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# PRODUCTIVITY IN THE PUBLIC SERVICE: A REVIEW OF THE LITERATURE

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# Productivity in the Public Service: A Review of the Literature

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# Productivity in the Public Service: A Review of the Literature

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## Executive Summary

The purpose of this report is to build a deeper understanding of the concept of productivity in the public service, its reality, and its drivers, in order to inform future people management research and policy. Productivity in the public service is an important issue for two principal reasons. First, much attention is paid to productivity as a measure of economic performance, and as a variable of concern in economic policy making, since productivity is the most important long-run determinant of living standards. Because the public sector is a large part of most advanced economies, mismeasuring productivity in the public service can result in misleading conclusions about trends in economic growth. Second, productivity is the best available means of assessing the overall efficiency of the government. As such there is considerable scope to improve management in the Government of Canada through improving the measurement of productivity.

It is important to be clear about how we define inputs, outputs, outcomes, and productivity. Productivity is most appropriately measured as the ratio of output to input measured in volumes that encompass dimensions of both quantity and quality. Outputs contribute to outcomes, but the relationship is most often affected by the context. For example, the output of the Correctional Service is only one factor that determines the crime rate. Many other factors that may be more or less subject to the Government of Canada's control may also contribute.

Measuring public service productivity presents somewhat different – and often more difficult – challenges than measuring the productivity of most areas of the private sector. The traditional approach has been to assume that government output grows at the same rate as government input (input = output); this assumption has widely been viewed as unsatisfactory because it implies that government never experiences productivity change. The most important distinguishing factor is that public service output is rarely sold at economically significant prices. As a result, it is more difficult to determine the value of what is being produced independent of the volume of inputs. Sometimes, in the case of collective output, which is consumed by society as a whole, even defining output can be challenging. Other important conceptual and measurement issues include how to adjust input and output measures for quality; how to aggregate different types of outputs to obtain estimates of department or government output in the absence of prices; how to ensure measures of inputs and output are comprehensive; and how to address the complementarity between public and private sector output.

The Government of Canada can learn from a number of countries that have made significant progress in overcoming these conceptual and measurement challenges. The leader today is the United Kingdom, and if anything this lead seems to be expanding. The United States had an extensive program to measure the productivity of the federal

government from 1967 to 1994, and this program could offer interesting options for measuring the productivity of activities, work units, and government organizations. New Zealand, Finland, and Australia have also made progress in moving away from input = output methods of estimating the growth of government output. Statistics Canada does not currently produce explicit estimates of government productivity; it uses the traditional input = output method to estimate government output.

The approach taken in the *People Management Framework* (PMF) to emphasize soft human resources management indicators to improve productivity – including employee engagement and organizational culture – is appropriate given the limited base of literature on the drivers of public service productivity. Our key observation about two-way linkages between the PMF and productivity is that the linkage is not, in fact, two-way, because the Government of Canada does not measure public service productivity in a manner that is consistent with the international good practice embodied in the national accounts. There is no two-way linkage because productivity is not measured and so cannot support the PMF.

There is now significant opportunity to use the PMF to considerably improve the measurement of productivity in – and thereby the management of – the Government of Canada in a manner consistent with the good practice and the national accounts. Based on the findings of this report, we recommend that the Government of Canada:

- Carefully define, develop empirical estimates of, and monitor the PMF indicators in order to determine their relationship with productivity, outputs, and outcomes, for use in future initiatives to improve productivity.
- Establish a program to rigorously measure public service productivity (and aggregate federal government productivity) in a manner consistent with the national accounts and international good practice.
- Take advantage of the large and rich repository of national accounting knowledge at Statistics Canada to support efforts to improve the measurement of public service productivity.
- Corroborate the rigorous and analytically well-founded national accounts estimates of public service productivity through comparison with other types of performance indicators, such as those included in the PMF.
- Corroborate the performance indicators in the PMF through comparison with rigorous and analytically well-founded national accounts estimates of public service productivity.
- Reduce gaming by using a broad range of indicators, including those proposed in the PMF and national account estimates of public service productivity.

In one fundamental way, productivity is more important in the public service than in the private sector. The duty of politicians and public servants to ensure that public resources are used efficiently and effectively exceeds the duty of the leaders of private-sector firms to their shareholders. While Canadians have the option of investing or not investing in a particular firm, no Canadian has the option of not paying taxes.

# Productivity in the Public Service: A Review of the Literature<sup>1</sup>

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## 1. Introduction

*What gets measured gets managed.*

-Peter Drucker

The purpose of this report is to build a deeper understanding of the concept of productivity in the public service, its reality, and its drivers, in order to inform future people management research and policy. This report supports the development of the *People Management Framework* (PMF) of the Government of Canada. The PMF is an initiative to reduce the reporting burden of departments, focus on results, and to measure what matters in the management of people in the public service. This report is one of several literature reviews that have been undertaken on different aspects of the PMF. It focuses on productivity in the public service.

Throughout this report it is important to bear in mind that productivity can mean different things to different people. Public service managers are primarily interested in productivity for planning, control, and accountability. National accountants are primarily interested in productivity as a measure of national economic performance and guiding economic policy. As this report will show, these two perspectives are complementary.

This report is divided into four parts. The first part reviews the literature on linkages between inputs, outputs, outcomes and productivity in the public service. Specifically it attempts to answer the following questions: how do we define productivity in the public service? What are the challenges in defining it? How do we measure productivity in the public service? How does productivity relate to the quality of service?

The second part of the report is a survey of international good practice in measuring public service productivity. It attempts to determine how other countries have addressed the challenges identified in the first part of the report.

Building on the discussion of conceptual and measurement issues and the survey of international practices, the third part identifies areas where the Government of Canada could most easily improve the measurement of its productivity.

The fourth part of the report examines two-way linkages between the draft *People Management Framework* and productivity, including those between individual

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<sup>1</sup> The Treasury Board Secretariat commissioned the Centre for the Study of Living Standards to produce this report in 2009. The material in the report continues to be relevant for discussion of public sector productivity, particularly in light of the recent announcement by Treasury Board of a working group to study public sector productivity. For this reason, it was decided to release the report. The authors would like to thank Sharon Bowles, Peter Ross, and Bernard Trop from Treasury Board Secretariat for their direction and useful comments on this report. Email: andrew.sharpe@csls.ca.

productivity and employee engagement and between organizational culture and organizational productivity.

The final part of the report synthesizes the findings of the literature review and makes specific recommendations for improvements to the *People Management Framework* in relation to productivity, including areas that require further research.

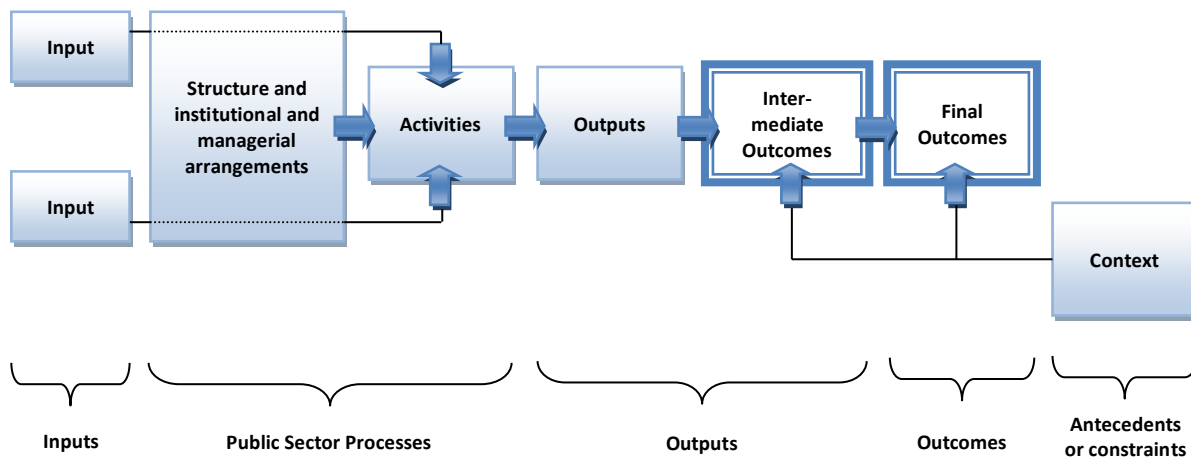
## 2. Definitions, Concepts, and Measurement Issues

This part of the report has two sections. First, we define the key elements related to measuring productivity in the context of the public service production process. We then discuss conceptual and measurement issues that must be addressed in order to apply national accounts notions of productivity to the public service.

### 2.1. A Framework for Understanding the Relationship between Inputs, Outputs, Outcomes, and Productivity

Having a logical framework with precisely defined elements is very important in productivity analysis. The Organisation for Economic Cooperation and Development (OECD) has undertaken a comprehensive program to improve the measurement of government activity called *Government at a Glance*. As part of this program, the OECD has developed a framework for thinking about government activity in terms of a public sector production process (Figure 1). This framework is a different perspective on the same set of issues addressed in the Government of Canada's Management Accountability Framework (MAF) (Treasury Board Secretariat, 2007a), the Management, Resources, and Results Structure Policy (MRRS) (Treasury Board Secretariat, 2007b), and *Canada's Performance* (Government of Canada, 2007).<sup>2</sup> At the same time, it provides a more parsimonious means of thinking about productivity in the public service. Conceptually, there is little difference between the OECD framework and that of the Government of Canada.

**Figure 1: Public Service Production Process**



Source: Van Dooren et al (2006).

Van Dooren et al (2006) provide a lucid summary of the relationship between the major types of performance indicators: efficiency, productivity, effectiveness, and cost-effectiveness (Table 1). Appendix A provides a glossary of the terms used in this report and explains how they differ from those used by Government of Canada's Results-Based

<sup>2</sup> See Appendix A for a discussion of some of the key differences between these frameworks.

Management Lexicon.<sup>3</sup> Table 1 makes the point that productivity can be considered one of a set of performance indicators, but as will be discussed below, it is a performance indicator that is particularly well-founded in economic literature, and an indicator on which a great deal of analytical work has been done.

**Table 1: The Major Types of Performance Indicators**

Single Indicators		
Indicators on input	What goes into the system? Which resources are used? Eg, litres of motor oil or hours of labour time.	
Indicators on output	Which products and services are delivered? What is the quality of these products and services? Eg, T1 forms processed or crimes solved.	
Indicators on intermediate outcomes	What are the direct consequences of the output? Eg, stolen property returned to rightful owners.	
Indicators on final outcomes	What are the outcomes achieved that are significantly attributable to the output? Eg, crime rate decreased.	
Indicators on environment	What are the contextual factors that influence the output? Eg, staffing process or employee engagement and job satisfaction	
Ratio Indicators		
Efficiency	Cost/Output Eg, input cost to process a T1 form.	These measures are valid only to the extent that there is a clear causal relationship.
Productivity	Output/Input Eg, T1 forms processed per hour of labour.	
Effectiveness	Output/Outcome (intermediate or final) Eg, percentage point reduction in crime rate per crime solved.	
Cost-effectiveness	Input/Outcome (intermediate or final) Eg, input cost to reduce the crime rate by one percentage point.	

Source: Adapted from Van Dooren et al (2006)

Productivity is the relationship between the output of goods and services and inputs of resources, human and non-human, used in the production process. This relationship is usually expressed in ratio form. The ratios may relate to the national economy, to an industry (the government, for example), or to a firm (or government department) or even a plant (departmental branch or division). Output growth that exceeds growth in measured inputs – that is to say, an increase in the ratio of output to inputs – is the definition of productivity growth.

