Social Science Research in Canada and Government Information Policy: The Statistics Canada Example

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This research on government information policy's effects on use and users of government information considered social scientists' use of information from Canada's central statistical agency, Statistics Canada. Using a triangulated methodology, the investigation focused on Canadian mid-1980s federal cost-recovery and restraint initiatives which applied to government information. The case study revealed Statistics Canada's response to the initiatives. Bibliometric research objectively documented policy effects on use of statistics sources, examining Canadian social science journal articles in five disciplines. Textual examination revealed use of Canadian and foreign governmental and nongovernmental statistics sources over the years surrounding policy implementation. An author survey supplemented bibliometric findings. Higher prices and increased electronic data dissemination by Statistics Canada were confirmed, however bibliometric analysis indicated no significant change over time in use of statistics sources. Survey respondents expressed unhappiness with the price increases, but did not change sources used. Many (in 1995) still used paper products rather than electronic ones, a finding which provides baseline data but which does not reflect the more recent explosion in Internet use.

Government information policy is primarily concerned with the management of information resources produced by or for governments. Management implies a recognition of the information life cycle from creation through dissemination and use to ultimate disposition or archiving. The literature on government information policy tends to focus on specific aspects of the life cycle (Hernon, McClure, & Relyea, 1996). Policy developers seldom consider the effects or impacts of government information policy on use and users of government information.

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Further, there has been little empirical research on impact or effects of government information policy, though it has been noted that a good deal of descriptive and prescriptive opinion is expressed (Hernon & McClure, 1988, p. 78; Hernon, McClure, & Relyea, 1996, pp. 4-5, 311-312; McClure, Hernon, & Relyea, 1989, p. 318).

Because government information policy can limit or expand accessibility to the great body of information produced by governments, the ultimate effects of such policies are a worthy object of study. We need to ask to what extent specific information policies change information collection priorities within government agencies. We need to consider whether policy instruments change information dissemination goals of government agencies. We need to ask how changes in government-wide policies affect both the internal information missions of government agencies and the external users of government information. The research described here examined the extent to which government information policy has an effect on the use and the users of government information. Additionally it sought to illustrate a methodology which could be used to measure information policy effects.

This article addresses government information policy at the Canadian federal level, looking specifically at government-wide policies of restraint and cost-recovery of the mid-1980s which applied to many government activities including government information production and dissemination. While these policies were not labelled as "information policy," they were, in fact, *de facto* information policies which were applied by government agencies to their information products. The Budget Papers which accompanied the announcements of these policies specifically cited government publications as an area which "provided opportunities for the government to realize a larger flow of revenues from those individuals or groups who benefit most directly from these services" (Canada, 1986, Budget Papers, p. 5).

Following the policy announcement in the 1986 Budget Speech (Canada, 1986, Budget Speech), Statistics Canada raised prices for its print publications at a precipitous rate. At the same time, its data were increasingly being made available only through electronic formats at ever higher prices. By the late 1980s, a number of media stories covered these developments and the implications for social science researchers and, ultimately, for society as a whole. Academics expressed concerns about price increases and limitations on access. Because Statistics Canada is the only source for much of the Canadian data of interest to social scientists, they argued that they would no longer be able to afford to do basic research on Canadians. Alternatively, they suggested that they would have to buy U.S. data, which would be less expensive, and then divide by ten to get an estimate of Canadian figures. (Canada is often described as being one tenth the size of the United States, in social and economic terms). These developments provided motivation for an exploration of the effects of these policies on the use of Statistics Canada's information by social science researchers, and an investigation of the extent to

which the researchers were driven to change the statistics sources they used to describe the Canadian scene.

Unlike the situation in the United States, Canadian government information is protected by Crown copyright. This means that control over dissemination of government information remains with the agencies producing it. The Canadian government is, in effect, in a monopoly position with respect to the information it produces. Private information providers such as publishers and the information industry cannot reproduce the information or add value to it, without specific contractual arrangements with the government. When a government agency chooses to increase prices for its information products, the potential users must either pay the higher prices or try to obtain similar information from other sources. However, government information is often unique and unavailable elsewhere.

