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The Micro-Economic Analysis Division: The Role of Analysis in Delivering Information Products

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This paper represents the views of the authors and does not necessarily reflect the opinions of Statistics Canada.

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1. For a general discussion of the role of analysis at Statistics Canada, see Ivan Fellegi, *Analytical Activities at Statistics Canada*. 47th Plenary Session. Conference of European Statisticians. Statistical Commission and Economic Commission for Europe. CES/1999/9. 23 March 1999.

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Abstract

Analysis meets a variety of needs of a statistical agency. It provides objective, accurate information on economic and social trends. It provides information products that are richer than the simple reporting of trends and percentages. It provides a more thorough understanding of phenomena, and of complex relationships between them. But most importantly, analysis serves to enhance the quality of products produced by a statistical agency.

The quality of statistical products is judged by their accuracy, coherence, interpretability and relevance. This paper describes how the analytical program of Statistics Canada's productivity group is used to enhance the quality of its products by showing a) how it has served to improve the relevance of statistical products; b) to ensure the coherence of the set of data products; c) by providing guidance to users that enhances their ability to interpret how they might use statistical data; and, finally, by ensuring that the output of the statistical program is relevant—helping the Agency adapt its products to meet the changing needs of data users.

1. Background

The Micro-Economic Analysis Division (MEAD) provides information products to Canadians. These information products consist of data series and analytical reports designed to improve our understanding of the structure and performance of the Canadian economy. MEAD's analysis program, developed over a 10 year period, serves several functions. The Division's analytical products contribute to the development of new statistical resources, and provide other production divisions with quality control indicators that lead to improvements in their survey and administrative databases. While these internal functions are important, MEAD's analysis program also provides the Canadian public with richer information products than simple data series. This note focuses on the nature of this analytical contribution—with particular reference to Statistics Canada's productivity program.

The analysis program at MEAD focuses on three different areas. First, it conducts analysis on a range of topics related to business dynamics and international trade. Second, MEAD is responsible for a program of analysis in the National Accounts. In addition, the Division is responsible for the production of productivity statistics and for publishing analytical studies on productivity.

1.1 Research on business dynamics

In the area of business dynamics, MEAD has published studies on entry and exit, structural change in different sectors, high-technology restructuring, innovation and technology use, factors related to business performance, the extent and impact of foreign ownership, growth patterns in small versus large firms, small-firm financing, tax incidence, and human-resource strategies and activities.

The output of the Division in these areas serves audiences that are both external and internal to Statistics Canada. The external audience consists of the Canadian public, federal and provincial policy departments, business and industry analysts, research institutions and analysts. MEAD's analysis products are also utilized by international agencies such as the Organisation of Economic Co-operation and Development (OECD) and foreign statistical agencies.

One example of analysis at MEAD that has contributed directly to the policy process, both in Ottawa and the provinces, is the Division's research on small business innovation and performance. This research has also garnered considerable attention from the business community, which, in turn, led to new requests for special surveys. Analytical studies on technology and labour markets have also been used as inputs for policy studies conducted by the OECD. MEAD also serves an internal market in that it works closely with other divisions at Statistics Canada—primarily through the development of survey content, but also by preparing integrated data packages for outside clients.

To support its research on business economics, MEAD makes use of special microeconomic databases that contain information on the characteristics of plants and business enterprises. These microeconomic databases have been developed at Statistics Canada, and, for reasons of confidentiality, reside within Statistics Canada. Many of the Division's analytical reports rely on

longitudinal data developed from production surveys such as the Survey of Manufactures. MEAD not only publishes analytical studies from this data, it also contributes substantially to data development at Statistics Canada by constructing longitudinal databases.