Economists distinguish between total factor productivity, namely total output divided by total (weighted) input(s) and partial productivity measures, namely change in output divided by change in one input. The most readily available and widely used measure of partial productivity is labour productivity, the ratio of output to some measure of labour input (based on employment or hours). This term sometimes creates confusion, as it can be seen to imply that the level of labour productivity or the rate of growth of

<sup>3</sup> The Government of Canada defines a number of different types of outcome (immediate, intermediate, outcome, and strategic). This distinction is not important for the purposes of this report, but is discussed in Appendix A. This report simply refers to (final) outcomes as defined by the OECD.



labour productivity is attributable solely to the effects of labour. In fact, labour productivity reflects the influence of all factors that affect productivity, including capital accumulation, technical change and the organization of production. While the intensity of labour effort obviously does affect labour productivity, it is generally significantly less important than the amount of capital a worker has to work with or the level of production technology (Sharpe, 2002).<sup>4</sup>

Productivity (and output) is indirectly related to outcomes. Improving the productivity of the public service may lead to improvements in outcomes, or it may not, because other factors may impact the effectiveness (the relationship between outputs and outcomes) of public service outputs. For example, an improvement in the productivity of food inspection – for example through more automation – might lead to fewer cases of food poisoning (outcome), but this improvement could be offset if people become less cautious about handling food in their kitchens, a factor largely outside of the control of the Canada Food Inspection Agency. This example assumes that there is a proven causal relationship between output and outcome. In some cases there may not be. For instance, the productivity associated with triple coronary artery by-pass surgery could increase, but may not impact the quality adjusted life years remaining of the patient, if the benefits of the procedure are uncertain.<sup>5</sup> This point was made by Atkinson (2005: 42), and will be discussed in the section on measuring the quality of output.

## 2.2. Conceptual and Measurement Issues

This section explores the most important conceptual and measurement issues associated with producing estimates of productivity in the public service. We begin with a note on the distinction between productivity growth and productivity levels. Then we explore issues related to the coverage of output indicators, market vs. non-market output, individual vs. collective output, adjusting output for quality, the complementarity of public and private output, weighting individual outputs to construct aggregate output indicators, and measuring inputs.

### 2.2.1. Productivity Growth and Levels

An important distinction is that between productivity levels and growth rates (Sharpe, 2002). The former refers to the output per unit of input at a given point. For example, in the year 2007 the level or value of output per hour in the business sector in Canada was \$44.31, expressed in constant 2002 prices. The latter refers to the percentage change in levels of output per hour, expressed in constant prices, between two points in time. An example is the 27.2-per-cent increase in labour productivity between 1989 and 2007, when output per hour was \$34.82. One often hears the complaint that Canada's productivity is poor. This could be in reference to a low aggregate productivity level, to a

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<sup>4</sup> Since many of the issues related to productivity are not sensitive to whether total factor productivity or labour productivity is being discussed, for simplicity, we often refer to productivity, meaning the relationship between output of goods and services and the inputs of resources.

<sup>5</sup> Another example, which is important but less directly relevant to this report, is the apparent disconnect between public perception of administrative performance (an outcome if we assume citizen trust and satisfaction with the public service is an outcome, see below), and actual administrative performance (output) (Van de Walle and Bouckaert, 2007).

low productivity growth rate, or both. Commentators should always specify whether they are referring to levels or growth rates, as the implications can differ significantly.

For the purpose of this report, productivity growth rates are of more interest. Whether or not the productivity of the public service is improving or declining is probably of more interest than comparing whether or not the Government of Canada is more productive than the Government of Manitoba, since these two governments do very different things. That said, productivity level comparisons are useful for comparing how efficiently different organizations can accomplish the same task. For instance, is the Department of Public Works and Government Services more efficient at managing office space than the Canada Revenue Agency or Brookfield Properties Ltd? Having estimates of productivity levels can help to answer these questions.<sup>6</sup>

### 2.2.2. Coverage of Output Indicators

In order to produce an accurate indicator of output, it is important that a sufficient proportion of the total output of the sector, department, or work unit be captured. Atkinson (2005: 47) proposes that the procedure should begin with identifying all services<sup>7</sup> provided by the government to households and firms. This point is important because from a management perspective, we are often interested not in final outputs provided to consumers and firms, but to intermediate outputs that are provided to other organizations within the government. For example, we might be interested in the productivity of the Human Resources Division of the Department of Fisheries and Oceans or of the Real Property Branch of the Department of Public Works and Government Services. The challenging issue of how to aggregate such intermediate outputs will be explored below in our discussion of weighting outputs.

### 2.2.3. Market vs. Non-Market Output

Around the world, most of the considerable analytical effort devoted to productivity has focused on the market economy. By market economy we mean the portion of the economy where goods and services are sold at economically meaningful prices. Economically meaningful prices are those that reflect consumers' marginal valuations of services – that is, the willingness of consumer to pay – and the costs of production. The distinguishing characteristic of the services produced by the public service is that they are most often provided free of charge or sold at prices that primarily reflect factors – including equitable access – other than consumers' marginal valuation or costs of production.

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<sup>6</sup> We note that the process of benchmarking, which is subject of a separate literature review in support of the people management framework, is a means of making productivity level comparisons that helps to avoid some of the measurement issues that arise in the strict national accounts framework. Van Dooren et al (2006: 37) define benchmarking in a way that makes its complementarity to productivity very clear:

Benchmarking is a structured debate between practitioners, agencies or governments concerning how and why things are different between them. The purpose of benchmarking is to open up issues for subsequent investigation – to provoke interest in deeper examinations. Benchmarking can be used to compare inputs, processes, outputs or outcomes.

<sup>7</sup> Since most government outputs are services, that term is used throughout this report, but at all times it means goods and services.

Since we do not have market prices for the output of the public service, there are two alternative methods for estimating output: the input = output method and the direct output method. The input = output method is more traditional, and is the basis for how public service output is measured by Statistics Canada (more on this below). The direct output method involves producing an indicator of output based on a weighted sum of quality adjusted measures of each service produced. Lequiller (2005: 4) notes that an accurate direct output measure must take into account both changes in the quantity and quality of services produced as well as the change in marginal benefit of the services, a point returned below to in our discussion of the quality adjustment of output.

The direct output method is preferable to the input = output method, because the latter relies on the assumption that a higher volume of input leads to a higher volume of output, in direct proportion. That is, a one-per-cent increase in input volume results in a one-per-cent increase in output volume. This assumption implies that productivity growth – output growth that exceeds growth in measured inputs – is always zero. As a result, conducting a meaningful analysis of productivity in the public service requires the development of output measures that are not constructed using the input = output method.

#### **2.2.4. Individual vs. Collective Output**

The fact that output is consumed in different ways presents substantial conceptual and measurement issues. The key distinction is whether or not the output is consumed in a transaction. When individual output is consumed there is a transaction between a producer and a consumer (Eurostat, 2001: 32). For example, a theatrical production is performed and is watched by spectators. For hospital services output is the amount of care received by a patient, and for education, it is the amount of teaching consumed by the pupil. The consumption of a collective service does not involve a transaction between a producer and consumer, because collective services are consumed simultaneously by society as a whole (Eurostat, 2001: 32).<sup>8</sup>

Individual output is usually considerably easier to measure than collective output, but even within these categories, some output is easier to measure (Table 2). Van Dooren et al (2006: 25) note that the collective or individual nature of outputs is related to, but not the same as, their measurability, since both easily measureable and harder to measure outputs can be found in both collective and individual outputs. One reason why individual inputs are generally easier to measure is that they most often have equivalent outputs in the private sector, and the methodology used to measure output in the private sector can be applied in the public sector (Douglas, 2006: 3). For instance, policy advice is analogous to some consultancy services offered in the private sector, and education services provided by a government department are analogous to education services provided by a private school.

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<sup>8</sup> Collective services are similar to public goods. Pure public goods are generally defined as goods and services the consumption of which is non-rival and non-excludable. Non-rival means that one person's consumption does not preclude another person's consumption. Non-excludable means that it is very difficult if not impossible to prevent someone from consuming the good. A lighthouse or national defence is an example of pure public good, a road is not. This distinction is not overly important for the purposes of this report.

**Table 2: Individual versus Collective Output**

		Collective	Individual
Measurability	Low	National defence	Job counselling
	High	Road construction	Vehicle registration

Source: Adapted Van Dooren et al (2006)

The output of collective services are especially difficult to measure, because it usually difficult to define the unit of output. The *1993 System of National Accounts* notes that

measuring changes in the volume of collective services is distinctly more difficult, however, as it is not possible to observe and record the delivery of such services. Many collective services are preventive in nature: protecting households or other institutional units from acts of violence including acts of war, or protecting them from other hazards, such as road accidents, pollution, fire, theft or avoidable diseases. It is difficult to measure the output of preventive services, and this is an area in which further research is needed. In practice it may sometimes be necessary to use changes in inputs as proxies for changes in outputs... (United Nations, 1993).

But difficult to measure does not mean that measurement is unachievable. In recent years there has been a considerable amount of effort devoted to improving the measurement of the output of collective services, and it is now possible to measure the output of preventative services such as police, corrective services, fire services, as well as some administrative services through direct output measurement. For example, it is difficult to determine the unit of output of the Department of National Defence or the Department of Public Safety, but work is underway in the United Kingdom to improve the measurement of the output of the defence forces and criminal justice system (Anagboso and Spence, 2008; and Spence and Tortoriello, 2008). While more work is still needed, the prospects have improved considerably since the *System of National Accounts 1993* was first released (Lequiller, 2005: 8).

### 2.2.5. Adjusting Output for Quality

Controlling for change in quality is also a major issue in respect of measuring outputs. Indeed, service quality is an issue of key importance for the Government of Canada; this sub-section addresses the issue of the relationship between productivity, outputs, and service quality.

In the private sector, where goods are typically sold at economically significant prices, adjusting for quality means separating out pure price change from the change in price that is related to the change in quality. Doing so is not always straightforward, since quality change can be very difficult to measure, as has been well documented in the case of computers. With no economically significant prices as a point of departure, measuring changes in the quality of government output presents a somewhat different challenge.

There are at least three ways of measuring quality of public service outputs (Atkinson, 2005: 42). First, we can differentiate services that embody different levels of quality. For example, one day of incarceration of a maximum security prisoner is a

qualitatively different service than one day of incarceration of a minimum security prisoner. If the output of the Correctional Service of Canada were measured as the number of prisoner days of incarceration, without distinguishing between different service levels, then the output of Corrections Canada would fail to capture changes in quality, reflecting the changing share of prisoners at different levels of security. An international good practice in output measurement is to define homogeneous outputs at as detailed a level as possible.

But Atkinson (2005: 37) notes that such differentiation of services into different quality outputs can only capture part of the change in quality. The second way of measuring the quality of public services is to define the volume measure in terms of degree of success (Atkinson, 2005: 42). For instance, the degree of success of a prison could be the number of prisoners released before the end of their terms due to good behaviour.

The third way of measuring the quality of public services is to adjust the output measure for effectiveness, that is, the contribution to changes in the desired outcome (Atkinson, 2005: 42; and O'Mahony and Stevens, 2004). Continuing with the Correctional Service example, an outcome could be that the crime rate falls, both while the prisoner is incarcerated and after he or she has been returned to society. One month of incarceration is of higher quality if, all else equal, fewer former inmates re-offend. Atkinson (2005: 38) argues that outcomes should only be used to adjust outputs for quality change to the extent that the outcome can be attributed to the output. Attribution is clearly problematic in the Correctional Service example, since many factors beyond what might happen in prison effect the likelihood that a former inmate will re-offend.

The third method of adjusting public service outputs for quality raises the issue of how to value government output in the absence of economically significant prices. In the private sector a consumer's marginal valuation (demand curve) of a service is the price he or she is willing to pay, which normally will be equal to the marginal cost of producing the service. In the government sector, Atkinson (2005: 40) notes that this approach to valuation encounters two difficulties. First, there is no revealed preference from consumers. Since output is not sold at economically significant prices, more (or theoretically less) may be consumed than had the consumer faced a market price. Second, there is no reason to think that the government will produce services up to the point where the marginal cost of production just equals the marginal benefit to the consumer. Atkinson (2005: 41) suggests that the value of output should be the incremental impact on outcomes arising from the activities of the public sector.