In order to test the effects of price increases and format changes resulting from the cost-recovery and restraint initiatives of the mid-1980s, this research focused on Statistics Canada because it is the nation's central statistical agency producing a wide range of information of interest to many groups and individuals. It is mandated to make its information available to the public and is required to "collect, compile, analyze, abstract and publish statistical information relating to the commercial, industrial, financial, social, economic and general activities and condition of the people" (Statistics Act, 1985). As noted, it responded positively to the government's restraint and cost-recovery initiatives of 1986 with both commercialization and privatization of its data.

While price increases at Statistics Canada might affect many individuals and groups in society, this research looked at the effects on a specific user group: social science researchers in Canada. This user group was chosen because an examination of the literature showed that social science researchers are heavy users of government statistics. Further, it was this group which had been most vocal in expressing through the media its concerns regarding price increases.

LITERATURE REVIEW

The literature review considered the literature on social scientists' use of materials, and sought evidence of disciplinary differences in their use of statistics. The review also examined the information policy literature, particularly that examining government information and government statistical policy.

User Studies

Identification of the disciplines which constitute the social sciences was made using a number of standard sources (Hernon, 1996; Kuper & Kuper, 1996; Sills, 1968; Webb, 1989). The review of the literature on social scientists' use of and demand for materials showed that social scientists do indeed use statistics. Major studies in the United Kingdom examined social science use of a wide variety of

materials, including statistics (Investigation into Information Requirements of the Social Sciences, 1971; Line, 1979). Their findings have been supported by more recent studies (e.g., Brittain, 1982; Slater, 1989). These studies provided data by social science discipline which allowed the investigator to determine which disciplines use published statistics.

In the 1970s, Hernon confirmed that social scientists are heavy users of government information (Hernon, 1979), and later work supported these findings (Hernon & Purcell, 1982; Hernon & Shepherd, 1983; Metoyer-Duran & Hernon, 1995). Because governments collect, analyze, and publish the largest amounts of statistics and raw data, it follows that social scientists will use government-produced statistics. This was confirmed by Hernon in his dissertation on the use of government publications by social scientists (Hernon, 1979), in which he determined that they used government publications primarily in order to obtain published statistics. He identified the disciplines most likely to use government publications. Disciplinary differences in use of government publications can also be discerned from the Line (1979) study.

Comparing all of these studies, the investigator developed a *Typology of Use of Statistics and Government Publications* (see Appendix A) and concluded that five disciplines use *both* published statistics and government information often or almost always. These disciplines are Economics, Education, Geography, Political Science, and Sociology. Thus, this research focused on these five disciplines.

Information Policy Literature

The second literature review examined the information policy literature of both Library and Information Science (LIS) and other disciplines. The literature on government information policy has been examined and synthesized in a number of studies (Hernon & McClure, 1987; Hernon & McClure, 1988; McClure, Hernon, & Relyea, 1989; Hernon, McClure, & Relyea, 1996). Hernon and McClure provided a typology of significant government information policy issues, which can provide a framework for research (Hernon & McClure, 1988, pp. 28-32). This research addressed three of the broad issues which they identified (information technology, economics of government information, and public access to and availability of government information).

Policy issues related to information technology and government information have been described by Hernon and McClure. They noted here, as elsewhere, that access to government information was not necessarily enhanced by the application of information technology and that there had been little attempt to assess the impact of technology on access (Hernon & McClure, 1993; 1988, pp. 35-36; 1987, p. 12). Information technology may enhance access for some, and limit it for others.

The literature on the economics of government information revealed the depth of concern about privatization and commercialization of government information (e.g., Freides, 1986; Kent, 1989; D. Smith, 1985). Commercialization of govern-

ment information appears to distort the "public good" vision of government information which prevailed up until the 1980s. Access is consequently of less import than market values. An examination of the literature on U.S. government statistical policy revealed concerns about qualitative declines in data quality, as well as the possible political influences on data collection, and limitations on data dissemination (Alonso & Starr, 1987; Wallman, 1988).

