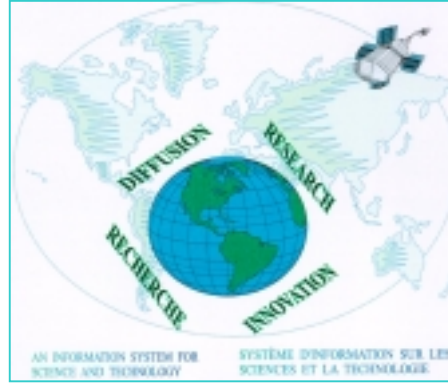


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Measuring the Networked Economy



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Measuring the Networked Economy

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Summary

The networked economy involves economic and social actors and the links that tie them together. The information and communication technologies that provide the links are changing, as are the electronic products that they deliver. This requires the statistical office to introduce new surveys and to develop and use relevant industrial and product classifications. As technology changes, so does the way of doing business and trade in a global economy, with implications for statistics on labour, balance of payments and prices, and, more generally for the whole System of National Accounts. While the networked economy is the way of the future, there are people and businesses that cannot participate fully and there is a need for statistical information about them. This paper looks at these issues, at the statistics that are being developed, and at some of the gaps that are arising.

January 2002
Statistics Canada

¹ This paper is a revised version of a paper presented to the Canadian National Statistics Council in April 2001 and to the Conference of European Statisticians in June 2001. A version was also used as a background paper for the Statistics Canada 2001 Senior Management Conference on November 19 and 20, 2001. The principal arguments are the same, source material has been updated, and the conclusion incorporates points raised in discussions.

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Working Papers

The Working Papers publish research related to science and technology issues. All papers are subject to internal review. The views expressed in the articles are those of the authors and do not necessarily reflect the views of Statistics Canada.

The Science and Innovation Information Program

The purpose of this program is to develop **useful indicators of science and technology activity** in Canada based on a framework that ties them together into a coherent picture. To achieve the purpose, statistical indicators are being developed in five key entities:

- **Actors:** are persons and institutions engaged in S&T activities. Measures include distinguishing R&D performers, identifying universities that license their technologies, and determining the field of study of graduates.
- **Activities:** include the creation, transmission or use of S&T knowledge including research and development, innovation, and use of technologies.
- **Linkages:** are the means by which S&T knowledge is transferred among actors. Measures include the flow of graduates to industries, the licensing of a university's technology to a company, co-authorship of scientific papers, the source of ideas for innovation in industry.
- **Outcomes:** are the medium-term consequences of activities. An outcome of an innovation in a firm may be more highly skilled jobs. An outcome of a firm adopting a new technology may be a greater market share for that firm.
- **Impacts:** are the longer-term consequences of activities, linkages and outcomes. Wireless telephony is the result of many activities, linkages and outcomes. It has wide-ranging economic and social impacts such as increased connectedness.

The development of these indicators and their further elaboration is being done at Statistics Canada, in collaboration with other government departments and agencies, and a network of contractors.

Prior to the start of this work, the ongoing measurements of S&T activities were limited to the investment of money and human resources in research and development (R&D). For governments, there were also measures of related scientific activity (RSA) such as surveys and routine testing. These measures presented a limited picture of science and technology in Canada. More measures were needed to improve the picture.

Innovation makes firms competitive and we are continuing with our efforts to understand the characteristics of innovative and non-innovative firms, especially in the service sector that dominates the Canadian Economy. The capacity to innovate resides in people and measures are being developed of the characteristics of people in those industries that lead science and technology activity. In these same industries, measures are being made of the creation and the loss of jobs as part of understanding the impact of technological change.

The federal government is a principal player in science and technology in which it invests over five billion dollars each year. In the past, it has been possible to say only *how much* the federal government spends and *where* it spends it. Our report **Federal Scientific Activities, 1998 (Cat. No. 88-204)** first published socio-economic objectives indicators to show *what* the S&T money is spent on. As well as offering a basis for a public debate on the priorities of government spending, all of this information has been used to provide a context for performance reports of individual departments and agencies.

