.36	106.46	111.81	111.74	111.86	119.74
2. Expense per Total Non-Step	Non-Steps	85.43	87.36	106.46	111.81	111.74	111.86	119.74
3. Expense per Salary	Salary	76.1	76.1	76.1	76.1	76.1	76.1	76.1
4. Expense per Change	Change	1.1	1.1	1.1	1.1	1.1	1.1	1.1
5. Expense per Change	Change	1.1	1.1	1.1	1.1	1.1	1.1	1.1
6. Expense per Change	Change	1.1	1.1	1.1	1.1	1.1	1.1	1.1

100

EXCISE AUDIT OUTPUT AND INPUT IN DIRECT MAN-DAYS, AND PRODUCTIVITY
1967-1973

LEGEND

- INPUT
- PRODUCTIVITY (DIRECT MAN-DAYS)
- OUTPUT

ENGINE ADHIT OUTPUT AND INPUT IN TOTAL MAN-DAYS AND PRODUCTIVITY 1967-1973

Total
Man-days
(000's)

Product
ity

LEGEND

- INPUT
- PRODUCTIVITY (TOTAL MAN-DAYS)
- OUTPUT

EXCISE ADULT
 OUTPUT AND INPUT IN CONSTANT (1970) SALARY DOLLAR AND PRODUCTIVITY
 (1967-1973)

Constant
 Salary \$
 (\$1,000)

8000

7500

7000

6500

6000

5500

5000

4500

INPUT

PRODUCTIVITY

OUTPUT

1967

1968

1969

1970

1971

1972

1973

Product
 ity %

110

105

100

95

90

85

80

75

LEGEND

----- INPUT
 PRODUCTIVITY (SALARY COST)
 - - - - - OUTPUT

In Tables 5.2a and 5.2b the man-day and salary unit costs of Tables 5.1a and 5.1b respectively, are used to value the quantities of the various types of outputs in all other years in order to derive their values in real terms. In essence, these values are what the outputs would have cost if they were produced at the same unit labour time costs that prevailed in the base year, 1970. Following this, in Table 5.3, the values of the outputs are divided by the value of input to yield the productivity indexes for each year. Three separate measures are calculated in order to determine the impact on efficiency of direct and indirect labour input as well as of any change in labour quality. The first measure is based on direct labour time input, the second on total paid-for man-days including overhead, and the third on total salary costs.

The output, input and productivity measures of Table 5.3 are plotted in Charts 5.1, 5.2 and 5.3. The productivity indexes based on direct labour input, i.e. the man-day input of operational and field, show that after significant gains between 1967 and 1970, productivity remained virtually at the 1970 level in 1971, declined by about 4% in 1972 and remained at about the same (1972) level in 1973. It is interesting to note that increases in productivity between 1967 and 1970 were accompanied by sharp increases in output, and that after 1970, both productivity and output series slowed down.

When the man-day inputs of supervisory and headquarters staff (i.e. overhead) are included, the indexes indicate increases in 1968, 1969 and 1971, and decreases in 1970, 1972 and 1973. It is interesting to note that while the productivity index based on direct man-days increased in 1970 and

(marginally) In 1973, the index based on total man-days declined in those years. This is because, while direct input increased by 7.8% and 1.4% in 1970 and 1973 respectively, total inputs increased more, by 13.1% and 6.7% in those years. If the ratio of overhead to total input had remained constant at the base-year level, then the year-to-year changes in productivity based on labour input of operational auditors, and those based on total labour input, including overhead, would have been the same.

The series based on salary cost of all Excise Tax Audit employees showed significant declines in three consecutive years, 1970-1972. The pronounced downward trend indicated by this series in those years, as compared to the movement of the series based on man-years, is due to the fact that real salary cost in those years rose more rapidly than man-year inputs. This would suggest that in those years, there were substantial upgrading of auditor positions (promotions and reclassification) which were not commensurate with gains in productivity.

All three indexes indicate a substantial productivity increase in 1969, and on the whole, they suggest that between 1967 and 1973, labour productivity of the Excise Tax Audit increased by an annual average of about 2 percent. A longer series is of course required in order to discern any underlying trend. Nevertheless, on the basis of the limited evidence, it may be inferred that savings from productivity improvement achieved by the sub-activity between 1967 and 1973 amounted to about 15,200 operational auditor man-days or 61 man-years, about 21,000 total man-days or 85 man-years, and about \$900,000 in salary costs in terms of 1970 dollar.