Policy researchers in many disciplines have focused on traditional social and economic areas of government policy. They know that "public policy directly results from politics rather than philosophic reflection" (Weimer & Vining, 1991, p. 103). Dissertation research in both LIS and other disciplines reveals that information policy is not unlike other public policy. It, too, is susceptible to political influences (Burger, 1988, 1993). Sadofsky (1984) posited liberal and conservative models of information policy. Political factors may be paramount, but other factors need to be considered as well. Bennett (1985) showed that structural and bureaucratic influences affect policy inputs. Regan (1981) illustrated that computerization increases bureaucratic power. Thus, information policy development is influenced by political, structural, and bureaucratic imperatives.

There were very few examples of research on the effects of information policy, though more recently there is evidence of more attention to such research. Policy effects can be studied from a number of perspectives. One might look at organizational impact (e.g., Robinson & Stone, 1987; Wilkinson, 1992), or at impact on the information products themselves (e.g., Florance, 1984). Eisenbeis (1992) provided a useful model of research on policy impact on use and users of government information. She examined the effects of privatization of government data resulting from the (U.S.) Land Remote-Sensing Commercialization Act of 1984, finding substantial effects on specialized users.

Canadian government information policy had been examined in several articles by Morton (1995) and Morton and Zink (1992, 1991) and by Nilsen (1994, 1993). For the research described here, the investigator conducted a close examination of Canadian government information policy in order to determine the political, ideological, and structural influences on policy development and the history of the cost-recovery and restraint initiatives of the mid-1980s. This examination sought to determine whether there were other policies which might have precipitated the Statistics Canada price increases. The review verified that the cost-recovery and restraint initiatives were implemented immediately throughout the government and that no other policies would have resulted in price increases at that time.

The review of the literature on government information policy revealed that political and ideological influences affect policy formulation and implementation. Governments which philosophically espouse market solutions to achieve fiscal balance will formulate information policies which identify information as a resource and a commodity. Pricing which generates revenue is encouraged. However, because of the characteristics of information, its price cannot be deter-

mined solely on market principles. Pricing of government information is a political decision based on the prevailing ideology rather than its value to society. Additionally, the monopoly nature of government information production results in increased prices and decreased supply when political influences overlook the "public good" value of information. At the same time, technology enhances bureaucratic control and encourages the imposition of higher prices rather than increased access. Canadian government information policy of the 1980s and early 1990s provides an example of policy outcomes which reflect these political, ideological, and technological influences.

One can conclude, then, that while empirical research on the effects of government information policy has been limited, existing research shows that policy implementation within the government depends on the type of organization involved, and can take unexpected directions. While pricing effects can be substantial on specialized users, these effects might take some time to become apparent.

OBJECTIVE

The objective of this research was to identify the effects of a policy such as the mid-1980s cost-recovery and restraint initiatives on government information accessibility and on use and users. This objective was met by first investigating policy effects on a government agency, Statistics Canada, in terms of access to its information. Changes in pricing and formats of its products over a 12-year period were documented. Second, the research focused on the impact of the pricing and format changes on use and users. The extent and nature of use of Canadian and other statistics sources by researchers publishing in Canadian social science research journals, and any changes over time in that use, were empirically investigated.

The research addressed the question of the extent to which the price increases and format changes, instituted following the restraint and cost-recovery initiatives, affected social scientists publishing in Canadian social science journals, and whether they changed the statistics sources that they habitually used.

The broad research question addressed was: What is the effect of government information policy on use and users of government information? A number of hypotheses correlated the independent variables of *time* (i.e., date of research publication), and of *discipline* of the social science researchers (as identified by the discipline of the journals in which they publish) with the use of statistics sources in general, and specifically the use of Statistics Canada materials. The results would indicate any changes over time (i.e., before and after policy implementation). Disciplinary differences were examined in order to document any changes over time by discipline. Additionally, the effects of *price* of materials and *format* in which information is made available were considered.