As of April 1999, the Program has been established as a part of Statistics Canada's Science, Innovation and Electronic Information Division.

The final version of the framework that guides the future elaboration of indicators was published in December, 1998 (**Science and Technology Activities and Impacts: A Framework for a Statistical Information System**, Cat. No. 88-522). The framework has given rise to **A Five-Year Strategic Plan for the Development of an Information System for Science and Technology** (Cat. No. 88-523).

It is now possible to report on the Canadian system on science and technology and show the role of the federal government in that system.

Our working papers and research papers are available at no cost on the Statistics Canada Internet site at <http://www.statcan.ca/cgi-bin/downpub/research.cgi?subject=193>.

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1. INTRODUCTION

What makes the economy different in the 21st century from the past is the recognition of the importance of the ties that bind together economic and social actors. These ties, between suppliers and firms, between firms and clients, between governments and constituents, are made easier by an infrastructure of information and communication technologies (ICTs), the very same ICTs which have been credited by A. Greenspan with sustaining the long period of growth of the US economy. Recognition of the importance of the links shifts the measurement and analytical interest from what the actors are doing, the businesses, the public institutions and the consumers, to how they are linked together into a networked economy.

The government is promoting the networked economy through its own commitment to become a model user of the Internet so that Canada will be known around the world for having the government most electronically connected to its citizens. It is also committed to bringing high-speed broadband Internet access to residents and businesses in all communities in Canada. High speed Internet access will facilitate distance learning, medical services, links between businesses and their suppliers and customers, and new forms of electronic business. However, there is more to this than just business and public service delivery, there is also the impact on the democratic process.

While ICT infrastructure is important, its impact depends on what is displayed, processed, stored, and transferred by the network. Electronic content is what matters to the people downloading music, games, videos, and software. Being able to receive electronic specifications for the manufacture of parts is part of doing business in some industries, as are electronic sales and payments. The commercial importance of content is seen in the mergers between firms like Time Warner and those that provide access to the network like America Online. In Canada, the creation of Globemedia brings together a broadcaster, a daily publisher, an Internet content provider. An Internet portal allows Globemedia to deliver content to a wide customer base through print, broadcast, and the Internet.

With the encouragement of governments, the engagement of business, and the participation of consumers, the networked economy is here to stay and to grow. Much of it functions just like the economy that the existing statistical system is designed to deal with: goods and services are produced, exported and imported; investment is made in fixed capital; and, the labour force is engaged in all of these activities. There are statistical measures of production, trade, value added, labour, capital, and productivity. What then is different about the networked economy and why should that difference interest the statistical office?

Measurement problems arise when classification systems do not allow the observation of new economic realities. For example, in Canada, cable companies primarily provide programming services and for that they are classified in class 51322 (Cable and Other Program Distribution) of the North American Industry Classification System (NAICS) (Statistics Canada 1998). However, these companies also provide access to the Internet and some are able to provide telephony. This means that the activities and services provided by cable firms overlap with those of telecommunications firms (NAICS 5133),

and independent Internet service providers (NAICS 512191). The reverse is also true. As a result of this convergence, there has to be a commodity dimension in cable and telecommunications surveys if the full picture on Internet services provision is to be presented.

A well articulated classification of commodities, in particular of service commodities, is essential if the Input-Output tables are to reflect changes in the organization of economic activity and the emergence of new activities. The elaboration of such a classification is the goal of the North American Product Classification System (NAPCS) project. The North American Free Trade Agreement (NAFTA) countries have just completed the first phase of this project. A draft classification of commodities produced in selected countries is about to be tested by national agencies. This draft includes commodities of particular interest for the networked economy, such as telecommunications services, on-line services, infrastructure provisioning services and software products.