MEAD has also been responsible—from initiation, planning, management and analysis—for several special surveys that permit Statistics Canada to extend the range of products that it provides to the Canadian public in the area of microeconomic studies. These special surveys have explored small-firm business strategies, innovative activities, and financing practices. The analytical capabilities of these surveys were enhanced by linking survey data to longitudinal data derived from administrative data sources. The *Growing Small and Medium Sized Enterprise (GSME) Survey* was used to examine how different strategies and activities were related to firm performance. This survey provided a unique opportunity to study differences between more successful and less successful firms because survey data were linked to administrative records that allowed firms to be classified in an objective way by their degree of success. The *Innovation and Technology Survey* was also linked to administrative data on firm profitability in order to assess how different forms of innovative activity are related to performance outcomes. MEAD conducted a special survey for Agriculture and Agri-Food Canada on innovation and technology use in the food-processing sector. The *Emerging Business Project* that studies new firms relied on longitudinal data for the development of the frame that is being used for analysis.

1.2 Research that supports national accounting

Under a special initiative undertaken by Statistics Canada to increase the analytical output of the Agency, MEAD has recently been given responsibility for a new analysis program related to the System of National Accounts (SNA). This program is designed to support the production divisions of the Accounts, and is aimed both at data development and at using National Accounts data to examine important research issues. For example, MEAD was responsible for much of the recent analytical work that led to the capitalization of software in estimates of Gross Domestic Product (GDP). MEAD then used the resulting GDP estimates to study the impact of investments in information and communication technologies (ICT) on economic growth. MEAD also played an important role in the development of a statistical standard within the System of National Accounts to measure the outputs of ICT industries.

MEAD has also investigated changes in Canada/US price differences over time using the microeconomic databases that form the basis for the purchasing power price estimates used by the Agency. The Division has also developed new provincial labour productivity estimates by building on the new provincial Input/Output tables that resulted from the Project to Improve Provincial Economic Statistics (PIPES) initiative. MEAD has worked on developing new estimates of economic depreciation for investment and capital services—which are used in the production system to keep Canada's estimates of multifactor productivity up to world standards. Subsequent sections provide an overview of the production responsibilities of the productivity program, along with discussion of the role that analysis plays in supporting the productivity program.

2. Statistics Canada's productivity program

MEAD is responsible for Statistics Canada's productivity program—which produces estimates of the growth in labour and multifactor productivity in Canada's business sector. Productivity statistics are important indicators of industrial competitiveness and economic well being. Labour productivity is measured as the output that an economy produces per unit of labour input. Since this measure considers only one input (labour), it is referred to as a 'partial' productivity measure.

Multifactor productivity estimates are more comprehensive in that they measure how much output is produced relative to a bundle of inputs, which includes not only labour, but also capital, materials, energy and services. Multifactor productivity (MFP) growth measures are meant to describe the rate of growth of the efficiency of an economy. MFP growth is calculated as the difference between the rate of growth of outputs and the rate of growth of inputs. Holding prices constant, if a business increases its output by 5% and its inputs by only 4%, there is an additional 1% of output to be distributed to workers and owners of capital. It is this surplus that multifactor productivity estimates are meant to capture. Increases in productivity over long periods of time have been associated with increases in the economic well being of society.

Recently, MEAD has expanded its productivity program by introducing new quarterly estimates of labour productivity that are more timely than previous estimates. It has also introduced new estimates of multifactor productivity that are of higher quality—bringing Canadian estimates to the forefront of international standards by extending the range of assets that are considered, and by using estimates of capital services rather than capital stock. To complement these production responsibilities, MEAD has initiated an extensive analysis program on productivity issues in order to provide quality control for the productivity program, and to provide new analysis products to the Canadian public. MEAD has introduced a new annual publication, *Canadian Productivity Review*, that reports on the Division's productivity research.

Analysis has played an indispensable role in the development of productivity estimates that meet the high standards set for products published by Statistics Canada. The next section outlines several ways in which research and analysis has contributed to the quality of the productivity program.

3. Analysis and quality

Analysis serves to improve the quality of the data that Statistics Canada provides to the Canadian public. Quality of data is defined at Statistics Canada as "fitness for use".[2] There are six dimensions that are used to determine "fitness for use". These are: accuracy, relevance, timeliness, accessibility, interpretability and coherence.