LIMITATIONS

Factoring out all the possible explanations for change in a target group is not usually possible (King, 1975). With a broad policy initiative such as the cost-recovery and restraint initiatives of interest here, attributing causation to any measured changes in statistics sources used is not possible. However, research could provide evidence of any change in the extent of use of statistics sources over a certain time period. Changes might be caused by price increases, format changes, lack of funding, or disciplinary differences. These possible causes were considered in this research. Other possible explanations for change (or lack of change) in use of statistics sources could not be factored out. All policy impact analysis suffers from similar difficulties in causal attribution. However, with the research results provided here, one could conclude that there was, or was not, change in the extent of use of various statistics sources over the time period considered. This might show that social science researchers were forced to use other statistics sources because of policy changes at Statistics Canada, or that the policy changes had minimal or no effect on use of sources. The research did not consider the extent to which researchers wrote on foreign topics and were published abroad. It specifically addressed use of statistics sources by researchers writing articles with a Canadian focus or setting and, therefore, likely to have reason to use Canadian statistics in their research and writing.

PROCEDURES

A triangulated study was designed to examine the effects of the federal government restraint and cost-recovery initiatives of the mid-1980s. Three research methods were used: case study, bibliometric research, and survey analysis. The case study was used to discern the organizational impact of the initiatives on a government agency, and to establish evidence of change in information accessibility. The bibliometric research and the survey sought to provide objective and subjective evidence of any change in use of statistics sources. This multi-method approach would provide a stronger base for conclusions regarding the effects of the *de facto* information policy than could be provided by any of these methods alone.

Investigation by case study methodology of Statistics Canada's response to the federal restraint and cost-recovery initiatives of the mid-1980s, included an examination of documentation from Statistics Canada, other government and non-governmental sources, and interviews with Statistics Canada officials. Information on goals, priorities, and programmes of the agency, policies which impinged on it, and documentation on the effects of budget cuts was examined. Figures on expenditure and revenue are provided annually in the *Annual Reports* and *Estimates*, along with descriptive and philosophical comment. Documentation was examined to provide evidence of changes in agency philosophy. Pricing of paper and electronic products over the period before and after policy implementation (i.e., 1982-

1993) was tracked using *Statistics Canada Catalogues*, other agency catalogs and various price lists. The investigator further examined the extent to which information began to be disseminated in electronic formats and was no longer made available in paper. Treasury Board and other government publications were examined. Articles published in journals and newspapers provided additional information. Personal interviews conducted with three Statistics Canada officials in Ottawa included the Associate Director of the Marketing Division, Director of the Dissemination Division, and the Director of the Census Operations Division. These interviews were open-ended discussions and did not use a formal interview schedule.

Bibliometric methods were used to document objectively policy effects on social science researchers' use of statistical sources. The criteria for selection of social science research source journals were: published in Canada, covered primarily Canadian topics, began publication in 1982 or earlier and still published in 1993, peer-reviewed, and focused widely in the discipline. The final list of journals in Economics, Education, Geography, Political Science and Sociology included two demography journals as sociology journals though they do not focus widely in the discipline because their users were likely to require Statistics Canada data. The final source list—21 titles—included all English and French language journals which met the above criteria (See Appendix B for list of journals).

Articles identified as the population to be sampled consisted of those listed in the tables of contents under the heading "Articles" or "Research Notes" or similar headings. Excluded were items listed under other headings such as "News," "Opinion," "Comments," "Replies," "Reviews," etc. Review articles were not included because the citations in them do not reflect actual use of the materials cited. Articles which were primarily editorial and introductory articles which discussed the contents of the issue were excluded, as were articles which were theoretical with no citations, annual conference proceedings, and articles of less than five pages of text. The population consisted of 5,414 articles. The investigator selected a systematic, stratified, and proportionate sample of 360 articles with a random start. Each discipline was represented in the total sample as follows: Economics 26.9% (97 articles), Education 22.5% (81 articles), Geography 7.2% (26 articles), Political Science 18.1% (65 articles), and Sociology 25.3% (91 articles). The sample reflects the amount of publishing in these disciplines in the 21 Canadian journals.