While new products and industries are appearing, the ways of doing business are changing. Firms are now able to deal with one another electronically, to gather information, to put questions, to order products and to pay for those products, all on-line. This means that both suppliers and customers can be anywhere, and that has implications for balance of payment statistics if digital products are crossing borders without being recorded. An indicator of the volume of this activity is the value of electronic sales and purchases by firms and by people.

The network has implications for the price of products as they can be sold on the net in a conventional manner, or auctioned. The products themselves can be specified by the client and priced interactively, and the quality of products can change in real time response to market signals. While rapidity of response to customer demand and a wide variety of products on offer are benefits of the networked economy, these benefits only accrue to those firms and people who are able to take advantage of the network.

If it is important in the present, and essential in the future, to be part of the networked economy, there are firms, and people, who will be disadvantaged both economically and socially if they cannot participate. This may result from a lack of skills, basic literacy, or physical access, or other factors which contribute to what is known as the 'digital divide'. Surveys are able to provide indicators of the state of levels of access and of barriers to access for firms and for people.

Classification, trade and network access are important for statistical systems and for policy making. However, these topics cannot be considered in isolation, not in a networked or global economy. This paper starts with a look at what is going on in the Organization of Economic Co-operation and Development (OECD), the European Union, and in Canada's principal trading partner, the United States.

2. AN INTERNATIONAL PERSPECTIVE ON THE NETWORKED ECONOMY

Statistics Canada works closely with the OECD, the European Union, the US Department of Commerce, and other national organizations, as part of its work on the networked economy. These working relations ensure that local initiatives are part of what is going on internationally.

The OECD has the role of providing concepts and definitions to support data collection and comparison for the networked economy. It has published an industry-based definition of the information and communication technology sector and produced a first publication in which the ICT sector data are compared (OECD 2000a). In 2000, after discussions in Canada, Europe and the US, it released broad and narrow definitions of electronic commerce which are now being used in surveys. Work continues on defining ICT commodities, influenced by the NAPCS project, and on identifying those industries that lead in the electronic delivery of products so that statistics can be gathered on the production and use of the products that are delivered by the ICT infrastructure. These products include the practices and tools of knowledge management, an activity which is attracting growing attention (OECD 2000b).

At Eurostat, the statistical office of the European Union, a cross-economy survey of the use of electronic commerce by businesses in most member countries was launched in November 2000 and results are being compiled for publication early in 2002. The UK, Denmark and Austria have published their results.

The United States has focused on electronic commerce in retail trade and on access to the Internet. The (US Bureau of the Census 2000) first released figures for retail electronic sales for the fourth quarter of 1999 in March, 2000. These figures showed that electronic sales amounted to 0.6% of total sales, a relatively small number. It did not include all of business to consumer electronic commerce as it excluded, for example, financial services and transportation. As subsequent quarters were released, the percentage of sales increased to 1.1% for the fourth quarter of 2000 and then declined to 0.9% in the second and third quarters of 2001.

Questions on electronic commerce have been placed on annual business surveys conducted by the Bureau of the Census for the year 1999, the first to use the NAICS classification, and results for 1999, and for 1998, were released in May and June of 2001. They are reviewed by (Mesenbrough 2001) and are available at www.census.gov/estats.

While electronic commerce is seen as an indicator of participation in the networked economy, there is also interest in measuring access to that participation. A series of reports (US Department of Commerce 1999, 2000) give substance to the interest in the digital divide in the US and this has stimulated work at the OECD (OECD 2001).

3. SURVEY ACTIVITY AT STATISTICS CANADA

Statistics Canada is actively engaged in measuring the networked economy and in working closely with the policy community which uses the results. This is due largely to the support of the Policy Research Initiative (PRI), which, on April 1, 2002, will enter the final year of a four year programme. The new activities divide into three broad categories: infrastructure; applications; and, analytical activity.