#### **2.2.6. The Complementarity of Public and Private Output**

Public service output might increase despite no change in how the service is produced, if the external environment changes. Atkinson (2005: 45) offers the example of the output of fire fighting services, which increases as the real value of the assets that are protected (houses and businesses) increases. For instance the average house today is substantially more valuable than the average house of the 1960s, because it provides a higher level of service owing to more features and larger size. The real value of the assets

protected by the fire services occurs independently of any changes in how fire fighting itself is undertaken.

Similarly, continuing with our Correctional Service example from the previous section, it could be argued that the value to society of incarcerating thieves and arsonists has risen in relation to the rising real value of the property that is being protected through incarceration. Atkinson (2005: 187) identified this complementarity between public and private sector output as one of his principles. On this basis, any measure of government output or productivity should be adjusted for complementarity in a manner similar to how it is adjusted for quality (Lequiller, 2005: 4).

### 2.2.7. Weighting Outputs

Weighting outputs is an important issue in measuring productivity growth in the public service. While measuring the change in the output of individual activities presents significant issues, as we have seen, another level of complexity is added when estimates of output for individual activities are aggregated into measures of output for work units, departments, or the government as a whole. This increase in complexity is the result of issues around the relative importance (or weight) that should be accorded to the outputs of individual activities when they are added up. For example, assume that the Canada Revenue Agency has only two activities: T1 processing and T2 processing. We cannot produce an estimate of the Agency's total output growth by taking a simple average of the individual growth rates of output in T1 processing and T2 processing, since the relative importance of each activity is different.

Weighting must be approached differently in the private and public sectors. In the private sector, the contribution of each unit of output to aggregate output is its price, which represents its marginal value to the consumer. In the public sector where most output is either given away free or sold at economically insignificant prices, using prices weights is not an option. According to the System of National Accounts, in principle

volume indices may always be compiled directly by calculating a weighted average of the quantity relatives for the various goods or services produced as outputs using the values of these goods and services as weights. Exactly the same method may be applied even when the output values have been estimated on the basis of their costs of production (United Nations, 1993: Paragraph 16.134)

We have previously noted the difficulty in attributing changes in outcomes to changes in government outputs. To the extent the link is weaker, changes in outcome become a poorer approximation of the marginal value of output (Atkinson, 2005: 90).

There are at least two approaches to weighting government output. First, if private sector analogs exist, these can be used. For instance, Public Works and Government Services Canada (PWGSC) owns a portfolio of office buildings. These provide services (outputs) to their tenants, in many cases free of direct charge. How should these outputs be weighted in a measure of the total output of PWGSC? One option is to value them at equivalent private sector marginal valuations. For example, one square meter of Class A



office space provided by PWGSC could be valued at the price prevailing in the private market.

The second approach is to weight outputs based on input costs. In theory marginal costs should be used, but in practice only average costs are usually available (Lequiller, 2005: 6). Continuing with the example of the office portfolio of PWGSC, the relative contribution to PWGSC's total output could be based on the share of total input cost that is allocated providing the office space. Input costs would include wages, salaries, and supplementary labour income, payroll taxes, amortization and interest expenses, and the costs of procured goods and services. The problem with cost weights is that the underlying cost structures of departments changes over time, running the office portfolio may consume a variable share of PWGSC's budget over time. The general conclusion is that the use of cost weights should result in frequent reweighting of outputs in an aggregate. Atkinson (2005: 91) recommends the cost weighting approach when using marginal valuations of output is not possible.

### 2.2.8. Measuring Inputs

To measure productivity estimates of inputs are also required. Atkinson (2005: 49) concludes that input measures should be as extensive as possible, since a failure to measure an input can result in apparent productivity changes that actually reflect an increase in the unmeasured input. Inputs include capital, labour, energy, materials, and services. Each must be adjusted for improvements in quality in order to be accurately measured.<sup>9</sup> For instance, if labour becomes more skilled, then output per hour worked can be expected to increase, but the increase is a result of a larger volume (quantity and quality) of labour, not of an increase in productivity. These issues are equally problematic on a conceptual level in the private sector.

There are two ways of measuring inputs. The direct method is to count the volume of input, for example, hours worked, kilowatt hours of electricity, or litres of motor oil. Alternatively, data on input costs can be gathered and adjusted to reflect changes in price that are not related to changes in underlying volume (quality-adjusted quantity), a process called deflation.<sup>10</sup> For labour input, Atkinson (2005: 50) recommends that both direct and deflation methods be used and that results be reconciled.

Measuring capital inputs is a particularly difficult area that has been the subject of much attention in both the productivity literature in both the public and private sectors (see for example Careless, 2008). Atkinson (2005: 49) concludes that capital input should be measured as capital services, the flow of productive services that a capital asset produces. This method is a direct volume measure. For example, a road provides transportation services over a period. Depending on the condition of the road surface, signage, and overall design and engineering standard, it may provide different service

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<sup>9</sup> In concrete terms this means measuring the compensation of employees, procurement of goods and services (e.g. electricity, consulting, maintenance), and the consumption of capital. Many countries have used only employment as a measure of input, potentially leading to misleading productivity estimates if there is substitution among inputs, for example as a result of outsourcing.

<sup>10</sup> Atkinson (2005: 72) recommends eight criteria by which deflation should be evaluated. We also note that deflation is the standard method of measuring output volume when economically significant output prices are available.

levels. The other aspect of capital services, and that which distinguishes capital services from capital consumption, is the inclusion of an interest charge to reflect the opportunity cost of using resources in form of capital rather than consuming them immediately.<sup>11</sup> This concept of capital services is the same used in cost-benefit analysis (for example Treasury Board Secretariat, 2007) and is used by Statistics Canada to estimate private sector total factor productivity (Baldwin, et al, 2007).

Somewhat paradoxically, measuring inputs accurately is more important for productivity measurement when the output = input method is used than when direct output measures are available (Atkinson, 2005: 57), because change in inputs are the same as a changes in output and productivity. As we will see below, this point is especially important with respect to the output of those services that we are unlikely to be able to measure directly in practice, such as policy advice and national defence.

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<sup>11</sup> What the appropriate interest charge should be is the subject of a long running debate that we do not discuss here (see Atkinson, 2005: 50).



### 3. International Survey of Government Productivity Measurement

One reason for interest in improving government productivity measurement is to maintain the international comparability of the national accounts. Douglas (2006: 2) mentions this motivation in connection with the efforts of the New Zealand government. This section of the report examines efforts to move away from the traditional and misleading input = output productivity measurement approach in a number of advanced countries. It also describes how some of the conceptual and measurement issues raised in the previous section have been addressed. After discussing international guidelines, we survey five countries that are often mentioned in the literature: the United States, the United Kingdom, New Zealand, Finland, and Australia.

#### 3.1. International Guidelines

The System of National Accounts (SNA) is the set of international guidelines prepared by the international statistical organizations and approved by the UN Statistics Commission. As Atkinson (2005: 27) notes, all major statistical offices take the SNA seriously. In the United Kingdom and Finland, among other countries, the introduction of the 1993 SNA, which suggested a move away from input = output methods, was the impetus for efforts to improve the measurement of government output and productivity.

**Table 3: Eurostat Handbook Recommendations for Government Output**

Type of Service	A/B/C Methods
Individual services, including education, health, social security, recreation, and cultural services	<p>A methods – output indicator approach where the indicators satisfy the following criteria:</p> <ul style="list-style-type: none"> <li>i) they should cover all services provided;</li> <li>ii) they should be weighted by the cost of each type of output in the base year;</li> <li>iii) they should be as detailed as possible; and</li> <li>iv) they should be quality adjusted.</li> </ul> <p>B methods – output indicator approach where the criteria are not fully satisfied: eg the level of detail could be improved or the measure does not take into account change in quality.</p> <p>C methods – if input, activity, or outcome is used (unless outcome can be interpreted as quality-adjusted output) or if coverage of output is not representative.</p>
Collective services, including general public administration, defence, police, and research and development	<p>A methods – broadly the same as for individual services</p> <p>B methods – input methods are B methods, as are the use of volume indicators of activity. If input methods are used they should estimate the volume of each indicator separately, taking quality change of inputs into account. Applying productivity or quality adjustments to the sum of the volume of inputs is not recommended.</p> <p>C methods – the use of a single input volume indicator is not a B method.</p>

Source: Adapted from Atkinson (2005: 32) Table 3.2.

Under the structure of the European Union, the statistical agency of the European Union, Eurostat, publishes guidelines for EU members that set minimum standards for national accounts.<sup>12</sup> These standards take the form of a ranking of the methods used to produce input and output estimates: A (most appropriate), B (can be used if A not possible, and C (should not be used). Effective 2006, with derogations for some countries, the European Union outlawed the use of C methods (European Commission, 2002). Eurostat has classified input = output methods as B methods for the measurement of the output of collective services and as C methods, and therefore unacceptable, for the measurement of the output of individual services (see Table 3).

### 3.2. The United States

The United States Government was an early leader in measuring productivity, but has since fallen behind the United Kingdom and other countries examined in this review. The Bureau of Labor Statistics (BLS), the US Government organization responsible for productivity statistics, produced estimates of the productivity of the Federal Government under the Federal Productivity Measurement Program (FPMP) from 1967 to 1994. In 1996 the program was terminated due to budget cuts (Fisk and Forte, 1997: 19).<sup>13</sup>

The scope of the FPMP was significant; in 1994 it covered 69 per cent of the civilian labour force of the executive branch of the US Government – 60 agencies, 255 organizations, 2 million employees. In addition, data allowed the BLS to estimate labour productivity for 24 functions based on the similarity of tasks performed. For example, estimates of productivity in “audit of operations,” “buildings, grounds, and equipment maintenance,” and “regulation: compliance and enforcement” were produced. Annually, the BLS asked each federal agency with more than 200 employees to provide data on its outputs, labour used to produce outputs, and compensation paid to employees producing outputs (Fisk and Forte, 1997: 20). Compliance was voluntary.<sup>14</sup>

Outputs were measured using the direct method. By 1994 the FPMP had over 2,500 indicators including inspections conducted, licenses processed, claims paid, kilowatt hours generated, outpatient visits conducted, and money orders sold (Fisk and Forte, 1997: 20). Kendrick (1991: 155) argued that the best way to improve the FPMP would be to measure productivity at an even more disaggregated level than the 2,500 indicators. More detailed output specifications would yield even better output measures,

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<sup>12</sup> Part of the impetus for these minimum standards is to improve the comparability of National Accounts estimates of economic growth for purposes of managing the common currency.

<sup>13</sup> The results of the FPMP program showed an average annual improvement of 1.1 per cent in labour productivity (output per employee per year) in the federal government from 1967 to 1994. In contrast, labour productivity in the nonfarm business sector rose only slightly more quickly, at an average annual rate of 1.4 per cent over the same period. The BLS found a decline in the rate of increase starting in the mid 1980s. From 1967 to 1982 labour productivity grew at an average annual rate of 1.5 per cent, but from 1982 to 1994 it grew by only 0.6 per cent per year. In the 24 functions labour productivity grew most rapidly in finance and accounting, which saw an average annual increase of 3.8 per cent. On the other hand, electric power production and distribution saw an average annual decrease of 1.0 per cent per year over the same period. Fisk and Forte attribute the improvement in finance and accounting to new accounting systems and the massive automation of operations (Fisk and Forte, 1997). The fact that differences between non-farm business sector and total economy (which includes government) productivity in Canada and the United States, has previously been noted by Smith (2004).