Bibliometric data collection was conducted manually, using worksheets developed for this purpose. Information about source articles and authors was recorded. Bibliographic citations and footnotes referring to statistics sources were recorded. Text-based analysis involved examination of tables for source notes, and of text and appendices for mentions of statistics sources and for implicit citations. All uses of statistics sources, whether documented or not, were recorded.

Textual examination was necessary because of the recognized limitations of citation analysis (e.g., Cronin, 1984; Paisley, 1990; L. Smith, 1981) and because authors do not consistently cite statistics sources or government publications

(Broadus, 1977; Hernon & Shepherd, 1983). The bibliometric examination revealed the extent of use of statistics from Statistics Canada and other governmental and nongovernmental sources, both Canadian and foreign, over a period before and after policy implementation. Time and discipline were the independent variables against which the use of various statistics sources was measured.

Finally, the investigator surveyed authors of articles examined in the bibliometric research. A 34 question English or French language questionnaire was sent to 163 Canadian social science academic researchers identified through the bibliometric analysis as having written articles with a Canadian focus or setting in which published statistics were used. These were researchers who could be expected to be users of Canadian statistics. The questionnaire asked the social scientists for background information including country in which highest degree was obtained, year in which they began to do research, and percentage of time doing research, and whether recent research had been funded. The extent to which they use statistical data, the sources they had used, and the formats they had used and that they preferred were all queried through a number of questions which provided options for choice, and space for additional comments. Their means of obtaining data were queried. Changes in use were explored, as well as specific impacts of price and format changes. They were asked their opinion on prices and format changes, and whether they thought that researchers in their discipline were using foreign data because they could no longer afford Canadian data. Respondents wrote many comments supplementing their responses.

Data Analysis

Bibliometric data and survey responses were transferred to machine-readable form and analyzed using SAS Release 6.10. The data provide descriptive statistics which were tested using chi-square analysis. Results were determined to be significant at $\rho = .05$.

FINDINGS

Case Study

Examination of Statistics Canada documentation revealed that there had been a shift in thinking at the agency during the period covered which led to a changing vision of its purpose. The prevailing Conservative government ethos regarding government's role in Canadian society encouraged a narrow interpretation of the agency's mandate. Ongoing budget cuts played a role in influencing agency thinking. Where formerly Statistics Canada had not exploited its monopoly, and had espoused a "public good" vision for its information dissemination, in the mid- and later 1980s, it began to think in terms of commercialization and commodification of its information. Results of the case study showed that Statistics Canada sought