2. See Statistics Canada. Policy Manual. Section 2.3. Policy on Informing Users of Data Quality and Methodology.

Accuracy refers to whether the information correctly describes the phenomenon it was designed to measure. *Relevance* reflects the degree to which this information meets the needs of users. *Timeliness* refers to the delay between the time period for which the information pertains and the subsequent date of publication. *Accessibility* refers to the ease with which the data can be obtained by users. *Interpretability* reflects the availability of supplementary information necessary to interpret and utilize the data appropriately. *Coherence* reflects the degree to which data can be brought together successfully with other statistical information within a broad analytical framework.

MEAD operates a research program that complements the labour and multifactor productivity estimates produced by the Division. MEAD's productivity analysis program improves the quality of the Division's productivity statistics in the following dimensions: accuracy, coherence, relevance, and interpretability.

3.1 Accuracy and coherence

MEAD's productivity analysis program provides quality assurance both by enhancing the accuracy of the Division's productivity estimates and by improving the overall coherence of these products.

Analysis in the productivity program, as is the case elsewhere in the National Accounts, is an extension of the particular nature of the production process. The production process in the SNA combines data from different sources. To construct official data series, this production process confronts data from one source with data from another—in the end, this comparative process serves to bring a variety of sources into coherence with one another. Data that are generated from production surveys are subject to both response and non-response errors. By examining how one series compares to another (for example, how employment estimates from the Labour Force Survey compare with those from the Survey of Employment, Payroll and Hours), analysts can assess whether the survey error in one or the other data source is particularly large in one period.

Analysis also serves to provide coherence across different data series. MEAD develops and maintains a large database in support of the productivity program—the KLEMS (Capital, Labour, Energy, Materials and Services) database. KLEMS integrates time series data on gross output, materials inputs, service inputs, energy purchases, labour, investment and capital. Each of these data series is calculated in both nominal dollars and real (constant) dollars. Price indices are collected for each of these series. Finally, KLEMS classifies these series using four different levels of aggregation—corresponding to the S, M, L, and W levels used in the Input/Output accounts. The W industry level (the most detailed of the four classifications) includes data on almost 300 industries. The period covered by the database extends from 1961 to the current reference year (2000 at present).

Productivity statistics are important indicators for those who analyze trends in the economy. These users are not only interested in knowing what the rates of productivity growth have been, but also in understanding the underlying causes behind slowdowns or accelerations in observed rates of productivity growth. Only by supporting the productivity program with large databases like KLEMS can these investigations occur. KLEMS thus serves a dual purpose. It is key to the

production of productivity statistics. And its analytical capabilities are essential to many in the user community who utilize these productivity statistics.

Analysis that provides quality assurance involves looking for unexpected deviations from known or assumed relationships.[3] Deviations from expected relationships might signal errors in the data. These can also signal some significant departure from expectations. The former, if true, requires correction. The latter might be a highly important finding that needs to be publicized. Deciding which of these two situations best describes the data aberration requires sophisticated analysis.

The productivity analysis program in MEAD makes extensive use of the KLEMS database for this purpose. This analysis function serves to identify problems in the data series maintained in KLEMS. These problems extend from the mundane—e.g., a series missing for a particular industry—to patterns that are more difficult to explain—e.g., incongruous price changes in a common production input across industries.

Analysis also provides MEAD with the expertise required to assign indicators of data quality to productivity statistics, a key requirement of Statistic Canada's *Policy of Informing Users of Data Quality*. It is only through investigating the nature of these productivity measures that MEAD analysts are able to use their expert judgements to assign accuracy ratings to productivity statistics that serve as guides to users.