<sup>14</sup> See Appendix F for a list of functions on which data were collected and estimates of productivity growth by function.

since changes in output mix would have less impact on measured productivity change. As noted above this recommendation was echoed by Atkinson 15 years later.

In cases where an organization produced multiple outputs, labour weights<sup>15</sup> were used to aggregate outputs into a measure of organizational output. Fisk and Forte note that in practice there is a close correlation between labour weights and cost weights, which they acknowledge would have been preferable in the absence of revenue weights.<sup>16</sup> In some cases, only a portion of an organization was included, because of the conceptual and measurement issues discussed above, or because the organization chose not to participate in the FPMP. For example, only a small part of the Department of State was included. As a result of omissions, FPMP never claimed to measure the productivity of the entire US Government.

As far ahead of its time as the FPMP was in intent, it had a number of limitations both in terms of providing useful information to improve government operations and the national accounts. First, in contrast to recent efforts to measure government productivity in Europe, the BLS restricted its measurement of inputs to labour. Labour was measured in full-time equivalent employees, and no adjustment was made for differences in labour quality or changes in hours worked. Second, the FPMP focused solely on outputs and not outcomes. Danker et al (2006) point out the irony in the termination of the FPMP at a time when the US Government began to orient itself around outcomes. Especially, since the outcome data could have been used to adjust the FPMP output estimates for changes in quality. Since the FPMP was terminated, the US Government has undertaken a number of initiatives related to productivity, including *Reinventing Government* and the *Government Performance and Results Act* under the Clinton Administration, and the President's Management Agenda under the Bush Administration (Danker et al, 2006).

Direct output estimates of government output have never been incorporated into the US national accountants. Consistent with this approach, the BLS estimates were never used to construct the national accounts (Kendrick, 1991). The Bureau of Economic Analysis (BEA), the organization charged with estimating government output, recognizes that the current input = output approach is inadequate. In the United States, education is almost one-third of services produced by government, so research efforts are underway to adjust the existing output measures (headcounts of school children and hours of instruction) for changes in quality based on teacher qualifications and student achievement (Baker and Kelly, 2008: 37 and Aizcorbe, et al, 2008).

Atkinson (2005: 53) took a very favourable view of the FPMP in his review of government productivity measurement in the United Kingdom. Noting the expense of developing and measuring 2,500 output indicators, he observed that even collecting a far smaller number of indicators would be a significant improvement for the United Kingdom. He also remarked on the limitations of only measuring numbers of workers and compensation, and that a more comprehensive definition of inputs would be more

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<sup>15</sup> It is unclear to what extent these labour were based on employee years per unit or labour cost per unit. In either case, the distinction is not important for the purpose of this report.

<sup>16</sup> Weights were fixed, base year unit labour requirements, and were updated every five years (Fisk and Forte, 1997: 20).

appropriate. He concluded that implementing an improved version of the FPMP for the UK government deserves “serious consideration.”

### 3.3. The United Kingdom

Owing to significant progress made over the past 10 years, the United Kingdom is now the world leader in improving the measurement of government output and productivity. Following the introduction of the 1993 System of National Accounts and the European System of Accounts in 1995, the Office for National Statistics (ONS) started to move away from the traditional input = output measurement change in output volume. The first improvements were introduced with the direct output measurement of health, education, and social services in 1998. The ONS recognized these improvements were rather piecemeal and therefore engaged Sir Tony Atkinson to undertake a comprehensive review, which was published in January 2005. In July 2005, the UK Centre for the Measurement of Government Activity (UKCeMGA) was established to implement the principles and recommendations of the *Atkinson Review* (Pont, 2008: 17). While the *Atkinson Review* is arguably the single most important piece of literature in the area of government productivity measurement, the dozens of articles produced by the UKCeMGA have also contributed significantly to this literature. As a result of this outstanding effort, many countries look to the UK for good practices related to the measurement of productivity.<sup>17</sup>

The ONS now measures over 60 per cent of general government (central and local, which include healthcare and education) output using direct output methods (Table 4). Military defence and the Criminal Justice System cover half of the remaining 40 per cent of government consumption spending that is still measured using input = output methods, and UKCeMGA is working on improving output measures in both of these areas (Pont, 2008: 19).

The UKCeMGA continues to research and develop improvements in government productivity measurement. For example, on the basis that equity and fairness are valuable to government and society, Jones (2008) experimented with incorporating equality considerations into measures of public service output. While such an adjustment is possible and can be used in productivity analysis, he concluded that it would not be suitable for use in the national accounts. Efforts are also underway to improve the measurement of defence in the national accounts, with the ultimate objective of developing direct measures of defence output (Anagboso and Spence, 2008). Research also continues on how best to adjust public service output for changes in quality (Careless, 2008). The key areas under study are how to weight the various dimensions of quality; how to estimate value weights instead of cost weights for use in the aggregation of output; and developing appropriate techniques to reflect the fact that the effect outputs have on outcomes may be delayed or spread over a number of years. Work is also underway to improve the criminal justice system input and output estimates (Spence and Tortoriello, 2008), to improve the measurement of labour (James, et al, 2009) and capital (Kimbuwe, 2008) inputs.

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<sup>17</sup> This opinion is shared by the authors of all of the literature review, for example Douglas (2006: 1).

**Table 4: Proportion of Total Government Output in the United Kingdom Estimated Using Direct Output Methods, by Activity Area, Current Prices, Per Cent, 2003**

Healthcare	30.0
Education	17.4
Adult social care	6.1
Social security administration*	2.8
Children's social care	2.2
Prisons	1.1
Fire and rescue	1.0
Legal aid	1.0
Probation	0.3
Crown Prosecution Service	0.2
Criminal courts	0.2
County courts	0.1
<b>Total</b>	<b>62.4</b>

Source: Pont, 2008: 19, Table 1.

Note: Government output is general government final consumption expenditure

Figures may not add due to rounding.

\*Includes only the cost of administering social security, not the transfer payments themselves, which are not part of government output as defined in the national accounts.

### 3.4. New Zealand

While an early leader in direct output measurement, progress on improving productivity measurement in the New Zealand government has been limited since the introduction of direct output measures for health and education in the mid 1990s. New Zealand measures the output of the public sector as the sum of all input costs. In order to calculate growth rates, volume indexes for government administration and defence are based on deflated wages and salaries, while for education and health, they are based on direct volume measures (Douglas, 2006: 6). For public hospitals direct output measurement was introduced in 1996. While New Zealand was probably a world leader at that time in terms of use of direct volume measures, it has done little since (Douglas, 2006: 14). Statistics New Zealand admits that developing measures of public sector productivity beyond health and education, especially for collective services, remains a “distant goal” (Statistics New Zealand, 2006). In spite of the progress made, as of 2008 Statistics New Zealand is not publishing productivity estimates for health, education, community services, general government administration or defence, because output is “largely measured using input methods” (Statistics New Zealand, 2008: 17).

### 3.5. Finland

Finland began measuring government productivity in 1995 (Lehtoranta and Niemi, 1997) and is regarded as a leader in Europe (Boyle, 2006: 18). Estimates of total

factor productivity and labour productivity are available from 1995 to the present for the aggregate central government. These estimates cover 78 per cent of the total cost base of the central government (Statistics Finland, 2008). Owing to the diversity of outputs produced by the central government, the various constituent organizations are responsible for defining outputs, not Statistics Finland. Up to 1999, quality changes were not taken into account in output and productivity estimates (Aaltonen, 1999: 14). Since 2005, cost, income and working time shares are used as weights (Statistics Finland, 2008). Aaltonen concludes that the “productivity of most collective services appears to be measurable,” but that it is essential to have one indicator for each type of precisely defined final product (1999: 15).

### 3.5. Australia

In spite of many experimental initiatives, the Australian Bureau of Statistics (ABS) does not publish productivity estimates for the non-market sector, because output estimates are based on inputs (Australian Bureau of Statistics, 2007). In an initiative in the late 1990s, the ABS developed experimental direct output measures for education and health (Tallis, 1999: 6), but to date these have not been implemented.

After exploring the development of direct output measurement in health and education, the ABS investigated improving output measures for the justice sector, which includes police, justice, and corrective services and represents around six per cent of government consumption spending (Northwood, et al, 2001). The result of this investigation was that the ABS retained input = output measures for the justice sector because the data available to construct an adequate indicator of police services were limited and contentious assumptions would have been required. Given the reluctance of the ABS to estimate police services productivity, it was felt there was little to be gained from replacing the input = output methodology for justice and corrective services, which are smaller components of the justice sector. Of interest to Canada, the ABS also noted that since policing was a state, rather than federal, responsibility in Australia, that finding consistent measures across jurisdictions was challenging (Australian Bureau of Statistics, 2004: 8).

The ABS has also attempted to improve the measurement of other government outputs. In 2003 the ABS produced, but has not published, experimental estimates of output for the Australian Taxation Office and Centrelink (the Australian Government social security agency). These measures related to briefing materials, processing claims, and services to benefit recipients. The ABS concluded that more data over a longer time period were needed before such measures could be considered for the national accounts (Australian Bureau of Statistics, 2004: 9). As for general government output, mainly defence and policy formulation, the ABS has concluded that input = output techniques will be retained until “significant breakthroughs in methods to measure the difficult components are made” (Australian Bureau of Statistics, 2004: 12).

### **3.6. Organisation for Economic Cooperation and Development: *Government at a Glance***

The *Government at a Glance* program of the Organisation for Economic Cooperation and Development (OECD) is a significant initiative to improve the measurement of government productivity. Launched in 2005, *Government at a Glance* has the objective of producing a publication, to be released every two years, that will provide a set of “indicators of good government and efficient public services to help member countries to better assess, plan and measure their public sector reform agenda” (OECD, 2009). Leading up to the publication of the first issue of *Government at a Glance*, scheduled for the fall of 2009, the OECD has released four technical papers covering background issues: how and why government activity should be measured (Manning et al, 2006); output measurement (Van Dooren et al, 2006); outcome measurement (Bertok, et al, 2006); and institutional drivers of efficiency in the public sector (Van Dooren et al, 2008). The OECD has performed a valuable service by gathering together disparate sources of information on government activity and related conceptual, definitional, and measurement issues. Any future initiative to improve productivity measurement in the Government of Canada should look to *Government at a Glance* as a starting point.



## 4. How Canada can Improve Public Service Productivity Measurement

There are significant lessons that the Government of Canada can draw from international experience to improve the measurement of public service productivity. However, these lessons are limited because the vast majority of work done abroad on productivity relates to the health and education sectors.<sup>18</sup> This focus is understandable, since for most governments, including every Canadian provincial government, these expenditures dominate budgets and public debate. As well, with the end of the cold war, the advent of the knowledge economy, the aging of the population, and significant medical breakthroughs, the growth of spending on health and education has eclipsed the traditional focus of government on national defence.

At present, Statistics Canada does not estimate either productivity levels or growth rates for the federal government. Nonetheless, we are of the opinion that the Government of Canada could measure the output of the public service in a manner consistent with the good practices already in place in other countries, particularly the United Kingdom, should they choose to do so.

This part of the report will begin by reviewing how Statistics Canada currently measures the inputs and outputs of the Government of Canada. It will then discuss the most promising areas for improving productivity measurement in the federal public service based on the international experience discussed in the previous sections.

### 4.1. How Statistics Canada Measures Federal Government Inputs and Outputs

While Statistics Canada does not estimate federal government productivity, it does estimate output and input for the national accounts, so it is possible to compare existing practice in Canada with international good practices. Statistics Canada uses an input = output methodology to estimate the output of the federal government. It does not publish estimates of the output of the public service as distinct from other legally defined organizations that make up federal government public administration (See Appendix B for further discussion). That said, Statistics Canada does employ a reasonable input-based proxy of output growth.