Determination of Resource Requirement

An audit output is planned in advance, the labour resources required can be forecast using the following formula, which postulates labour resource requirement as a function of output, price, and targeted productivity:

$$R_t = \frac{R_b \times O_t \times P_t}{\%_t}$$

Where R_t = labour resources required in time period, t

R_b = labour resources utilized in base-period, b

O_t = Index of forecast output in time period, t

P_t = estimated labour price index for time, t

$\%_t$ = index of targeted productivity in time t

Where labour resources are estimated in terms of man-time only, the P can be dropped out of the equation.

Topics for Further Research

As discussed earlier, the objective of the Excise Tax Audit function is not simply to produce the outputs which have been identified and used in the calculation of the above efficiency measures. Rather, those operational outputs are the means of attaining the objectives set for the function, namely: the recovery of excise tax revenue which is not voluntarily paid by licensees, and obtaining the right type of compliance on the part of the licensees. It may be postulated that the more audit outputs are produced, the more unvolunteered revenue and better future compliance are generated. However, a change in the volume of operational output may not generate a corresponding or proportionate change in either the amount of unvolunteered revenue or compliance. Therefore, in addition to calculating

and using productivity measures based on operational outputs for resource determination, further research should be made to:

- develop reliable estimates of program outputs;
- use economic analysis to determine the optimal amount of resources to be channelled to the Excise Tax Audit function;
- determine how some of the major factors which affect audit revenue should be taken into account when making decisions on resource allocation to the sub-activity.

Developing Reliable Estimates of Program Outputs: It was noted in Chapter 3 that no program output (i.e. output which reflects the extent of attainment of an objective) was selected for the calculation of productivity because appropriate and reliable measures were not readily available. In particular, it was noted that a true measure of the degree of compliance, which is one of the sub-activity's program output, is the ratio of the amount of tax voluntarily paid and the total potential amount of tax payable. However, reliable estimates of potential tax revenue are not available. Further studies will be necessary in order to obtain good estimates of this variable so that the degree of compliance can be calculated. Such research might profitably explore the possibility of using sampling, and data on such pertinent variables as number of licensees, tax rate, and estimates of gross volume of production and sales to compute potential tax due.

Marginal Analysis for Optimal Resource Allocation:

When a government activity has been created for the purpose of revenue collection, it becomes possible to apply to it a type of economic analysis similar to that used in determining the optimal resource allocation and production level for a firm.

It is of critical importance for this kind of analysis that the objective(s) be expressed in precise terms rather than in the ambiguous way in which they are generally stated. Furthermore, they should be expressed in such a manner that the extent to which they are accomplished can be quantified. As noted before, the objectives of Excise Tax Audit are revenue protection, detection, and deterrence or compliance.

— The first, revenue protection, is an objective of ensuring that all excise money due to the crown but not volunteered in accordance with the law, is collected. This objective is not specific in its present form. It could be translated as an aim to achieve any of the following three specific goals:

1. Simply maximize revenue, i.e., collect all unvolunteered excise dollar.
2. Maximize net revenue, i.e., revenue less costs.
3. Break even financially on the audit operation.

The objective of detection of error is not truly an objective per se. It is only a means used to achieve the other objectives, i.e., revenue protection and deterrence. Although it

is identified as an objective by the Excise Tax Activity management, and although it is clear and precise, it is not, and should not be considered an objective for the purpose of analysis.

The third objective of deterrence and compliance is a goal to instill correct behaviour among licensees in the present and in the future. Although the objective is unambiguous, it is not precise enough to permit the measurement of the extent to which it is accomplished. As the degree of compliance increases, all other things being equal, voluntary tax revenue will increase while unvolunteered revenue or assessments as well as errors detected will decline. Should the objective therefore be expressed as a goal to:

1. minimize revenue not initially volunteered by licensees, or
2. minimize errors in excise tax statements by licensees?

Stated in the above terms, the objective would appear to be contrary to other objectives. For example, minimizing revenue not initially volunteered could be misinterpreted as a goal to minimize assessments. If so, it will be contrary to the objective of maximizing unvolunteered revenue. Success or improvement in the attainment of the compliance objective as measured by decrease in assessments would appear to be a failure or deterioration in the achievement of the objective of maximizing unvolunteered revenue.