Productivity measures are part of the National Accounts, and the quality indicators used in the Accounts differ from the standard quality concepts associated with survey programs—sampling errors, response error, processing errors, and non-response bias. While each of the above quality concepts is important to the survey programs that feed into the National Accounts, the essence of the production process in the Accounts is the integration of data from various sources—which involves benchmarking, data confrontation, adjusting for inconsistencies and undercoverage. The use of multiple data sources and complex estimation methods make it necessary for the SNA to rely on accuracy ratings—an assessment of data quality ranging from acceptable to unacceptable. The SNA evaluates the quality of its product from the reaction of its clients—and these judgements are based on extensive usage, usage that allow clients to assess whether the product that they receive makes sense in the context of other information that they possess on the state of the economy.

The Productivity Accounts rely on data that are generated by the National Accounts—data on gross domestic product, materials, energy, and service inputs. And to each of these variables, a quality rating needs to be applied. MEAD also produces estimates of labour input for individual industries. While the source for these estimates of labour input is the Labour Force Survey (LFS) and the Survey of Employment Payroll and Hours (SEPH), adjustments are made to both if the labour data are not compatible with the production data derived from the SNA. Finally, MEAD ensures that the capital stock estimates it generates for each industry are coherent with the system of Input/Output Accounts, from which key input and output data are taken. The end result is a set of Productivity Accounts that needs to be assigned a quality rating for the benefit of users.

3. See Fellegi (1999), op. cit.

This rating cannot be assigned in isolation of users' needs. Most users employ these data as part of analytical exercises—e.g., analyses that examine factors associated with productivity growth, or that compare productivity growth in Canada to that in the United States. By engaging in select analyses that complement the analysis of outside users, MEAD develops the type of expertise required to assign ratings to all of the data variables in the KLEMS database. For example, analysis at MEAD has isolated some industries where the capital stock has been in long-term decline while output, material inputs, energy use and labour input have all been increasing. Further examination has revealed that these are industries where capital is being leased—suggesting that the investment survey that feeds into the National Accounts potentially have a major undercoverage problem. In other cases, the results that the production system generates for productivity growth in certain industries are sufficiently counter to general perceptions of the economic circumstances in these industries that major efforts have been made to reengineer the nature of the estimation process. One example here is the mineral and oil extraction industries in Canada.

The quality ratings assigned to the Productivity Accounts therefore benefit from an internal analytical capability. An analysis group internal to Statistics Canada is best able to gather information on the problems that exist in survey systems that feed into the Accounts—problems that are either systemic, or that have arisen for idiosyncratic reasons in a particular time period.

Finally, analysis serves to improve data accuracy or suitability by contributing to the production of time series that are consistent over time. National Accounts data, if they are to be useful, need to have a consistency over time. These data are used primarily for time series analysis. But, by their nature, the survey systems that provide data to the SNA are often not 'time-series' consistent. Industry classification systems have changed from being SIC-based to being NAICS-based. Surveys (such as the Annual Survey of Manufactures) change their coverage. Other surveys are restratified. Each of these changes may improve survey estimates at a given point in time—but serve to render analysis over time less coherent. While rough corrections are often provided by survey programs to account for the impact of changes in coverage or classification, the survey programs rarely provide all of the changes that are required to provide time-series coherence. This is accomplished by using the data for analysis and then communicating the results of this analysis to production divisions.

3.2 Relevance

3.2.1 Creation of statistical outputs

Analysis makes a substantial contribution to the quality of the statistical program through the creation of relevant statistical products. Analysis is key to the creation of statistical products that are in essence *analytical constructs.*

Productivity estimates are analytical constructs. The most comprehensive measure of productivity, multifactor productivity, is meant to capture changes in the efficiency of the economy's production system—in a single, relatively simple measure that is estimable. It is a Herculean task to produce such a measure, one that requires simplifying assumptions about the nature of the economic system.

Research on the estimation of multifactor productivity is firmly based on economic theory—using representations of the production process and investment decisions. Keeping abreast of this literature requires active participation in the analytical process, not only to understand how productivity numbers are being used, but also to learn what advances are being suggested as to how they may be better estimated.