Statistics Canada creates input-based indexes of federal government output based on three broad segments: expenditure on labour (including wages, salaries, and supplementary labour income), capital consumption allowances (not capital services), and all other current non-wage expenditures (Statistics Canada, 2008: 193-195). Expenditure on labour is considered for three sub-sectors of the federal government: civilian defence, military pay, and other civil servants. Hours worked in each of the three segments are the measure of volume, and are adjusted annually for changes in labour quality. Capital consumption allowances and price indexes are estimated for only two sub-sectors: civilian defence and other civil servants.

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<sup>18</sup> The CSLS has also conducted research in the health area; see Sharpe et al (2007).



The all other current non-wage expenditure segment is broken down into defence expenditures and a remainder for all other outlays. The volume index for defence output presents, in the words of Statistics Canada (2008: 194), “unusually difficult problems.” These problems are related to a lack of data availability and the complex nature of the goods and services purchased by the Department of National Defence.<sup>19</sup> The “all other outlays” volume measure is a combination of price indexes for major operating expenditures: freight, postage, and telephones; utilities; office supplies and equipment; and building maintenance and repairs.

Overall, Statistics Canada is certainly doing more than simply estimating the growth of federal government output based on a headcount of employees, but the input = output methodology that is employed must be regarded as weak in comparison with the direct output methods in use in other countries, notably the United Kingdom and Finland. Particularly evident deficiencies are the small number of categories of government workers, which severely limit opportunity for quality adjustment, and the use of capital consumption rather than capital services, especially in light of recent accounting reforms – including the introduction of full accrual accounting – that have made capital asset information more readily available.

## **4.2. Opportunities to Improve Productivity Measurement in the Federal Public Service**

Based on the findings of the previous section, there are three principal ways to improve productivity measurement in the federal government. First, input measures could be improved with more disaggregated definitions of inputs and better quality adjustment. Second, direct output measures could be developed for a number of federal departments. Experience from other countries shows that in practice, both of these options could be employed – direct output measurement for individual services and some collective services, and improved input = output methods for the most conceptually difficult areas of government activity. Third, a program similar to US Federal Productivity Measurement Program could be developed to measure the productivity of specific activities and functions.

We are optimistic about the ability of the Government of Canada (GC) to dramatically improve productivity measurement. Many of the largest departments and agencies of the GC produce outputs for which significant analytical work done in other countries has resolved many conceptual and measurement issues that have traditionally hindered productivity measurement. For example, the ten largest GC organizations –

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<sup>19</sup> “First, an object breakdown of these expenditures in the level of detail most appropriate for deflation is not available from the Department of National Defence. Second, the problem of pricing individual products or commodities within the available breakdown of defence expenditure is particularly troublesome. Changes in price can be measured readily if the nature of the priced object remains constant. For example, a bushel of Number 1 Northern Wheat in 2000 is essentially unchanged from a bushel of that commodity in 1990. But commodities such as aircraft are constantly undergoing technological and structural changes so that an aircraft produced today is not easily comparable to an aircraft produced fifteen years earlier. Consequently, changes in the cost of these goods to the government cannot be regarded wholly as changes in their price. Because of these difficulties, the present deflator for defence expenditure combines various material and average-hourly-earning indexes, with the implicit assumption that these prices move in the same way as do the prices of the final products” (Statistics Canada, 2008: 194).

representing 64 per cent of public service employment – appear to predominantly produce outputs for which significant progress in measurement has been made in other countries, especially the United Kingdom and the United States (Table 5).

**Table 5: Ten Largest Federal Organizations by Public Service (PS) Employment, At December 30, 2008**

	<b>Number of PS Employees</b>	<b>Share of Total PS Employees (per cent)</b>
Canada Revenue Agency	39,021	15.1
Department of National Defence	26,076	10.1
Department of Human Resources and Social Development	23,348	9.0
Correctional Service of Canada	16,506	6.4
Canada Border Services Agency	13,814	5.3
Department of Public Works and Government Services	12,674	4.9
Department of Fisheries and Oceans	10,458	4.0
Department of Health	9,931	3.8
Royal Canadian Mounted Police (Civilian Staff)	6,893	2.7
Department of the Environment	6,383	2.5
<b>Total (top 10)</b>	<b>165,104</b>	<b>63.8</b>
<b>Total Public Service</b>	<b>258,825</b>	<b>100.0</b>

Sources: Canada Public Service Agency (2009). Population Affiliation Report. See Appendix D for more details.

Note: Shares may not add due to rounding.

Assuming no improvement over time in the productivity of the public service is concerning for two main reasons (Douglas, 2006: 2). First, much attention is paid to productivity as a measure of economic performance, and as an input to economic policy making. Since the public sector is a large part of most advanced economies, mismeasuring productivity in the public service can result in misleading conclusions. Second, productivity is the best available means of assessing the overall efficiency of the government.

## 5. Linkages between the People Management Framework and Productivity

This part of the report considers two-way linkages between productivity and the *People Management Framework*. It has three sections. First, we consider how the *People Management Framework* relates to the framework we have outlined above (Figure 1 on Page 3) to analyze public service productivity. Second, we review the literature on human resources management as a driver of public service productivity. Finally, we emphasize a key finding of this report, that the people management indicators can be rendered more useful by the development of public service productivity (and output) estimates based on the national accounts, and that both sets of indicators are complementary through the process of triangulation.

### 5.1. The People Management Framework in Context of Productivity Analysis

The draft *People Management Framework* (PMF) “primarily focuses on outcomes. It does not focus on activities, inputs, or process” (CPSA, 2008: 4). The PMF has two final outcomes “social and economic well-being of citizens within a global context” and “citizen trust and satisfaction in the public service.” As we saw in the first part of this report, the OECD defines outcomes as “those events, occurrences, or conditions that are the intended or unintended result of government actions. They are generally of more direct importance to customer or the public than other measures of output or process” (Bertok, et al, 2006: 7). But they also caution that other factors outside the government’s control also contribute to outcomes.

A key finding of the OECD’s *Government at a Glance* initiative is that “executive governance outcomes” are often absent from the sets of outcomes that governments often claim to desire to achieve. Executive governance outcomes are outcomes that reflect the activities of the executive as opposed to the legislature or judiciary. Bertok et al (2006: 7) define three broad categories: public confidence, equity, and fiscal/economic stability.

Public confidence might encompass issues around trust in government, and associated concerns relating to the predictability and acceptability of government policy. Equity might encompass the measured distribution of services and benefits across diverse populations. Fiscal and economic stability might relate to the track record of government in these spheres (Bertok, et al, 2006: 7).

In the OECD’s framework, the people management results and the public service results and the intermediate outcomes of leadership, workforce, and workplace are more appropriately considered as the structures and institutional and managerial arrangements that influence how activities are carried out than outcomes themselves. For example, whether or not public servants are “engaged employees” is probably of little direct importance to the public, as long as the “Results for Canadians,” which are true outcomes, are achieved. The “Results for Canadians” are true executive governance outcomes. Indeed, “public confidence” is akin to “citizen trust and satisfaction in the

public service,” and “equity and fiscal/economic stability” is akin to “social and economic well-being of citizens within a global context.”

## 5.2. Human Resources Management as a Driver of Productivity

Without doubt, leadership, workforce, workplace are institutional drivers of efficiency and productivity in the public service. Having better leadership, a better workforce, and better workplaces can help the public service produce more and better services per hour of work, per dollar of procured goods and services, per dollar of services from capital. Van Dooren et al (2008: 20)<sup>20</sup> conclude that the soft aspects of human resources management (HRM) practices matter a great deal for the productivity and efficiency of the public service, much more than the hard aspects like performance pay.

The soft aspects of human resource management such as employee satisfaction and morale are the most important drivers of performance. While wages are still important for staff, non-monetary incentives are essential. High wage levels – compared to similar work in the private sector – could lead to inefficiencies, although governments often are model employers and their wage policies reflect equity concerns as well. Wages are also important for attracting and retaining qualified staff, especially in case of skill-shortages (Van Dooren, et al, 2008: 20).

Performance-pay schemes have a low impact on staff motivation, in both the public and private sectors. This weak effect is at least partly the result of the unwillingness of managers to differentiate among their subordinates (Van Dooren, et al, 2008). But the organizational and managerial changes required to implement performance pay may have a beneficial impact on performance, especially in organizations with more easily measurable output (OECD, 2005). Boyne (2003) found that the soft aspects of HRM, such as employee satisfaction and morale are more important drivers of performance than the hard aspects, such as performance pay and job security. In a contrasting view, we note that in a study of private sector firms, Bloom et al (2006) find that soft aspects are compatible with low or high productivity. Heintzman and Marson (2005) suggest that public service job satisfaction may be correlated with citizen trust and satisfaction, suggesting that public service outputs are of higher quality when public servants are satisfied with their jobs.

The literature seems to suggest that soft HRM practices are important drivers of productivity. Within the simplified public service production process that was set out in Figure 1 (Page 3), HRM practices are captured as “structure and institutional and managerial arrangement” that affect how activities are carried out in the public service. These activities lead to outputs that in turn contribute to outcomes. In this sense, the focus of the *People Management Framework* on the soft HRM issues of employee engagement and organizational culture are appropriate, since the evidence seems to suggest that these can be drivers of productivity.

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<sup>20</sup> While the authors were examining the drivers of efficiency rather than productivity, the two concepts are closely related (see Table 1 on Page 3) and many of the findings are relevant in either case.

We note that separate literature reviews are being conducted in support of the *People Management Framework* on the topics of employee engagement – a concept embodying the soft aspects of HRM –, benchmarking, and performance measurement. As a result, we leave to the authors of those reports to summarize the literature on how HRM affects the outputs and outcomes of the public service.

### 5.3. People Management Indicators, Productivity Indicators, and Triangulation

The *People Management Framework* is very much in the spirit of the triangulation principle of the *Atkinson Review*. Atkinson (2005: 94) makes the subtle but important point that even if measures of inputs and outputs are acceptable in their own right in terms of all the criteria outlined in his report, when output is divided by input, the resulting productivity estimate may not retain these desirable properties. This paradoxical result occurs because of measurement error. Atkinson recommends that independent evidence be gathered on each of the three elements of the productivity relationship: productivity, inputs, and outputs (2005: 51). While we should not expect measures of productivity that are used for management purposes (planning, control, and accountability) to be the same as those used for the purposes of the national accounts, any differences should be explicable. For instance, if the Canada Revenue Agency installs a new computer system to process T1 forms more quickly, but productivity of the Agency measured on a national accounts basis falls, we might want to examine other aspects of the CRA's operations to determine whether the productivity improvement in processing is being offset by productivity declines elsewhere. Atkinson (2005: 51) concludes that “independent evidence should be sought on government productivity, as part of a process of ‘triangulation,’ recognizing the limitations in reducing productivity to a single number.”

Our key observation about two-way linkages between the *People Management Framework* and productivity is that the linkage is not, in fact, two-way, because the Government of Canada does not measure public service productivity in a manner that is consistent with the international good practices discussed in detail in the first part of this report. This situation is a violation of Atkinson's triangulation principle, but in reverse. Atkinson emphasized the need to corroborate the rigorous and analytically well-founded national accounts estimates of public service productivity with other types of performance indicators, such as those included in the *People Management Framework*. Not doing so could lead to a distorted picture of productivity because of the weaknesses inherent in national accounts estimates of productivity. At the same time, employing the national accounts methodology to corroborate the indicators of the PMF is equally important, and should be a high priority for the Government of Canada.

Van Dooren et al (2006: 15) offer two reasons in favour of using output and productivity, as defined in the System of National Accounts, as the basis for assessing government performance over more generic performance indicators like those in the PMF. First, output and productivity as defined in the SNA have undergone thorough conceptual analysis and significant experience has been built up through decades of use. While the SNA provides an economic conception of outputs, the implications of

aggregation and options for maintaining data quality are “unmatched in any other measure of public sector activity.” The second reason is that output and productivity measures underlie almost every other performance indicator that can be constructed. For these reasons, we also strongly recommend that the Government of Canada emphasize output and productivity indicators that are firmly grounded in the long and distinguished tradition and body of knowledge of the SNA.