3.1 Infrastructure Surveys

The infrastructure surveys, supported under the Policy Research Initiative 'Connectedness' project, are telecommunications; cable; Internet service providers; and, computer services. Each of these industries belongs in the OECD definition of the ICT sector.

Telecommunications

The telecommunications survey is older than Statistics Canada and it continues to chronicle the connection of Canadians and their businesses as the industry deregulates, new firms enter, and technology changes. There is an annual survey and, in 1999, the monthly survey which covered only wireline telephone operators was replaced with a new quarterly telecommunications survey.

The new quarterly added facilities-based wireline entrants and wireless telephone operators, and estimates for the contributions of resellers, satellite and other telecommunications providers, to arrive at a quarterly measure of activity for the telecommunications industry group (NAICS 5133).

The telecommunications statistical program seeks to keep abreast of the changing services offered to Canadians. In 2001, questions concerning mobile Internet access were added to the quarterly and annual surveys to complement data already collected from telcos (telephone companies) on high speed access to the Public-Switched Telephone Network (PSTN), used almost exclusively for Internet access. This is distinct from data collected from Internet service providers (ISP's), and other high speed services provided by telcos such as broad and wide band services that make up the Internet backbone. The number of digital connections to the PSTN, closely related to Internet access and needed to support new media services, is also collected.

As of the third quarter of 2001, there were 30 million access paths to the Canadian PSTN, or close to one access path for every Canadian (Statistics Canada 2002). This access was mainly through wireline networks, with just over 20 million fixed access paths. The remaining just under 10 million access paths were mobile. Recent increases in PSTN access is largely mobile however. There were 23% more cell phone subscribers in the third quarter of 2001 from one year ago. Most of this growth came from the provision of digital services, which increased 67% in the same period. Whereas nearly all wireline access to the PSTN is digital (99.6% in 1999), only 63% of mobile access was digital by Q3 2001. This is a marked increase from the previous year, when digital mobile access surpassed analogue mobile access for the first time.

The mobile telecommunications service providers spent \$1.3 billion in February 2001 at an auction for new spectrum. The new spectrum will enable service providers to support web-browsing, multi-media, and electronic commerce for their subscribers. Capital expenditure for the telecommunications industry first three quarters of 2001 amounted to \$4.6 billion, 18% and 45% above spending levels reported for the first three quarters of 2000 for the wireline and wireless industries respectively. Most of this investment is necessary for the roll out of broadband services.

Cable and Other Program Distribution

The cable industry has introduced new services and technologies in the recent past (April 2000). In order to track these innovations, the cable survey has collected information on the deployment of high-speed Internet access and digital television for the 2000 reference year. This information supplements data on subscriptions to, and revenues from, Internet access services first collected for the 1999 reference year.

It was found (Statistics Canada 2001a) that high speed Internet access by cable, first launched in late 1996, was available to 7.5 million households in August 2000, or 68% of households with access to cable. However, access varied considerably by size of community; 83% within Census Metropolitan Areas, 47% within Census Agglomerations and 14% elsewhere. Information on the deployment of high-speed Internet access by cable is one of the tools used to measure progress towards universal access to broadband Internet, a goal of the government.

Digital television is another technology gaining ground. At the end of August 2000, cable operators had deployed 390,800 digital terminals and wireless operators had deployed 967,800. This suggests that Canada is moving towards the critical mass of digital television customers necessary to make the television set a viable alternative to the computer for selected web applications.

Internet Service Providers and Related Services

This is a new survey, developed as part of the Policy Research Initiative. Results for 1999 were released in *The Daily*² of November 26, 2001. The survey provides standard input to the SNA and it makes use of the commodity classification work of the NAPCS project. It provides information on electronic commerce products provided, the distribution of business and personal subscribers and the capacity of access, whether it is narrowband (64 Kilo bits per second (Kbps), or less) or broadband (more than 64 Kbps).