The apparent conflict is due to a subtle difference in the variables to be maximized or minimized, namely the amount of unvolunteered tax revenue detected and the amount of unvolunteered revenue existing. Maximization relates to the amount detected, while minimization relates to the amount existing. In symbols, if Y_p represents potential tax revenue in any time period, Y_v the amount volunteered in the same period, then maximization objective is to maximize $(Y_p - Y_v)$ detected, and minimization objective is to minimize $(Y_p - Y_v)$ existing.

It should be pointed out again that the minimization of unvolunteered revenue existing is not achieved by audit effort in the current time period, but by audit work as well as that of other sub-activities of Excise Tax activity in previous years. In other words, compliance is only partly achieved through audit. It is therefore not suitable for analysis of the audit function.

As noted earlier, reliable data on the amount of potential tax revenue for any period are not available. As such, it is not possible at this time to express the compliance objective in a meaningful quantifiable form. $(Y_p - Y_v)$ detected is equivalent to assessments. There is the danger that assessments may be misinterpreted as the amount of unvolunteered revenue existing. Consequently, if there is a decline in assessments from one year to another, it might be misconstrued as a decrease in $(Y_p - Y_v)$ existing, and hence an improvement in the achievement of the compliance objective. If the performance of the Excise Tax Audit is unwittingly assessed on the basis of year-to-year decrease in assessments, there is a greater danger that auditors may overlook some evasions, errors,

and cases where assessments are necessary. Consequently, licences may not be assessed for some unvolunteered revenue due to the Crown.

It would appear from the above discussion that only the revenue maximisation objective should be considered for analysis because:

- (a) it is understandable and not subject to misinterpretation;
- (b) it can be expressed quantitatively and is therefore suitable for monitoring performance;
- (c) the objective of detection is actually not an objective but a means or instrument for attaining the other objectives; and
- (d) the compliance objective is a joint objective of all sub-activities of the Excise Tax activity and therefore not suitable for the analysis of the audit function alone.

Amongst the three possible ways of expressing the revenue objective more specifically, the net revenue maximisation is the most reasonable as well as the most suitable for meaningful and useful analysis. Maximisation of total revenue without regard to cost is potentially uneconomical and almost irrational. The objective of breaking even yields no net financial benefit to the activity or the government.

With the revenue objective precisely specified, marginal analysis can be applied to the Excise Tax Audit function. In the case of the firm, the objective is profit maximisation. In the case of the audit function, the objective

is similar, namely net revenue maximization. Such analysis could be used to determine the optimum amount and mix of resources to be channelled to the sub-activity.

The objective of the analysis is to determine the point where an additional dollar cost of the sub-activity will yield an additional dollar of unvolunteered excise tax revenue.

An attempt was made in the course of this study to carry out this type of analysis but the result was unsuccessful because of a number of statistical problems:

- (a) The available set of data was not sufficient enough to permit appropriate statistical analysis and its use in fitting curves. Only seven sets of annual observations were available.
- (b) The revenue curves to be used in the analysis should refer to a point in time, but the available historical data relate to different points in time. Hence any curve derived from them will be subject to shifts due to changes in such pertinent factors as tax rates, number of commodities subject to tax, level of voluntary compliance, audit selection and volume of audit.
- (c) Similarly the cost curve is subject to shifts due to changes in the price of labour and other factors.

Further research into the method of deriving the relevant cost of revenue curves and using marginal analysis to determine optimal resource needs of the Excise Tax Audit sub-activity will be potentially beneficial.

Major Factors Affecting Assessment (Unvolunteered Revenue)" Although it was suggested in the preceding section that the objective of maximizing net revenue could be used as a basis for analysis to determine optimal resource allocation for the Excise Tax Audit-Function, this should not be misinterpreted to mean that all other objectives should be ignored. The sole pursuit of the net revenue maximization objective could lead to deterioration in the achievement of the deterrence or compliance objective. Selection of licensees to be audited may concentrate on those with higher revenue potential, ultimately resulting in a slackening of compliance among those with low revenue potential. As such, in determining the resource requirements for accomplishing this objective, one should ensure that the net gain in revenue arising from concentrating on the audit of licensees with higher revenue potential exceeds the loss of potential revenue resulting from not auditing licensees with low revenue potential. Furthermore, it would be necessary to consider the impact of the major factors which affect unvolunteered audit revenue or assessments.