It is also important to understand that some of the PMF indicators will be unrelated to productivity or will move in the opposite direction of productivity. For example, there is some evidence to suggest that more diversity may not improve productivity, but may have an important impact on the outcome of public confidence and trust (Van Dooren, et al, 2008: 20). Further work will be required to develop each of the potential indicators. In so doing, the theoretical link between each indicator and productivity should be documented. Over time, as time series become available for each indicator, analysis could be used to quantify the relationship of each indicator with outputs, productivity, outcomes, effectiveness, and cost-effectiveness.

The need to triangulate productivity indicators reinforced by the opportunities for gaming that exist when such indicators are used to guide decision making, either in terms of planning decisions or accountability and control decisions (Van Dooren, et al, 2006). Van Dooren and his co-authors define gaming as “the strategic reaction of individuals, organizations, and countries to the use of measures.” They identify two types of gaming. The first is to manipulate the measures, resulting in a loss of data quality. The second is to change the output itself, usually resulting in a loss of the quality of output. Or the gamer could both manipulate the indicators and manipulate output.

While a detailed discussion of gaming is outside of the scope of this report, we make four observations in regard to the *People Management Framework*. First, there is an extensive international literature on gaming that should be reflected in the PMF and associated initiatives.<sup>21</sup> Second, the rigour of appropriately employed output and productivity measures developed in accord with the national accounts can reduce the scope for the manipulation of indicators. In contrast, the lack of definition of the potential PMF indicators and the relatively scant literature supporting them – relative to that supporting the national accounts – appears to exacerbate the potential for gaming. Third, triangulation is seemingly a promising defence against gaming. Fourth, there is a balance to be struck between moderating the incentive to game; offering useful direction for planning to public servants; and developing targets that can be used hold individuals and organizations accountable.

Finally, we cannot over emphasize the importance of improving data gathering in the Government of Canada. The move to accrual accounting is an important step in the right direction, but further efforts must be made to improve the financial and non-financial information available in many GC organizations. Concerns around the quality of

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<sup>21</sup> Many studies come from the former Soviet Union, which arguably experienced the most serious gaming problems of any system as managers, workers, and planners attempted reacted to the incentives provided by a system with few economically significant prices. The lessons learned by Soviet planners are still applicable to many gaming issues that affect the public service.

publicly available data are not new and have been documented by the Parliamentary Budget Officer in his examination of the fiscal implications of the Mission in Afghanistan (Mathilakath, et al, 2008: 9-10) and the Auditor General in her recent assessment of the readiness of large departments to submit their financial statements to audits (Auditor General, 2007). The exercise of rigorously defining and gathering information in support of the potential PMF indicators will certainly help to improve overall information quality and comprehensiveness. But there is no doubt that existing data quality and availability problems would severely constrain any efforts that Statistics Canada might make to improve the measurement of GC outputs (Statistics Canada, 2008: 192-194). Fortunately, the significant work done abroad should provide valuable lessons about how this objective could best be achieved.

## 6. Conclusion and Recommendations

The Government of Canada can learn from a number of countries that have made significant progress in overcoming the conceptual and measurement challenges associated with measuring the productivity of the public service, particularly the United Kingdom and the United States. Statistics Canada does not currently publish estimates of government productivity; it uses the traditional input = output method to estimate government output. This methodology assumes that public service productivity does not grow, an assumption that is problematic for two reasons. First, using indicators that show no productivity growth by construction is not helpful from the standpoint of public service management (planning, control, and accountability). Second, it is also problematic for macroeconomic policy making. Since the government is an important part of the economy, inappropriately measuring government productivity can result in misleading estimates of Canada's overall economic performance, including GDP growth.

The approach taken in the *People Management Framework* (PMF) to emphasize soft human resources management indicators to improve productivity – including employee engagement and organizational culture – is appropriate given the limited base of literature on the drivers of public service productivity. Our key observation about two-way linkages between the PMF and productivity is that the linkage is not, in fact, two-way, because the Government of Canada does not measure public service productivity in a manner that is consistent with the international good practice embodied in the national accounts. There is no two-way linkage because productivity is not measured and so cannot support the PMF.

There is now significant opportunity to use the PMF to considerably improve the measurement of productivity in – and thereby the management of – the Government of Canada in a manner consistent with the good practice and the national accounts. Based on the findings of this report, we recommend that the Government of Canada:

- Carefully define, develop empirical estimates of, and monitor the PMF indicators in order to determine their relationship with productivity, outputs, and outcomes, for use in future initiatives to improve productivity.
- Establish a program to rigorously measure public service productivity (and aggregate federal government productivity) in a manner consistent with the national accounts and international good practice.
- Take advantage of the large and rich repository of national accounting knowledge at Statistics Canada to support efforts to improve the measurement of public service productivity.
- Corroborate the rigorous and analytically well-founded national accounts estimates of public service productivity through comparison with other types of performance indicators, such as those included in the PMF.
- Corroborate the performance indicators in the PMF through comparison with rigorous and analytically well-founded national accounts estimates of public service productivity.



- Reduce gaming by using a broad range of indicators, including those proposed in the PMF and national account estimates of public service productivity.

In one fundamental way, productivity is more important in the public service than in the private sector. The duty of politicians and public servants to ensure that public resources are used efficiently and effectively exceeds the duty of the leaders of private-sector firms to their shareholders. While Canadians have the option of investing or not investing in a particular firm, no Canadian has the option of not paying taxes.

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## Appendix A: Government at a Glance Glossary

Terms	Use in this Report	Formal Meaning
Efficiency	Costs per unit of output	In economics efficiency is used in two ways: operational or technical efficiency and allocative efficiency. Operational efficiency is costs per unit of output, given the existing input combination. Allocative (input) efficiency is costs per unit of output, given the input prices. The efficient combination may change according to a change in input prices. Cost efficiency comprises both operational and allocative (input) efficiency (Coelli, et al, 1999).
Final (end) outcome	Outcomes significantly reflect the intended or unintended results of government actions, but other factors are also implicated	The final result desired from delivering outputs. An output may have more than one end outcome; or several outputs may contribute to a single end outcome.
Financial input	Costs of inputs	Costs at current prices of the inputs sacrificed to produce outputs.
Financial proxy output	Value of outputs or groups of outputs, measured by input costs	The value of non-market output can be estimated directly or indirectly. The conventional method for government is indirect, namely by the “input method,” which consists of measuring output value by the sum of input costs sacrificed for its production.
Gaming	A conscious response to manipulate outputs or the data as a reaction to measurement	“(R)eactive subversion such as ‘hitting the target and missing the point’ or reducing performance where targets do not apply.” (Bevan and Hood, 2005: p. 8)
Input (non-financial)	Units of labour, capital, goods and services sacrificed for the production of output.	“Taking the health service as an example, input is defined as the time of medical and non medical staff, the drugs, the electricity and other inputs purchased, and the capital services from the equipment and buildings used.” (Lequiller, 2005: p. 4)
Intermediate outcome	A consequence of the outputs or activities of government which contributes towards the final outcome. Can be more directly attributed to public sector activities than final outcomes. <i>Classified as outputs in “Government at a Glance.”</i>	An intermediate outcome is expected to lead to an end outcome, but, in itself, is not the desired result.
Output (non-financial)	Output derived from the direct measurement of output volume and associated quality characteristics.	Measures which arise from “the calculation of a volume indicator of output using appropriately weighted measures of the output of the various categories of non-market goods and services produced.” (Lequiller, 2005: p. 4)
Performance	Used <i>non-analytically</i> to convey that achievements matter as well as probity and parsimony in resource use.	The term “performance” is used to indicate that there is a standard to which managers, agencies, will be held to account — beyond complying with constraints on the consumption of inputs. The difficulty in the term is that the standard that is to be achieved can refer to anything beyond inputs – whether it is in fact classifiable as

		processes, outputs, or outcomes.
Productivity	Output per unit of input or weighted input	Economists distinguish between total productivity, namely total output divided by total (weighted) input(s) and marginal productivity, namely change in output divided by change in (weighted) input(s). (Coelli, et al, 1999)
Public sector process	Structures, procedures, and management arrangements with a broad application within the public sector	Cross-cutting managerial and institutional arrangements within the public sector (Andersen, 2004).

Source: Adapted from Van Dooren et al (2006)

As noted in the body of the report, the definitions in this glossary are broadly consistent with those used in the Government of Canada (*Result-Based Management Lexicon*; Treasury Board Secretariat, 2004). One notable difference is that the Government of Canada (GC) defines three types of outcome, versus the two identified in *Government at a Glance*. GC identifies not only final and intermediate outcomes, but also “immediate outcomes,” which are outcomes that are “directly attributable to a policy, program, or initiative’s outputs. In terms of time frame and level, these are short-term outcomes and are often at the level of an increase in awareness of a target population.” This distinction is not of central importance in our discussion of productivity in the public service, since – consistent with the OECD – we consider any outcome prior to a final outcome to be an output.

Another point of note is the use by the GC of the concept of “strategic outcome,” which is

a long-term enduring benefit to Canadians that stems from a department or agency’s mandate, vision and efforts. It represents the difference a department or agency wants to make for Canadians and should be a clear measurable outcome that is within the department or agency’s sphere of influence (TBS, 2004).

Strategic outcomes appear prominently in Departmental Performance Reports. As with immediate outcomes, the distinction between strategic and other types of outcomes is of secondary importance for this report, and while we note it, there is little value in making the distinction in the body of this report.

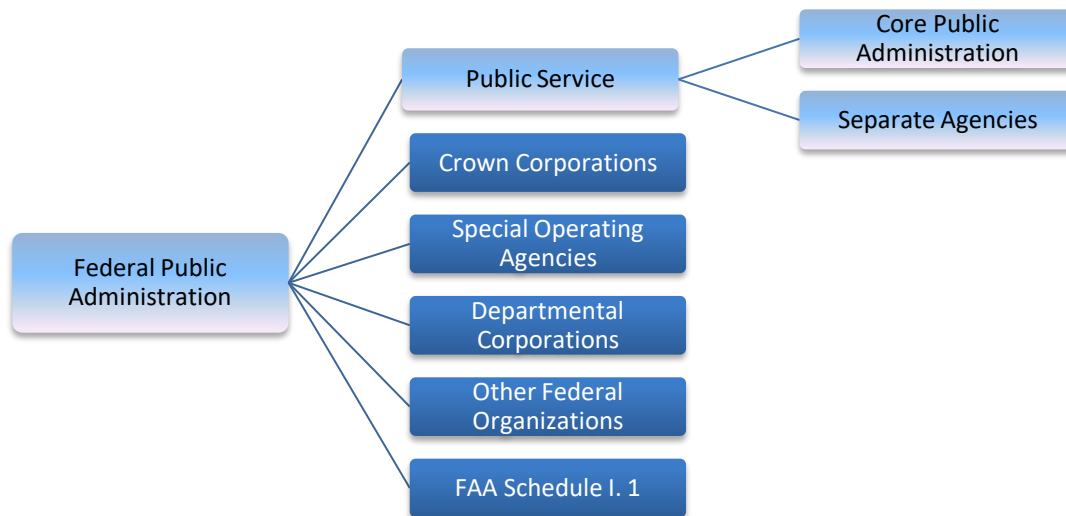
## Appendix B: The Organization of the Public Service

This appendix deals with a number of definitional issues associated with public service productivity. First, the definition of public service is discussed. Second, the definition of public administration used by Statistics Canada is discussed.

### A. Legal Organization of the Public Service

This report is focused on productivity in the Public Service, as defined in the *Population Affiliation Report* of the Government of Canada (Figure 2). The Public Service is a component of the Federal Public Administration. The distinction between the various entities relates to their affiliations with the major acts government personnel administration/management.