FIGURE 1
Average Prices Per Year for Statistics Canada Print Products

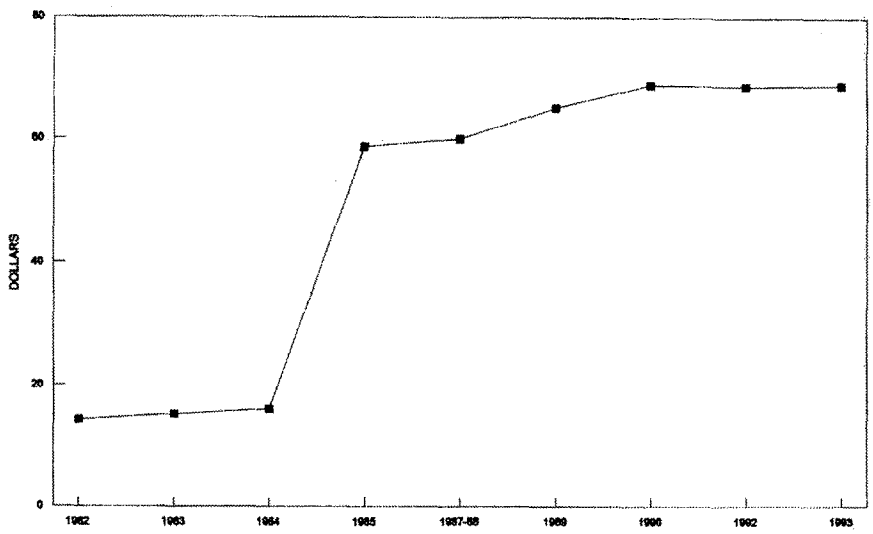
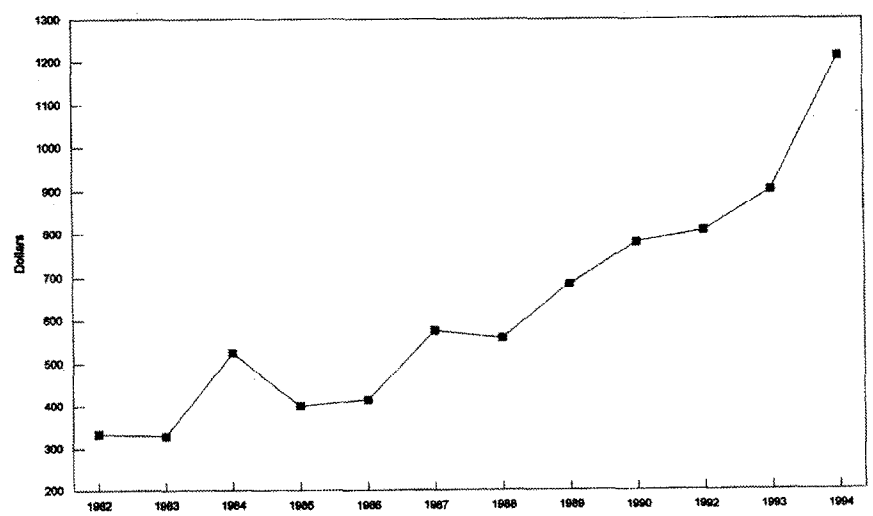


FIGURE 2
Average Prices Per Year for Statistics Canada Microdata Files



to recover costs and achieve greater revenues through higher prices and increasing electronic data dissemination. Implementation of the government-wide cost-recovery initiatives resulted immediately in sharply higher prices for the agency's information products and encouraged a shift to dissemination of information in

electronic formats with further cost-recovery in mind. The case study illustrates price increases for print products averaging 267% in 1985, followed by more gradual increases, leading to a total increase between 1982 and 1993 of 438% (see Figure 1). Price increases for electronic microdata files were less dramatic, rising by 170% between 1982 and 1993, however, the amount of data per file decreased (see Figure 2). Some census computer-readable formats had earlier been documented as increasing by 9900% (Ruus, 1987).

The case study also revealed that some information formerly available in paper became accessible only in electronic formats at much increased prices. Paper products were increasingly designed for generalists. Those with more detailed or specialized needs were expected to pay for electronic access. The agency argued that it charges dissemination costs only, but there is evidence that supports the conclusion that Statistics Canada is assigning costs to dissemination which belong elsewhere (e.g., data collection and analysis).

There was a change in accessibility of the agency's information following imposition of the cost-recovery and restraint initiatives of the mid-1980s. In 1985, Statistics Canada responded to this *de facto* information policy with substantially increased prices for paper and computer readable products. Prices continued upward in the following years, though not at the same high rate of the 1985 increases. The agency's interpretation of its mandate has been affected by financial considerations. Since the mid-1980s, the product mix has changed, with a decreasing number of print products and ever-increasing computer readable accessibility. Effects on users have not been studied by the agency and this research sought to fill that gap.

Bibliometric Research

The bibliometric research examined 360 articles categorized as to discipline, type, geographical focus or setting (if any), and language. The sample's disciplinary categorization was based on the discipline of the journal in which the articles appeared, which were not necessarily the disciplines of the authors or of the subjects covered. Categorization by type revealed that 55.6% (200 articles) could be identified as empirical, 22.8% (82 articles) as descriptive, and 21.6% (78 articles) as either historical, opinion, methodological or theoretical. These latter types were unlikely to use statistics. The geographical focus or setting of 269 (74.7%) of the articles was Canadian, and in 34 articles (9.5%) the focus was not Canada. Fifty-seven articles (15.8%) could not be categorized geographically, often because they were theoretical or methodological. One hundred and twenty-one (33.6%) of the articles were in French, the remaining 239 (66.4%) articles were in English.