Software Development and Computer Services

The software development and computer services survey has been completely redesigned and, in addition to the standard inputs to the System of National Accounts (SNA), it produces information on electronic sales and purchases by firms in the industry. The information on electronic commerce will provide a test of such questions on annual industry surveys and how the aggregate figures compare with those from the cross-

² Where data are released in *The Daily* (Catalogue No. 11-001-XIE), the date is given so that the article may be retrieved from the Statistics Canada web site, www.statcan.ca. No other reference is given.

economy survey. The survey is also making use of the commodity classification work in the NAPCS project. Results for 1999 were released in The Daily of November 26, 2001.

3.2 Surveys of Applications of the ICT Infrastructure

Surveys about the provision of the ICT infrastructure have to be complemented by those for private and public institutions, households and people that use the infrastructure. Measures of the use and impact of ICTs are reviewed by (Gault and Peterson 2001).

Survey of Electronic Commerce and Technology (SECT)

Statistics Canada, working closely with Industry Canada, the US Bureau of the Census, and with the OECD, designed the first ever cross-economy survey of electronic commerce activity and it also measured the use of ICTs as an indicator of readiness for electronic commerce. The survey used the infrastructure of the Capital Expenditure Survey and it collected data for 1999. The results were released in The Daily on August 10, 2000, well within a year of the reference year, and they demonstrated that the activity of electronic commerce in Canada was small. It was less than 0.2% of total operating revenue of the business sector (Bakker 2000).

The survey was redesigned and simplified for the year 2000 and renamed the Survey of Electronic Commerce and Technology (SECT - 2000). Results were released in The Daily on April 3, 2001. The survey revealed that there was a 73% increase in the value of sales over the Internet between 1999 and 2000. However, the percentage of enterprise selling over the Internet declined over the same period, from 10% to 6%. Among the enterprises that were in our sample in both 1999 and 2000, for every two businesses that started to sell online, five stopped. Finally, the proportion of economic activity attributable to businesses selling online advanced from 17% in 1999 to 25% in 2000 (Peterson 2001).

This implies two things. First, electronic commerce became more concentrated into fewer, larger businesses. Also, the strong increase in sales over the Internet hid a considerable amount of volatility among businesses engaged in this activity. Statistics Canada was the first organization, public or private, to publish this observation.

Household Internet Use Survey (HIUS)

The HIUS has been in place since 1997 and provides data on the use of the Internet by households in Canada (Dickinson and Ellison 2000, Ellison et al. 2001) and, consequently, on the digital divide. It does this by adding questions to five out of six panels of the Labour Force Survey (LFS). For 1999 it collected data for the first time on electronic purchases made from home by households that have a regular user of the Internet.

This survey was conducted again for 2000. Data on Internet use were released in The Daily of July 26, 2001 and the estimates of Internet purchases made from home were released in The Daily of October 23, 2001. As in the case of SECT, the volume of Internet purchases increased between 1999 and 2000. In 2000, about 1.5 million

households spent an estimated \$1.1 billion over the Internet, up from about \$417 million in 1999.

The 1999 results were for electronic purchases made from home by households that have a regular user of the Internet. This measure was made because of the policy interest in the connection of households. However, there is also interest in the total value of purchases made on the Internet and in measures of the Internet activity of individuals, as well as households. The 2001 HIUS will collect the value of orders placed over the Internet regardless of location. There are plans to redesign the HIUS to collect information on Internet use and electronic commerce categorized by individual as well as household characteristics.

The General Social Survey (GSS) - Cycle 14

The GSS Cycle 14 released data on individuals and their access to and use of the Internet in The Daily of March 26, 2001. It found that 53% of people in Canada, aged 15 or over, used the Internet at least once in 2000. Cost was the major barrier to use for low-income non-users, an observation which complements the findings from the Household Internet Use Survey. A paper on the reasons why people used the Internet (Dryburgh 2001) was released at the same time as the data.