Some of the important factors which determine the amount of assessment are: audit selection procedure, the intensity of audit, the volume and quality of audit output, ex-ante compliance activities of the Excise Tax branch (such as Valuation and Classification) which are geared towards achieving greater voluntary compliance, the state of the economy, the volume of transactions by licensees, the number of licensees, the tax rate, the number of items subject to tax, and the integrity of licensees.

A diagrammatic presentation of how these factors affect revenue from audit or assessment is given on page 87. A brief explanation of how each impacts on assessment and how they could be taken into account in deciding the amount of resources to be allocated to the audit function is also given.

The external factors have substantial influence on the amount of total revenue due to the Crown. For instance, if national-income increases, it is reasonable to expect that the volume of transactions of licensees would increase, thus resulting in an increase in total tax due. If the integrity of the licensees is higher, voluntary payments will rise thus reducing the amount that could be picked up as a result of audit. If integrity and compliance remain unchanged or falls, then the amount of unvoluntarily tax revenue will definitely increase, given that audit selection and procedures remain unchanged, assessments will also increase. The GNP can be used a proxy for the volume of business done by the licensees. If voluntary tax revenue increases at a lower rate than the GNP, it could be estimated that unvoluntarily tax due has increased. In that case, audit resources might be appropriately increased in order to detect and collect as much of the unpaid tax as possible.

As the number of licensees grows or as the number of commodities subject to tax increases, both the workload and revenue of the Excise Tax Audit will increase. Both variables are quantifiable, but since the number and mix of commodities

subject to tax are frequently changing, it would be a tedious and painstaking job to obtain the numbers of taxable commodities in each year. Audit resources should be varied in the same direction as changes in the numbers of licensable and taxable commodities.

All activities of the Excise Tax Branch directly or indirectly affect the amount of revenue collected on a voluntary basis and those collected as a result of audit. In particular, those activities performed ex-ante to achieve compliance, e.g. dissemination of pertinent information and rulings to licensees by Valuer and Classification sub-activity, will tend to increase voluntary tax payments, and consequently, reduce assessments. Similarly, the ex-post actions of the audit function taken after the voluntary payments have been made, will tend to increase compliance and voluntary payments in subsequent years and reduce assessments in those years.

Since all the compliance activities, Audit, Valuer and Classification, are working towards the same goal, namely, the recovery of all tax revenue due to the Crown, resources devoted to one should be considered substitutable for resources devoted to the other. Allocation of resources to each should take into account the relative prices of the types of labour used in each, as well as whether emphasis should be on prospective or on retrospective compliance activity. Given the present inflationary trend, a dollar of tax revenue obtained when due is worth more than if obtained three years later as a result of audit. Effort should therefore be concentrated on the

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collection of tax revenue as promptly as possible. If it were possible to determine the marginal tax revenue yields per additional resource input into each type (prospective and retrospective) of compliance activity, resources should be allocated such that the marginal tax yields per additional dollar devoted to each activity are exactly equal.

Assessment is a direct function of the rigour and thoroughness with which audits are conducted. However, the more thorough the audit the more time consuming, and therefore the more costly it is. In addition, increased thoroughness of audit may incur the dissatisfaction of licensees and even lower voluntary compliance in the future. Should management of the Audit sub-activity want the quality and rigour of audit to be increased (i.e. check, and recheck), audit resources should be increased.

Selection of licensees to be audited is also a determinant of the amount of revenue that can be derived from audit. If the selection is done on a random basis the amount of revenue derived will be smaller than if the sample was purposive, and aimed at picking up those licensees with high revenue potential. In other words, if licensees are classified according to the audit revenue potential (such classification will be based on such factors as the size of the licensee, past records on compliance, and amount of voluntary payments), and a higher proportion of those with high-revenue potential is selected relative to those with low-revenue potential, a greater amount of revenue will be generated.

collection of tax revenue as promptly as possible. If it were possible to determine the marginal tax revenue yields per additional resource input into each type (prospective and retrospective) of compliance activity, resources should be allocated such that the marginal tax yields per additional dollar devoted to each activity are exactly equal.

Assignment is a direct function of the rigour and thoroughness with which audits are conducted. However, the more thorough the audit the more time consuming, and therefore the more costly it is. In addition, increased thoroughness of audit may incur the dissatisfaction of taxpayers and even lower voluntary compliance in the future. Should management of the Audit sub-activity want the quality and rigour of audit to be increased (i.e. check, and feedback), audit resources should be increased.