In recent years, MEAD has created a new analytical product that is designed to meet the best practices of the profession—as outlined in the most recent OECD manual that sets out desirable standards.[4] Implementation of these new measures required extensive analysis using microeconomic databases—a facility that the analysis group had developed for other projects. For example, new estimates of capital services required the estimation of a new set of depreciation rates—using data on used asset prices collected in an investment survey carried out by the Investment and Capital Stock Division. MEAD's new analytical product on productivity also required the use of the Input/Output Accounts. Finally, it required the collection of data on wages and salaries by education, age group and class of worker back to 1971, and the estimation of wage equations for this period from each census. While specialized groups within Statistics Canada could each have undertaken some of the individual tasks described, MEAD was able to tackle each of these problems in an integrated fashion. Researchers at MEAD are accustomed to working on different projects simultaneously, and have developed the skills necessary to carry out large projects that require considerable data integration.

3.2.2 Creation of inherent capabilities to ensure continued relevance

Analysis is integral to program delivery. Analysis aids in the discovery of data gaps in established programs. Analysis thus ensures that the statistical agency continues to play a leading role in incorporating new developments.

If we wish to act proactively to address missing gaps in information, the data series that make up the core of any program need to be used in analysis—since this analysis provides production divisions with a more complete assessment of what is missing, and why it matters.

Existing gaps are discovered when an analysis program finds that a production program does not sufficiently address the needs of the public. This type of analysis involves an iterative process—one that begins with conceptual work, data development, and program implementation, followed eventually by program evaluation.

The multifactor productivity program provides an example of how analysis can contribute to this process. For instance, because of its analysis program, MEAD became convinced that the capital measure that was being used in the program had become outdated by current analytical standards. This, in turn, led to an updating of the measurement system. By participating in research networks, MEAD's productivity group learned that the existing concept of production inputs derived from investment (capital) had to be replaced by a new concept (capital services).

4. Organisation for Economic Cooperation and Development. 2001. *OECD Productivity Manual: A Guide to Measuring Aggregate and Industry Level Productivity Growth*. Statistics Directorate and Directorate for Science, Technology and Industry. Paris.

And when this decision was taken, a research program was put into place to help bring this transition into effect.

A relevant analysis program will anticipate future needs and develop data by the time these needs come to the fore. As new data were being created in the reengineering phase of the capital services project, the OECD produced a new manual on how to estimate productivity that established the new standard towards which statistical agencies were encouraged to work. Because of MEAD's productivity research program, Statistics Canada produced a new set of productivity estimates, consistent with these new standards, shortly after the publication of the new international manual.

3.2.3 Analysis as explorations in new products

Analysis allows the agency to both improve existing products and develop new products. Examples of the contribution that analysis makes exist in both areas.

First, ongoing analysis has improved the scope of Statistics Canada's productivity estimates—by taking into account the impact of production on the environment. Productivity measures examine the efficiency with which the inputs purchased by businesses are transformed into marketed goods and services. Recently, MEAD adopted a research agenda that examined how environmental effects might be factored into the conventional estimation process. Two research papers were published that dealt with related questions. First, what would happen to Canada's productivity estimates if CO_2 emissions were considered along with the production of goods and services? Second, what would happen to productivity estimates if we took into account the water that is used as a free input into the production system? These papers have sparked considerable interest, and demonstrated that the productivity program can look beyond, and improve upon, the traditional framework that forms the basis for the Productivity Accounts.

In addition, a recent project has been aimed at extending the present definition of capital that is used for productivity estimation in the mining and forestry areas. At the moment, capital in industries such as smelting is defined as consisting of the expenditures that are made on buildings, machinery, equipment and engineering. But these industries also make use of the natural resource base, which is not included in the estimates of capital that are currently used. An analysis project is currently examining how natural resource capital could be included within the estimation framework, and what the impact of this inclusion would be.

3.3 Interpretability

Ease of interpretability requires information that allows users to utilize data appropriately. Analysis serves this function in several ways.

3.3.1 Analysis as guidance on quality issues

The *Policy of Informing Users of Data Quality* stipulates that it is the responsibility of programs to provide adequate documentation of quality indicators and issues.