Identifiable published statistics were used in 238 (66.1%) of the articles, 70 (19.4%) made no use of statistics, 39 (10.8%) used only self-collected data derived by the author from experiments or other research methods, and 13 (3.6%) used only unidentifiable published statistics.

Variation by discipline in use of statistics showed that published statistics were heavily used in most disciplines (i.e., more than 70% of the articles in each discipline except Education used identifiable published statistics. In Education only 49.4% used these materials. Political Science was the heaviest user of identifiable published statistics (86.2%), followed closely by Geography (84.6%). Economics and Sociology were categorized as making no use of statistics more often than other disciplines (no use of statistics by 25.8% and 23.1% respectively), and these were the disciplines in which theoretical articles were most likely to be found.

Authors used many different statistics sources. The research identified the sources used as Canadian (with data provided for Statistics Canada, other federal government, provincial regional, and municipal sources) or foreign (United States and other), intergovernmental, and nongovernmental. The most heavily used statistics sources were nongovernmental (e.g., business, foundations, universities, and published books and articles). Nongovernmental sources were used in 170 (71.4%) articles. These were used most heavily in Political Science articles (88.9%) and least in Geography (63.6%). Intergovernmental statistics sources were very little used, with only 17 (7.1)% of articles using them. All of the variations by source are analyzed in this research by time and discipline.

A subset of the sample was identified consisting of 207 articles (57.5% of the total sample) which were written with a Canadian focus or setting and which used identifiable published statistics. These articles would be the most likely to use Canadian statistics. The data provided below refer to these 207 articles.

The bibliometric analysis showed that Statistics Canada was the single most frequently used source of statistics, but it was used in only 85 (41.1%) of the 207 articles written with a Canadian focus or setting. Almost the same number 84

FIGURE 3
Use of Statistics Sources

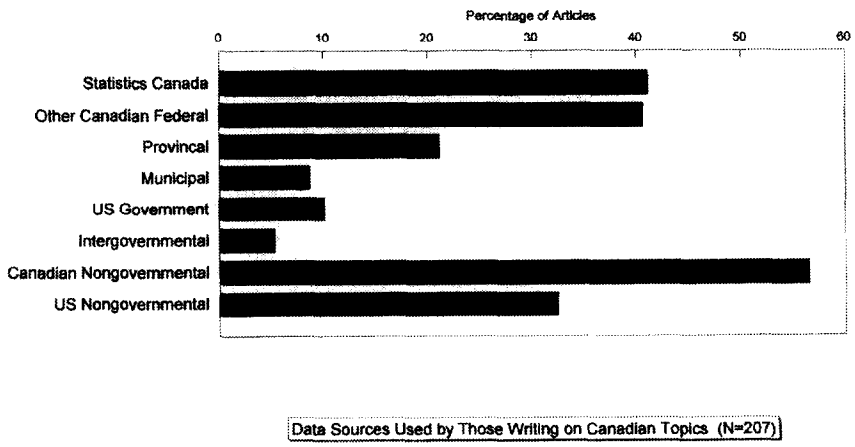
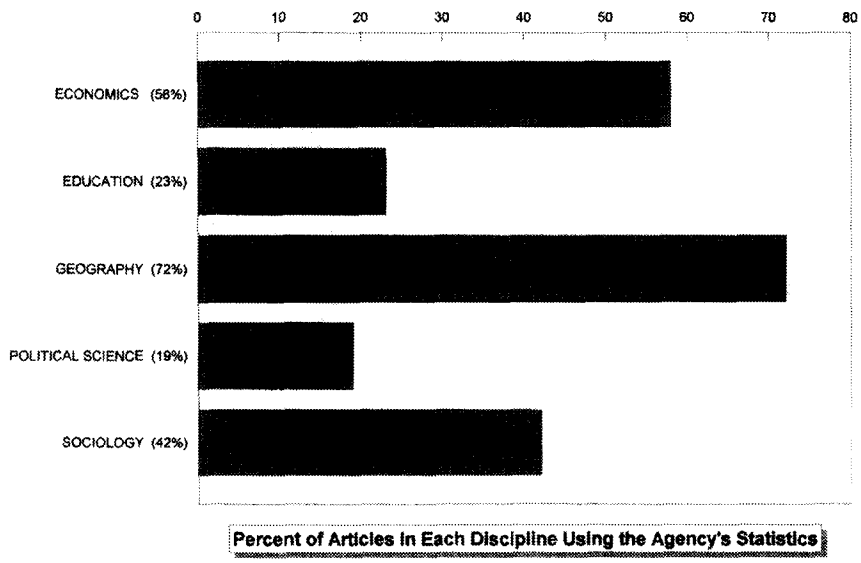