Selection of taxpayers to be audited is also a determinant of the amount of revenue that can be derived from audit. If the selection is done on a random basis the amount of revenue derived will be smaller than if the sample was purposive, and aimed at picking up those taxpayers with high revenue potential. In other words, if taxpayers are classified according to the audit revenue potential (such classification will be based on such factors as the size of the taxpayer, past records on compliance, and amount of voluntary payments), and a higher proportion of those with high-revenue potential is selected relative to those with low-revenue potential, a greater amount of revenue will be generated.

If revenue was not the primary objective, and the key aim of audit was to instill correct behaviour amongst all categories of licensees, then a random selection will be more appropriate. Although audit selection affects revenue, it does not affect labour input, unless the sample size is increased. So in determining the amount of resources to be devoted to the audit in order to maximize revenue, audit selection should be a secondary consideration.

In order to glean some insight into how those quantifiable variables which affect revenue relate to each other, observations for the 7 year period are graphed in Chart 5.7.

No particularly striking relationships or trends are discerned. Generally, all the variables have been moving in an upward direction. Since 1971, the movement in GNP seems to parallel that of audit assessment. Audit assessment and assessment less audit salary cost (i.e. net revenue) have been moving parallel to each other, and in later years, almost parallel to audit input. No definite conclusions regarding productivity or resource allocations could be drawn from the chart. Nevertheless, further studies could be profitably undertaken to determine how these factors which affect compliance and assessment could be incorporated in the resource allocation mechanism for the Excise Tax Audit function.

Major Variables Associated with or Affecting the Enslavement Tax Audit Function

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- Audit Input (000's of man days)
- Audit Output (000's of direct man days)
- Audit Amendment (000,000's of dollars)
- No. of Litigations (000's of litigations)
- Input into other Enslavement Tax Activities (000's of man days)
- GDP at Market Prices (\$'000,000)
- GDP Less Gov't. Exp. on O & M (\$'000,000)
- Compensation Less Salary Cost (Net Revenue) (\$'000,000's)

CHAPTER 6 - CONCLUSION

The author believes that the major objectives of this thesis have been achieved. It has provided the management of Customs and Excise Department with a basis for measuring and monitoring the productivity of the Excise Tax Audit function. The productivity measures computed and shown in Table 5.3 of Chapter 5 not only makes the performance of the function visible, but also raises a number of questions as to why certain results have been obtained. Answers to these questions and conscious effort towards that end on the part of the departmental management will lead to productivity improvement and consequent considerable savings in resources, both for the department and the federal government as a whole. Savings in resources (85 man-years and \$0.9 million salary costs in terms of 1970 constant dollars) between 1967 and 1973 from productivity improvement achieved by the sub-activity has been made visible. As well, the paper highlights the need to assign priorities to the objectives of the function and to state them in more specific terms so that analysis can be carried out to determine the optimal amount of resources that will be required to achieve the objective.

Conclusions and findings from the thesis may be summarized as follows:

- (a) The thesis has demonstrated how output measures can be identified, weighted and aggregated, and productivity calculated for a government function.

The calculations illustrate that where different inputs are used in the calculations, different indications of productivity changes are obtained. Thus, whereas the audit output per unit of direct labour input increased in all the years between 1967 and 1973 except in 1972, output per unit of all labour input (including overhead) showed declines in three years, 1970, 1972 and 1973.

These results raised the question - Why? Some of the answers partly provided by the data of Table B.3 and those suggested by the personnel of the Excise Tax Branch were: In 1972 for example, productivity declined because output dropped but was not accompanied by a decrease in input. On the contrary, inputs increased in that year. New operational auditors were hired and productivity declined because of time spent by the experienced auditors to train the new ones. There was also a significant turnover of old and experienced staff.

- (b) The computed productivity measures for the function confirm what has been observed in similar studies in Canada, U.S. and the U.K., i.e. that productivity of government activities is not constant as assumed in the national accounts.

(c) With the type of output, input and productivity data calculated, the management of the Excise Tax Audit Function can make a more rational resource allocation to the function, since the average output per unit of input, the backlog of audit and the number of licensees to be audited are known.

(d) Finally, the thesis has suggested relevant topics for further studies which if carried out, will provide potentially meaningful, reliable and useful data. In particular, the departmental management will find it useful and worthwhile to examine in further detail the following:

- method of computing reliable estimates of potential tax revenue and consequently the degree of compliance.
- possible use of marginal analysis to determine the optimal amount of resources to be devoted to the Excise Tax Audit function.
- the impact of audit selection on revenue, i.e., should selection be random or purposive? This should be considered in relation to the objective(s) i.e. revenue versus compliance.
- the relationship between, and effects on revenue of, ex-ante (Values and Classification) and ex-post (Audit) compliance

activities. The allocation of resources to each should be such that the marginal revenue derived by each should be equal.

the extent to which variations in the relevant factors such as number of licensees, UNP, etc. affect revenue.