The GSS includes a comprehensive analytical programme leading to papers on how the Internet affects the lives of people at work and elsewhere and how these effects are influenced by gender and age (Akyeampong and Nadwody 2001, Clark 2001, Marshall 2001, Rotermann, 2001, Silver 2001a, 2001b, and Williams 2001).

The Workplace and Employee Survey

New data from the Workplace and Employee Survey (WES) 1999 were released in The Daily on February 19, 2001. The survey provides an integrated view of the activities of employers and employees and from the perspective of the networked economy, it supports analysis of the use of computing technology and its use in learning (Wannell et al. 2001).

The survey found that nearly one-quarter of all workplaces, accounting for more than a third of paid employees, made a significant investment in new computer technologies in 1999. These investments were not associated with either higher employee layoff rates or slower employment growth. They were associated with growth in computer-related training. Another study indicated that computer technology implementers were more likely to employ and hire university-educated workers (Wannell et al. 2002). According to a study of vacancies, there do appear to be pockets of unmet demand for highly skilled labour among some "high-tech" employers, but the "low-tech" retail trade and consumer services accounted for the majority of unfilled vacancies (Galarneau et al. 2001).

Approximately 20 WES research projects are currently underway, involving researchers from Statistics Canada, policy departments and universities.

Knowledge Management Practices

The use of ICTs has made easier the monitoring and management not just of information flows but also of knowledge flows in public and private institutions. Statistics Canada, in collaboration with other federal departments and agencies organized an OECD High-Level Forum on Knowledge Management in Ottawa in September 2000. An outcome of this meeting was a proposal to develop a pilot survey of the use of knowledge management practices, tools and infrastructure in business. The first planning session took place in Denmark in February 2001 followed by a second meeting in Ottawa later that month and a draft questionnaire was reviewed at an OECD meeting in Paris in July 2001.

The draft questionnaire was subjected to extensive field-testing and review within Statistics Canada, before it was sent to about 400 firms in the autumn of 2001. The effectiveness of the preparation is reflected in the 85% response rate achieved by the end of 2001. Results are planned for March 2002.

3.3 Analytical Activity

Much of the analytical activity has been covered in the discussion of the surveys. However, the Connectedness Series (Catalogue No. 56F0004MIE) has been launched specifically to publish articles on how Canadians are connected in a way that ensures the consistent application of concepts and definitions across sources. As well, the first Canadian compendium of data on the ICT sector has been published (Statistics Canada 2001b) and the supply side data have been updated (Statistics Canada 2001c). Analytical reports also appear in Canadian Social Trends (Catalogue No. 11-008-XIE), Perspectives on Labour Income (Catalogue No. 75-001-XIE), and in The Evolving Workplace Series (Catalogue No. 71-584-MIE).

The principal analytical integrator of a statistical office is the System of National Accounts and consideration is now given to the networked economy and its impact on the SNA.

4. IMPLICATIONS OF THE NETWORKED ECONOMY FOR THE SNA

The integration of the networked economy into the national accounts is a concern for statistical offices and Statistics Canada works closely on this with colleagues in the US, which is Canada's principal trading partner. Recent papers that have influenced this work are (Landefeld and Fraumeni 2001), Fraumeni et al. 1999) and The Emerging Digital Economy (US Department of Commerce 1998 and 1999).

With some exceptions, the SNA captures economic activity associated with the networked economy through:

Industry Output – which includes manufacturers producing equipment supporting the networked economy (mostly for export) and industries providing Internet services, as described below:

Incomes – consisting of wages and salaries, self-employed income, and corporate profits of industries supplying equipment and services for the networked economy;

Expenditures – include consumer spending on computer and related equipment and Internet services, and government spending on internet services. Intermediate expenses by business on Internet services are included in the input or “use” matrix of the Input-Output Accounts;

Capital Investment – comprises spending on the capital infrastructure for the networked economy, as well as business and government expenditures on equipment associated with the networked economy;

International Trade – the exports and imports of networked economy equipment and services are included in the current account of the Balance of International Payments, which are also included in the expenditure-based Gross Domestic Product (GDP) estimates.