The productivity group at MEAD strives to meet this policy in a number of ways. First, it provides detailed descriptions of methodology—these often take the form of chapters in the annual publications (*Productivity Growth in Canada,* Catalogue No. 15-204 and the *Canadian Productivity Review*, Catalogue No. 15-206). Second, it provides a description of the quality of the major series that enter into the productivity calculation.

Analysis is also used to provide an important form of guidance to users. This occurs in a variety of ways. First, the program produces articles that provide information to the Canadian public in the form of annual publications—*Productivity Growth in Canada* and the *Canadian Productivity Review*. The first issue of *Productivity Growth in Canada* included an article that outlined key productivity concepts and then described their trends.[5] Another article compared differences in productivity growth between Canada and the United States.[6] Both provided relevant data to the users of productivity statistics on the types of issues that are usually the main focus of their attention. Other articles investigated issues that are of less immediate interest to the majority of users, but are nevertheless still important—such as who gains from productivity growth, workers or consumers;[7] and has the economy become more volatile in recent years?[8] These papers also provide examples of how the large KLEMS database that anchors the productivity program can be used to investigate important issues. Analysis helps to establish the relevance of the program by pointing out uses for the data.

Two other articles in the first issue of *Productivity Growth in Canada* focused more narrowly on core aspects of the quality agenda. Both of these investigated the accuracy of productivity estimates—but in different ways. Productivity estimates are produced by a non-parametric estimation technique that makes several simplifying assumptions about the structure of the economy—that there are no economies of scale in the production process and that factors of production are paid their marginal product. Users sometimes question the impact of these assumptions on the estimates that Statistics Canada produces. On an experimental basis, we used an alternative estimation technique, multivariate analysis, to generate estimates of multifactor productivity, and utilized the confidence intervals that are associated with multivariate regression analysis (Baldwin, Gaudreault, Harchaoui, 2001) to give users an alternate estimate of the confidence bounds that they might use when making cross-country comparisons.[9]

The second article focused directly on the precision of the productivity estimates when used for cross-country comparisons.[10] While the productivity program produces a document that meets the standards of the *Policy of Informing Users of Data Quality and Methodology* (by providing data accuracy ratings on a scale of 1, 2 and 3), we felt that more information was required.

5. J.R. Baldwin, T. Harchaoui, J. Hosein and J.-P. Maynard. "Productivity: Concepts and Trends," *Productivity Growth in Canada 2001*. Chapter 1.
6. J.R. Baldwin, T. Harchaoui and J.-P. Maynard. "Productivity Growth in Canada and the United States," *Productivity Growth in Canada 2001*. Chapter 4.
7. J.R. Baldwin, R. Durand and J. Hosein. "Restructuring and Productivity Growth in the Canadian Business Sector," *Productivity Growth in Canada 2001*. Chapter 2.
8. J.R. Baldwin and T. Harchaoui. "The Cyclical Behaviour of Industrial Labour Productivity in Canada," *Productivity Growth in Canada 2001*. Chapter 7.
9. J.R. Baldwin, V. Gaudreault and T. Harchaoui. "Productivity Growth in the Canadian Manufacturing Sector: A Departure from the Standard Framework," *Productivity Growth in Canada 2001*. Chapter 8.
10. J.R. Baldwin and T. Harchaoui. "The Precision of Productivity Measures," *Productivity Growth in Canada 2001*. Chapter 3.

As a statistical agency, we need to provide guidance to users of productivity estimates. Productivity estimates are often used in a highly charged political atmosphere to compare Canada's performance to that of other countries. When this is done, most users do not use the productivity data as estimates subject to uncertainty; rather, they treat them as if they were known with certainty.

Many users are prone to use point estimates of productivity growth as if they were estimated without error. For example, users have a tendency to compare growth rates across countries by asking whether one point estimate exceeds another. Only rarely is consideration given to whether the difference in these estimates is in any way (statistically) significant. But we recognize that it is difficult to provide traditional confidence intervals for productivity estimates that suffice for all users.