**Figure 2: Legal Organization of Federal Entities**



Source: Canada Public Service Agency (2009). Figures may not sum exactly.

Within the Public Service, the Core Public Administration is employed directly by the Treasury Board, while the Separate Agencies employ their own staff. Examples of entities that are part of the Core Public Administration are the Department of Public Works and Government Services and the Office of the Chief Electoral Officer. The Canada Revenue Agency and the Parks Canada Agency are examples of Separate Agencies. A full database of all federal entities is available on the Canada Public Service Agency website at [http://www.psagency-agencefp.gc.ca/pas-srp/overview-apercu\\_e.asp](http://www.psagency-agencefp.gc.ca/pas-srp/overview-apercu_e.asp).

Examples of Federal entities that are not the focus of this report are Atomic Energy of Canada Limited and VIA Rail Canada Inc. (Crown Corporations); Passport Canada and the Canadian Coast Guard (Special Operating Agencies); the Canadian Centre for Occupational Health and Safety (Departmental Corporation); Vancouver Port Authority and the Canada Foundation for Innovation (Other Federal Organizations); and

the Office of the Communications Security Establishment Commissioner (FAA Schedule I.1 entity).

## **B. Statistical Structure of the Public Service for Measuring Productivity in a Manner Consistent with the National Accounts**

Statistics Canada uses a classification system called the North American Industry Classification System (NAICS) to group establishments for the purposes of estimating productivity by sector and industry. In the context of NAICS an establishment is

is the level at which all accounting data required to measure production are available. The establishment, as a statistical unit, is defined as the most homogeneous unit of production for which the business maintains accounting records from which it is possible to assemble all the data elements required to compile the full structure of the gross value of production (total sales or shipments, and inventories), the cost of materials and services, and labour and capital used in production (Statistics Canada, 2007).

NAICS is a hierarchical structure in which establishments are identified by digits which relate to the nature of the production process. Two-digit sectors are composed of three-digit sub-sectors, which are composed of four-digit industry groups, which are composed of five-digit industries.

“Public Administration” is a two-digit sector under NAICS and “Federal Public Administration” is a subsidiary three-digit sub-sector. The federal public administration sub-sector is divided into five industry groups: defence services, federal protective services, federal labour, employment, and immigration services, foreign affairs and international assistance, and other federal government public administration.

It is important to note that public administration comprises establishments engaged in “activities of a governmental nature.” Ownership is not material in determining whether or not an establishment is included in federal public administration. Statistics Canada (2007) notes that “government-owned establishments engaged in activities that are not governmental in nature are classified to the same industry as privately owned establishments engaged in similar activities.” For instance VIA Rail Inc. is a federal crown corporation, but is not part of federal public administration, because it is a railway, not a purely governmental activity like immigration or defence.

A final point of note is an important limitation to cross-country analysis that has been built into NAICS. Below the sector level, i.e. at the three-digit sub-sector level and below (including for federal public administration), industries are not directly comparable between Canada and the United States. Only the two-digit public administration sector should be directly compared between Canada and the United States.

The superscript symbols at the end of NAICS class titles used to signify comparability are:  
CAN            Canadian industry only

MEX	Canadian and Mexican industries are comparable
US	Canadian and United States industries are comparable
[Blank]	[No superscript symbol] Canadian, Mexican and United States industries are comparable.

## 91 **Public Administration**

This sector comprises establishments primarily engaged in activities of a governmental nature, that is, the enactment and judicial interpretation of laws and their pursuant regulations, and the administration of programs based on them. Legislative activities, taxation, national defence, public order and safety, immigration services, foreign affairs and international assistance, and the administration of government programs are activities that are purely governmental in nature.

Ownership is not a criterion for classification. Government owned establishments engaged in activities that are not governmental in nature are classified to the same industry as privately owned establishments engaged in similar activities.

Government establishments may engage in a combination of governmental and non-governmental activities. When separate records are not available to separate the activities that are not governmental in nature from those that are, the establishment is classified to this sector.

### 911 **Federal Government Public Administration**<sup>CAN</sup>

This subsector comprises establishments of the federal government primarily engaged in activities of a governmental nature, such as legislative activities, judicial activities, taxation, national defence, public order and safety, immigration services, foreign affairs and international assistance and the administration of government programs.

### 9111 **Defence Services**<sup>CAN</sup>

This industry group comprises establishments of the Canadian Armed Forces and civilian agencies primarily engaged in providing defence services.

Example activities include armed services, military bases, civil defence services, federal government defence research board, federal government defence services, military bases and camps, military defence services, military messes, naval bases, and defence radar stations.

### 9112 **Federal Protective Services**<sup>CAN</sup>

This industry group comprises establishments of the federal government primarily engaged in providing services to ensure the security of persons and property. Protection includes measures to protect against negligence, exploitation and abuse.

### 91121 **Federal Courts of Law**<sup>CAN</sup>

This industry comprises establishments of the federal government primarily engaged in rendering judgements in, and interpretations of, the law, including the



arbitration of civil actions. Appeal boards of federal jurisdiction are included.

Example activities include federal government administrative courts, chancery courts, the federal government court of appeal, courts of customs and patent appeals, exchequer court, Federal court of law, and the Supreme Court of Canada.

**91122 Federal Correctional Services** <sup>CAN</sup>

This industry comprises establishments of the federal government primarily engaged in providing the incarceration and rehabilitation services of prisons and other detention establishments.

Example activities include federal government correctional services, detention centres, federal government, federal correctional services, federal government parole services, federal government penitentiary services,

**91123 Federal Police Services** <sup>CAN</sup>

This industry comprises establishments of the federal government primarily engaged in maintaining law and order by means of operating police forces and services.

**Exclusion(s):** Establishments primarily engaged in:

- providing private police services (56161, Investigation, Guard and Armoured Car Services)

Examples activities include the Royal Canadian Mounted Police.

**91124 Federal Regulatory Services** <sup>CAN</sup>

This industry comprises establishments of the federal government primarily engaged in the general protection of individuals, singly or in groups, against negligence, exploitation or abuse.

Example activities include general federal regulatory services, federal government occupational safety and health standards services, regulation and inspection of agricultural products, securities regulation commissions, and federal government work safety and health program administration.

**91129 Other Federal Protective Services** <sup>CAN</sup>

This industry comprises establishments of the federal government, not classified to any other industry, primarily engaged in dealing with major emergencies and catastrophes. Establishments primarily engaged in animal or pest control activities, or other federal protective services, are included.

Example activities include federal government animal quarantine service, federal government emergency planning services, fishery inspection and protection services, and the fishery patrol service.

**9113 Federal Labour, Employment and Immigration Services** <sup>CAN</sup>

This industry group comprises establishments of the federal government primarily

engaged in providing services for labour, employment, immigration, citizenship and the like.

**91131 Federal Labour and Employment Services** <sup>CAN</sup>

This industry comprises establishments of the federal government primarily engaged in labour market research and dealing in matters pertaining to employer-employee relations, including the promotion of improved working conditions and the provision of arbitration and conciliation services in collective bargaining.

Example activities include federal government arbitration services, federal government conciliation and mediation services, federal government employment services (placement counselling), industrial relations services, labour relations board, manpower program (job placement), and mediation and conciliation services.

**91132 Immigration Services** <sup>CAN</sup>

This industry comprises establishments of the federal government primarily engaged in promoting immigration, assisting immigrants and controlling the entry of individuals into the country.

Example activities include deportation services, federal immigration services, immigration services, refugee settlement, and visitor admissions (tourists and temporary).

**91139 Other Federal Labour, Employment and Immigration Services** <sup>CAN</sup>

This industry comprises establishments of federal government departments or agencies primarily engaged in activities that combine labour, employment and immigration services. Establishments primarily engaged in the registration of citizens and the promotion of citizen-oriented activities are included.

Example activities include citizenship registration services.

**9114 Foreign Affairs and International Assistance** <sup>CAN</sup>

This industry group comprises establishments of the federal government primarily engaged in promoting formal relations between the government of Canada and foreign countries.

**91141 Foreign Affairs** <sup>CAN</sup>

This industry comprises establishments of the federal government primarily engaged in promoting formal relations between the government of Canada and foreign countries.

Example activities include consular service, diplomatic representation, diplomatic services, embassies, external affairs services, international agency representation, international exchange services (scientific, academic), missions established in foreign countries, passport services, and the organization of state and official visits.

**91142 International Assistance** <sup>CAN</sup>

This industry comprises establishments of the federal government primarily engaged in economic development and improvement of social conditions in foreign countries.

Example activities include external aid services, food aid programs, foreign economic and social development services, and international development assistance.

**9119 Other Federal Government Public Administration** <sup>CAN</sup>

This industry group comprises establishments of the federal government, not classified to any other industry, primarily engaged in executive and legislative activities; fiscal and related policies and the administration of the public debt; assessing, levying and collecting taxes; conducting relations with other governments; and the administration of programs.

**Exclusion(s):** Establishments primarily engaged in:

- railway operation (482, Rail Transportation)
- airport operation (48811, Airport Operations)
- port operation (48831, Port and Harbour Operations)
- archive or library operation (51912, Libraries and Archives)
- operating the Bank of Canada (52111, Monetary Authorities - Central Bank)
- operating schools and local school boards (61, Educational Services)
- hospital operation (622, Hospitals)
- residential care facility operation (623, Nursing and Residential Care Facilities)
- museum and art gallery operation (71211, Museums)

Example activities include agricultural extension services, air transport program, amateur sports program, arts and cultural programs, Atomic Energy Commission (except inspection and defence), Auditor General's office, civil rights commissions, civil service commissions, Commissioner of Official Languages, Communications policy planning, conservation and stabilization agencies, conservation authority, consumer and corporate affairs, councils of economic advisers, criminal justice statistics centres, culture and arts support programs, customs tariff, duty/tax collection on goods, economic and fiscal policy, economic development agencies, economic research programs to improve performance and competitiveness, education programs for Indians and Eskimos, electoral offices, environment policy, programs, export development programs, Federal Communications Commission, federal-provincial relations, financial affairs, general economic statistics agencies, Governor General's office, health and medical care programs, housing programs, Human Rights Commission, Indian affairs program, National science foundation, natural resource conservation programs, old age security program, Parliament, performing arts program, Prime Minister's office, Privy Council office, Public Service Commission, Public Service Staff Relations Board, Public works programs, recreation policy and planning, regional industrial development programs, revenue ministry, Senate, social development services, space research and development, taxation, tourism promotion programs, Treasury Board Secretariat, and veterans' benefits program.

## Appendix C: The Atkinson Review: Measurement of Government Output and Productivity for the National Accounts: Principles

This report devotes considerable attention to the *Atkinson Review* as one of the most significant initiatives ever undertaken to improve the measurement of government productivity.

Atkinson concludes that the direct measurement of the output from government spending, and the measurement of inputs and productivity, should be based on a set of principles, within the framework set by international guidelines. The principles cover outputs, inputs, deflators and productivity:

- **Principle A:** the measurement of government non-market output should, as far as possible, follow a procedure parallel to that adopted in the national accounts for market output.
- **Principle B:** the output of the government sector should in principle be measured in a way that is adjusted for quality, taking account of the attributable incremental contribution of the service to the outcome.
- **Principle C:** account should be taken of the complementarity between public and private output, allowing for the increased real value of public services in an economy with rising real value of public services in an economy with rising real GDP.
- **Principle D:** formal criteria should be set in place for the extension of direct output measurement to new functions of government. Specifically, the conditions for introducing a new directly measured output indicator should be that (i) it covers adequately the full range of services for that functional area, (ii) it makes appropriate allowance for quality change, (iii) the effects of its introduction have been tested service by service, (iv) the context in which it will be published has been fully assessed, in particular the implied productivity estimate, and (v) there should be provision for regular statistical review.
- **Principle E:** measures should cover the whole of the United Kingdom; where systems for public service delivery and/or data collection differ across the different countries of the United Kingdom, it is necessary to reflect this variation in the choice of indicators.
- **Principle F:** the measurement of inputs should be as comprehensive as possible, and in particular should include capital services; labour inputs should be compiled using both direct and indirect methods, compared and reconciled.
- **Principle G:** criteria should be established for the quality of pay and price deflators to be applied to the input spending series; they should be sufficiently disaggregated to take account of changes in the mix of inputs; and should reflect full and actual costs.