The limitation of survey and administrative data, that have to date been incorporated into the SNA structure, and SNA industry and commodity classifications, make it difficult to estimate the explicit impact and contribution of the networked economy to overall GDP. Rapid changes in technology and the services, provided through the networked economy, make the measurement of price change, real output, and productivity problematic.

The Input-Output (I-O) tables provide the most comprehensive structure to measure and analyze the networked economy in the SNA. These accounts, which are available approximately 30 months after the reference year, provide the benchmark from which timely SNA measures; Monthly GDP by Industry and the Quarterly Income and Expenditure Accounts are projected. New surveys and other data sources measuring the networked economy, as described earlier, will begin to feed into the 1999 Input-Output accounts. Further data developments, NAICS classification modifications (2002), and the implementation of NAPCS will make it easier to measure the networked economy within the SNA.

Supply of Internet Services - Industry Output

In the NAICS based Input-Output tables (beginning in reference year 1997), Internet services are produced by several industries that fall under:

- ∂ Information services
- ∂ Telecommunications
- ∂ Cable and Other Program Distribution
- ∂ Computer Services

The production of Internet and related services by these industries are captured in I-O Commodity “On-line services”, which provides an estimate of the aggregate value of output.

Prior to 1997, the SIC80 based industry-commodity detail provides no explicit means of estimating the value of output of on-line services. This is implicit in the output of telecommunications carriers, cable, and computer service providers.

Measuring Real Output

Measuring real output of the networked economy is indeed a big challenge in the SNA. This largely results from the lack of appropriate price statistics for deflation. For example the first estimates of change in real output of “On-line services”, introduced in 1997, were included in the deflation of the 1998 Input-Output tables in the summer of 2001. The availability of price statistics for Internet access services, is to date, limited to a Hedonic price index in the Consumer Price Index (CPI). The application of this price index for the deflation of business and government Internet use and production of Internet service provider (ISP) services has yet to be tested.

The quality of real output for ISP industries is also dependent on the availability of information on revenue by type of service produced by communications and computer service companies and enterprises (Bell Canada, Rogers Cable, etc.). These data are expected to improve with new survey results that will be incorporated into the 1999 Input-Output tables.

Demand for Internet Services - Intermediate and Final Demand

Business purchases of On-line services (intermediate demand) are included in the operating expenses of business establishments and enterprises. The existing surveys and administrative data sources, however, do not uniquely identify on-line services as a separate expenditure item, but include them within communications services. Household expenditures on Internet services are available from the Survey of Household Spending.

Purchases of Goods and Services, Intermediate and Final – Via Electronic Commerce and Shopping

The Internet provides an alternative way for producers and distributors to sell merchandise and services; and for business, government and households to make purchases. The inclusion of expenditures resulting from Internet trading of goods and services is essential in the measurement of GDP, both the Value-added by industry and the Expenditure approach. On-line purchases by business and government are included in operating expense statements, but not necessarily identified as such.

For private consumption, on-line shopping is largely an extended service of retail establishments (Sears, Chapters, etc.) and, as such, the value of these sales is captured in the Retail Trade Survey. For example, Ford, the first automotive producer to offer on-line purchasing of vehicles, delivers its product to customers through local dealerships, where the value of sales is recorded. In addition there is an annual survey of Direct Sellers to cover NAICS Industry “Electronic Shopping and Mail Order Access”. On-line purchases from abroad are expected to be recorded in the operating expenses of businesses and the Survey of Household Spending for consumers.

International Trade

International trade estimates in SNA need to capture cross border sales of on-line services and the value of sales and purchases through e-commerce and shopping.