Therefore, we have adopted a multipronged approach. First, we adopted an alternate estimation procedure involving multivariate analysis that produced classical confidence intervals. Second, we asked what sort of changes occur when slightly different methodologies are used to estimate some of the data that are inputted into the estimation procedure. It is often the case that countries do not use identical methods. Warning users about the effect of potential differences in methods provides guidance on the appropriate uses of the data. Finally, we dealt with the impact of revisions on estimates. Productivity estimates cover both a historical back period for which National Accounts data have been finalized, and more recent years that rely on preliminary data. Users differ in terms of needs. Some are only interested in the long-run changes in productivity. Others want to know what is happening in the immediate past, when estimates of productivity performance are still only preliminary and subject to revision. The latter use is particularly susceptible to error—because of revisions to National Accounts statistics that make up the core of the data used in the productivity program.

The most recent volume of *Productivity Growth in Canada* has focused much more on providing documentation for the methods used to estimate the most complex productivity statistic of the program—the measure of multifactor productivity growth. As a result of the ongoing analysis conducted by MEAD, it became clear that the program needed to implement a new way of measuring inputs if the program was to remain relevant to users. The annual publication, *Productivity Growth in Canada – 2002*, has focused on explaining both the new concepts that are used along with the analysis that supported the development and implementation of these new concepts. The analysis was extensive and drew on the expertise developed at MEAD. New estimates of depreciation were developed using microeconomic data on the prices of used assets. This information was derived from numerous investment surveys conducted by the Investment and Capital Stock Division. In addition, wages for workers—stratified by age, education, gender and class of worker—were developed using Censuses stretching from 1971 to 2001. Each of these issues was explained in detail in *Productivity Growth in Canada*, along with an overall summary of methods for the productivity program.

3.3.2 Analysis as a dissemination medium

Interpretability is also enhanced by analysis when it is used to provide information on the use and capabilities of data through example. Research can provide the critical dissemination

medium for new data products that are not yet appreciated by the public—by bringing these products to the attention of outside users.

Recently, Statistics Canada has been working to enhance the detail and quality of the Provincial Economic Accounts—via the Project to Improve Provincial Economic Statistics (PIPES). Detailed Provincial/Output accounts have been created for the first time. And, as part of this project, the productivity group at MEAD has contributed estimates of labour input to these Accounts. Together, industry-level output measures and labour estimates can be used to produce measures of labour productivity. The analysis program within MEAD has been tasked with producing papers that evaluate these estimates for two reasons. First, these papers serve as a key form of quality control. Second, their publication, and associated press coverage, serve to focus the attention of the user community on the new product.

Analysis therefore improves our understanding of the capabilities of data—and, as such, is essential to the agency's quality goal in the area of interpretability. The usefulness of this function in the context of evaluating existing and new data has been described previously. But analysis also provides a key input into the development of new data.

In the past two years, discussions have been taking place within government concerning the need to improve Canada's environmental statistics. It has been Statistics Canada's position that environmental statistics are more useful if they can be integrated into a larger framework that supports the analysis of interactions between the economy and the environment. As support for this project, MEAD has been developing new 'eco-efficiency' productivity estimates that take into account the impact of production on the environment. This initiative has produced a number of secondary studies that examine how the integrated database that combines standard data on the economy with data on the environment facilitates new and interesting research. As such, these studies have been useful in developing support for the overall environmental initiative.

4. Conclusion

Analysis meets a variety of needs. It provides objective, accurate information on economic and social trends. It provides information products that are richer than the simple reporting of trends and percentages. It provides a more thorough understanding of phenomena, and of complex relationships.

All of these important functions serve to enhance the quality of products produced by a statistical agency. Analysis improves the relevance of statistical products. It ensures the coherence of a set of data that come from the National Accounts. It provides guidance to users that enhances their ability to interpret how they might use the data. Finally, it ensures that the output of the statistical program is relevant—helping the Agency adapt its products to meet the changing needs of data users.

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