In order that the impact of each type of resource input on productivity can be discerned, data should also be maintained on salary costs of operational auditors, and total dollar cost (including material, capital used, etc.), of the audit sub-activity.

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TABLE 1 COMPLETED DEPARTMENTAL PROJECTS

Department	Estd. DMY 1973/1974	Man-years Covered by OPM	Dept'l Coverage (%)	Gov't Coverage (%)
1. Post Office	49,871	46,380	93	11.7
2. NR-Taxation	13,047	10,698	82	2.7
3. NR-Customs & Excise	8,918	8,205	92	2.1
4. Manpower & Immigration	10,987	7,567	69	1.9
5. Veterans Affairs	10,346	6,725	65	1.7
6. Unemployment Ins.	12,126	10,307	85	2.6
7. DHB - Services	4,592	3,674	80	0.9
8. Cong. & Corp. Affairs	2,396	1,845	77	0.5
9. Public Archives	502	447	89	0.1
10. National Energy Board	247	151	61	0.0
11. Bureau of Pensions Adv.	109	102	94	0.0
12. National Library	413	351	85	0.1
Total	113,534	90,452	85	24.2

TABLE 2 DEPARTMENTAL PROJECTS IN PROGRESS

Department	Est. DMY 1973/1974	Potential NY to be Covered by OPM	Potential* Dept'l Coverage (%)	Potential Gov't Coverage (%)
1. National Defence	121,142	62,993	52	15.8
2. DHB - Supply	5,219	3,653	70	0.9
3. NH&W - Welfare	2,695	2,264	84	0.6
4. NH&W - Health	6,627	3,314	50	0.8
5. Communications	2,709	1,490	55	0.4
6. Labour	1,404	884	63	0.2
7. Transport	23,314	15,154	65	3.8
8. Environment	11,996	6,598	55	1.7
9. RCMP	15,556	10,089	70	2.7
Total	190,662	102,239	56	27.0

*Note: Potential man-years to be covered by OPM represent departmental man-year resources which should be covered by measures of operational efficiency once the project is completed.

TABLE 3 DEPARTMENTAL PROJECTS OUTSTANDING

Department	Est'd. DMY 1973/74	Potential Man-years to be covered by OPMS	Potential ¹ Dept'l Coverage %	Potential Gov't Coverage %
1. Indian Affairs & Northern Development	12,870	9,657	75	2.4
2. Public Works	6,213	6,570	80	1.6
3. Agriculture	11,885	7,131	60	1.8
4. Solicitor General	6,447	4,513	70	1.1
5. Energy, Mines & Resources	6,549	4,782	35	1.2
6. Statistics Canada	5,161	3,097	60	0.8
7. National Research Council	3,641	1,436	40	0.4
8. Public Service Commission	1,550	1,162	75	0.3
9. Industry, Trade & Commerce	2,772	693	25	0.2
10. Regional Economic Expansion	2,278	911	40	0.2
11. Secretary of State ²	14,320	948	7	0.2
12. Urban Affairs ³	3,850	536	14	0.1
13. Justice	1,036	528	50	0.1
14. Canadian International Development Agency	840	420	50	0.1
15. External Affairs	5,021	753	15	0.2
16. Treasury Board	655	164	25	0.0
Other	4,402	0	0	0
TOTAL	93,534	43,241	46	10.9
TOTAL PUBLIC SERVICE (incl. Military)		397,730		

NOTE: ¹ Potential man-years to be covered by OPMS represent departmental man-year resources which should be covered by measures of operational efficiency once the project is completed.

² Secretary of State includes:

Canada Council, Canadian Broadcasting Corp., Canadian Film Development Corp., Company of Young Canadians, National Arts Centre Corp., National Film Board, Canadian Gov. Photo Centre/Revolving Fund, National Museums of Canada, Staff Development and Training Revolving Fund, Representation Commission.

³ Urban Affairs includes:

Central Mortgage and Housing, National Capital Commission

⁴ Other includes:

Finance, Governor General, Parliament, Privy Council, Science & Technology

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