Balance of Payments surveys capture the value of trade in Information Services, which include a wide range of on-line services and other information services. There is at this time, however, no explicit identification of ISP. As for Internet related sales and purchases of merchandise, trade statistics capture cross border flows of merchandise resulting from e-commerce and e-shopping, since these goods must clear customs. Furthermore, Balance of Payments business surveys ask to include sales and purchases made on-line. There are some concerns, however, that business and household imports of services (including digital download products) are being captured in business and household spending surveys, but not in the international trade statistics.

Labour and Capital

Factors of production of the services for the networked economy; labour (employment and payment of wages and salaries) and capital investment in plant equipment and software, as well as, depreciation of capital stock are included in the SNA, but captured on an industry basis. This again, poses the problem of the industry versus measuring the economic activity. What share of the cable industry's workforce and capital stock is attributed to the ISP? Is the revenue share a suitable proxy? The distinction is essential in measuring productivity for the networked economy.

5. GAP AREAS

Timeliness

Surveys provide information to the SNA and to policy makers and the broader community of users. The needs for information on the networked economy change as policies change, and as Canadians seek information, which helps them to participate in public policy debate. The redesign and introduction of new surveys take time to feed into the SNA. The Input-Output tables will incorporate 1999 survey results in 2002. This lack of timeliness limits their usefulness, given the rapid changes in this sector of the economy.

Time Series Consistency and Technological Change

An example of a potential gap in the statistical system is information on broadband as it facilitates high quality multimedia communications. As the policy interest grows, there will be demand for statistics on the production and use of broadband Internet services. This is also relevant to the debate on the digital divide. Within the SNA, this poses a problem of time series consistency, as traditional industry detail changes structure. The rapid growth of the networked economy will not only have profound changes on the importance and structure of the communications industry, but will be far reaching into other service sectors such as, finance, tourism, entertainment, education, etc.

Data Linkage

The observation by A. Greenspan that ICTs in the US have been responsible for growth has stimulated interest in the link between the use of ICTs by Canadian firms and their

performance. This could be addressed by linking the data from the Electronic Commerce and Technology Survey - 2000 to administrative data and data from other surveys.

Digital Divide

Access to the Internet by Canadians is a public policy issue of growing importance. The GSS Cycle 14 data provide a wealth of information on the subject but that information is likely to stimulate more questions about the digital divide, questions which can only be addressed by a statistical office.

6. CONCLUSION

The networked economy is changing the way business is conducted and lives are led. New surveys and industry and commodity classifications are required if the System of National Accounts is to continue to reflect economic reality. This paper has described the changes in the systems of classification, the revision of existing surveys and the introduction of new surveys to ensure that relevant information continues to flow to the SNA.

While the SNA supports economic policy development, there is also a need to contribute to industrial and social policy and new surveys, or new commodity dimensions to existing surveys have been developed to provide this information. Much of this work has been supported by the federal Policy Research Initiative and has included extensive collaboration with the relevant policy departments and with international organizations. The networked society cannot be analysed in isolation.

The blurring of industry boundaries calls for more work on commodity classification, and the production of commodity statistics, especially for services. Commodity statistics are also key to reporting on biotechnology and other knowledge-based activities in the networked economy, including the production and use of electronic products (music, video, information services, etc.). The electronic delivery of products may give rise to errors in coverage, although this is not yet seen as having a significant impact on the measurement of aggregate economic activity. However, quality change is a consideration, as is its effect upon price change measurement and deflation, and work on quality change will also have impact on the measurement of real output and of productivity. There are measurement issues associated with the ICT sector, but that is well dealt with. The challenge lies in measuring the economic impact of the electronic products delivered using the ICT infrastructure.

Policy needs are evolving, and the SNA is dealing with new classification systems and other challenges of integration. As a result, gaps continue to be identified in the statistical system and, through consultation and discussion, plans are being put in place to address them. This paper is part of that process.

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