- **Principle H:** independent corroborative evidence should be sought on government productivity, as part of a process of ‘triangulation’, recognising the limitations in reducing productivity to a single number.
- **Principle I:** explicit reference should be made to the margins of error surrounding national accounts estimates.

## Appendix D: The Largest Federal Organizations

This appendix provides information on the 25 largest federal organizations. Together these organizations represent 90 per cent of public service employment according to the Population Affiliation Report produced by the Treasury Board Secretary (as of December 30, 2008).

**Appendix Table 1: Largest Federal Organizations by Public Service Employment, at December 30, 2008**

Rank	Organization	Number of Employees	Share of Total PS Employees	
			(per cent)	Cumulative Total (per cent)
1	Canada Revenue Agency*	39,021	15.08	15.1
2	Department of National Defence	26,076	10.07	25.2
3	Department of Human Resources and Social Development	23,348	9.02	34.2
4	Correctional Service of Canada	16,506	6.38	40.5
5	Canada Border Services Agency	13,814	5.34	45.9
6	Department of Public Works and Government Services	12,674	4.90	50.8
7	Department of Fisheries and Oceans	10,458	4.04	54.8
8	Department of Health	9,931	3.84	58.7
9	Royal Canadian Mounted Police (Civilian Staff)	6,893	2.66	61.3
10	Department of the Environment	6,383	2.47	63.8
11	Canadian Food Inspection Agency*	6,372	2.46	66.3
12	Department of Agriculture and Agri-Food	6,335	2.45	68.7
13	Statistics Canada	5,600	2.16	70.9
14	Department of Industry	5,298	2.05	72.9
15	Department of Transport	5,139	1.99	74.9
16	Department of Foreign Affairs and International Trade	4,574	1.77	76.7
17	Department of Justice	4,524	1.75	78.4
18	Department of Natural Resources	4,489	1.73	80.1
19	National Research Council of Canada*	4,478	1.73	81.9
20	Department of Indian Affairs and Northern Development	4,275	1.65	83.5
21	Department of Citizenship and Immigration	4,011	1.55	85.1
22	Department of Veterans Affairs	4,006	1.55	86.6
23	Parks Canada Agency*	3,719	1.44	88.1
24	Department of Canadian Heritage	2,309	0.89	89.0
25	Public Health Agency of Canada	2,285	0.88	89.8
	Total (organizations shown)	232,518	89.84	
	Total Public Service	258,825	100.00	

Sources: TBS Population Affiliation Report: [http://www.tbs-sct.gc.ca/pas-srp/overview-apercu\\_e.asp](http://www.tbs-sct.gc.ca/pas-srp/overview-apercu_e.asp)

Note: \*Separate employer

## Appendix E: Publicly Available Input and Output Estimates for the Government of Canada

Although Statistics Canada does not publish estimates of productivity for the Government of Canada (GC), it is possible to construct rough estimates based on published labour input and GDP estimates. These estimates are produced on the basis of the North American Industry Classification System (NAICS), which groups together establishments based on production processes. NAICS differs from the legal organizational structure of the GC, a distinction discussed in Appendix B. As a result, estimates for the public service (the legal concept) as distinct from federal government public administration (the NAICS concept) cannot be produced.

Estimates of hours worked are available for NAICS industries from the Canadian Productivity Accounts of Statistics Canada. These can be combined with estimates of real GDP from the Income and Expenditure Accounts to generate rough estimates of labour productivity (Appendix Table 2). At this time, estimates of other types of inputs (eg capital services, energy, materials, other services) are not available for the GC. Estimates of the capital stock are publicly available for the public administration sector as a whole, but do not separate out the GC from provincial governments, and therefore cannot be used.

**Appendix Table 2: Labour Productivity, Chained 2002 Dollars, 1997-2007**

	All Industries	Business sector Industries	Non-Business Sector Industries				
			Total Non-Business Sector Industries	Total Public Administration	Federal Government		
					Total Federal Government	Defence Services	Federal Government (except defence)
<b>1997</b>	35.84	36.16	34.51	42.46	45.50	36.34	50.37
<b>1998</b>	36.43	36.82	34.67	43.41	46.89	37.14	52.00
<b>1999</b>	37.43	37.87	35.36	43.83	47.62	38.15	52.26
<b>2000</b>	38.57	39.15	35.82	45.14	47.22	39.86	50.62
<b>2001</b>	38.85	39.50	35.82	44.73	46.59	40.27	49.24
<b>2002</b>	39.31	39.95	36.27	45.82	47.85	41.72	50.34
<b>2003</b>	39.54	40.24	36.30	45.96	48.50	41.88	51.21
<b>2004</b>	39.65	40.36	36.34	46.23	49.15	41.72	52.26
<b>2005</b>	40.40	41.22	36.58	46.52	48.82	41.81	51.73
<b>2006</b>	41.87	42.79	37.59	47.42	48.85	43.68	50.96
<b>2007</b>	41.07	41.98	36.81	46.89	49.01	41.69	52.21
<b>Compound Annual Growth Rate, Per Cent</b>							
<b>1997-2007</b>	1.37	1.50	0.65	1.00	0.75	1.38	0.36

Source: CSLs calculations based on Statistics Canada estimates from the Canadian Productivity Accounts and Income and Expenditure Accounts. Real GDP per Hour Worked.

As noted in the body of the report, the input = output techniques used by Statistics Canada are reasonable, in that they do not produce estimates of zero productivity growth in the GC. For instance, according to our calculations, the GC (public administration only, see Appendix B) experienced labour productivity growth of 0.75 per cent per year from 1997 to 2007. This aggregate growth reflected labour productivity growth of 1.38

per cent per year in defence services and of 0.36 per cent per year in the federal government except defence. In contrast, over the same period, the business sector industries experienced labour productivity growth that was on average twice as rapid as the federal government, 1.50 per cent per year. These rough estimates are illustrative only, and should be interpreted with caution. As discussed in the report, they certainly do not reflect international good practice.

The input = output techniques used by Statistics Canada do not produce estimates of zero productivity growth because inputs are adjusted for changing composition and quality as noted in section 4.1.



## Appendix F: Supplemental Information on the US Federal Productivity Measurement Program

As noted in the third part of this report, the US Federal Productivity Measurement Program (FPMP) produced estimates of productivity for the federal government by department, and function. This appendix provides a sample of the functions measured (Appendix Table 3) by the FPMP and estimates of productivity by function (Appendix Table 4).

### Appendix Table 3: Sample Output Measures by Function

<i>Audit of Operations</i>	<i>Library services</i>	<i>Procurement</i>
Installation audits completed	Circulation items loaned	Contract actions completed
Pricing proposal audits	Reference questions answered	Line items purchased
Internal operations audited	Periodicals and new journals routed	Purchase actions processed
<i>Buildings, grounds, and equipment maintenance</i>	<i>Loans and grants</i>	<i>Records management</i>
Acres of fine lawn maintained	Disaster loans approved	Records updated
Average square feet cleaned	Minority business grants issued	Archival information services provided
Minor maintenance items repaired	Rehabilitation loan applications processed	Reference services completed
<i>Education and training</i>	<i>Medical services</i>	<i>Regulation: compliance and enforcement</i>
Flight training (student days)	Medical care provided (weighted composite)	Cotton samples classified
Student enrollment (continuing education)	Clinical visits made	Inspections conducted
Participant training days	Outpatient visits conducted	Cattle herds tested for brucellosis
<i>Electric power production and distribution</i>	<i>Natural resources and environmental management</i>	<i>Regulation: rulemaking and licensing</i>
Kilowatt hours generated	Miles of trails maintained	Trademark applications disposed
Megawatts sold	Pounds of fish raised	Permits issued or reissued
<i>Finance and accounting</i>	<i>Personnel investigations</i>	<i>Social services and benefits</i>
Invoices paid	Inspections conducted	Compensation claims paid
Insurance claims processed	Clearances conducted	Hospital insurance claims processed
Domestic payroll accounts maintained	Position sensitivity determinations made	SSI change of address made
<i>General support services</i>	<i>Personnel management</i>	<i>Specialized manufacturing</i>
Mail items processed	Retirement actions completed	Munitions produced (equivalent units)
Graphic units produced	Incentive award forms completed	Tons of fertilizer materials produced
Travelers serviced	Vacancies filled	Millions of coins produced
<i>Information services</i>	<i>Postal service</i>	<i>Supply and inventory</i>
Regular reports prepared	Letters delivered by class of mail	Line items processed
News releases published	Express mail delivered	Requisitions processed
River stage forecasts made	Money orders sold	Short tons received and shipped
<i>Legal and judicial activities</i>	<i>Printing and duplication</i>	<i>Transportation and traffic management</i>
Cases disposed	Equivalent sheets printed	Fleet miles operated
Settlements and decisions rendered	Paper copies reproduced	Revenue ton-miles of freight and passengers carried
Appellate decisions entered	Offset printing impressions made	Icebreaker support days provided

Source: Fisk and Forte (1997), Exhibit 1, p. 21.

**Appendix Table 4: Average Annual Rates of Change in Output per Employee Year and Related Data, by Selected Functions in the Federal Civilian Workforce, Fiscal Years, 1967-1994**

	Output per Employee Year	Output	Employee Year	Compensation per Employee Year	Unit Labour Cost
Total Federal sample	1.1	1.4	0.3	6.7	5.6
Audit of operations	0.8	-0.9	-1.7	6.2	5.4
Buildings, grounds, and equipment maintenance	2.2	1.0	-1.1	5.8	3.6
Education and training	0.4	-1.0	-1.5	6.1	5.6
Electric power production and distribution	-1.0	0.4	1.4	6.5	7.6
Finance and accounting	3.8	2.2	-1.5	6.3	2.4
General support services	2.2	4.7	2.5	5.6	3.4
Information services	1.8	1.9	0.0	5.5	3.6
Legal and judicial services	0.1	3.7	3.6	6.0	5.9
Library services	3.7	4.6	0.9	7.1	3.3
Loans and grants	2.4	2.7	0.4	6.8	4.3
Medical services	-0.1	1.3	1.4	6.6	6.6
Natural resources and environmental management	1.0	0.7	-0.4	6.0	4.9
Personnel investigations	2.3	3.5	1.2	6.8	4.4
Personnel management	0.0	2.2	2.3	5.2	5.2
Postal service	1.0	1.9	0.9	7.0	6.0
Printing and duplication	0.3	-2.2	-2.4	6.3	6.1
Procurement	0.7	0.2	-0.4	4.9	4.2
Records management	2.1	-0.6	-2.6	6.3	4.1
Regulation: compliance and enforcement	1.9	3.9	2.0	6.5	4.5
Regulation: rulemaking and licensing	2.7	4.6	1.8	6.6	3.8
Social services and benefits	2.5	3.2	0.7	6.7	4.1
Specialized manufacturing	2.4	0.8	-1.5	6.8	4.3
Supply and inventory control	1.8	-1.1	-2.9	5.5	3.6
Transportation and traffic management	2.0	2.2	0.1	7.1	5.0

Source: Fisk and Forte (1997) Table 2, p. 24.

The FPMP measured productivity in 24 functions. Fisk and Forte (1997: 26) note that the impact of technological progress can be seen in the finance and accounting and library services functions, which saw relatively fast labour productivity growth.