FIGURE 4
Disciplinary Differences in Use of Statistics Canada

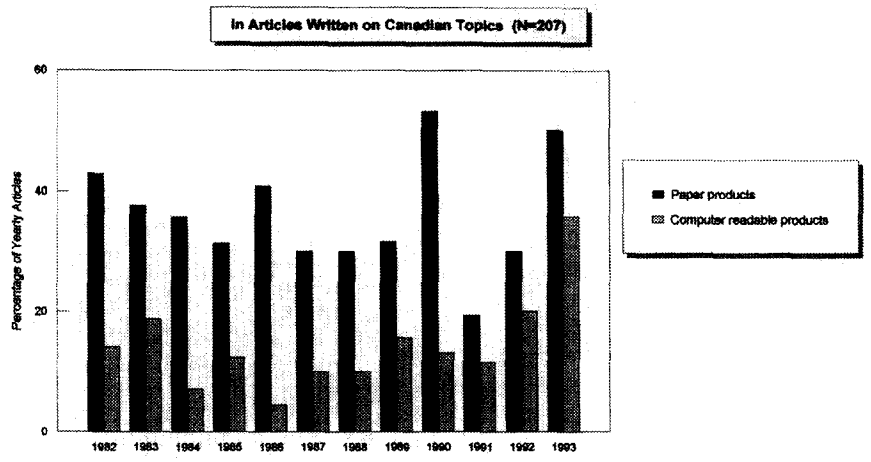


(40.6%) used all other Canadian federal government sources combined. Provincial government sources were used in 52 (25.1%) of these articles. Nongovernmental sources were used in 147 (71%) of these articles. U.S. government statistics sources were used in only 21 (10.1%) of these articles and American nongovernmental statistics sources were used in 67 (32.4%) of them. The nongovernmental sources were mainly books and articles published in the U.S. Foreign (U.S. and other) sources were used mainly for comparative purposes and were seldom the major source of statistics on which conclusions were based. The bibliometric data indicated that social scientists range widely to obtain the statistics they use (see Figure 3).

With respect to the research objective, the bibliometric study found that there was no significant change over time in use of statistics from any source. There was a statistically significant decline ($\rho = .045$) over the time period in the number of articles using Statistics Canada's paper formats, but the corresponding increase in the number of articles using Statistics Canada computer readable products was not statistically significant ($\rho = .290$). As noted, the number of paper formats available from the agency has declined.

The discipline of the journal in which an article is published was found to be a statistically significant predictor of use of statistics in general, and of use of particular sources. Articles published in Geography and Economics journals made greatest use of Statistics Canada's statistics, and those in Political Science journals made least use of them (see Figure 4). However, there was no change over time in these disciplnary variations.

FIGURE 5
Use of Statistics Canada Paper and Computer Readable Products



The bibliometric research provided objective evidence of use of statistics sources and found no significant change in use over the period covered 1982-1993. Thus, despite the concerns of social scientists that they would be forced to use other data sources, they did not, in fact, do so. Changes in accessibility of statistics sources that might result from increased pricing or format changes did not fundamentally alter the research patterns of Canadian social scientists over the period. They continued to write the same types of articles, with the same geographic focus or settings after the mid-1980s as they had earlier. They continued to either use or not use published statistics and self-collected data to the same extent as they had done earlier. The research found that there is no statistically significant relationship between date of publication of articles and use of Statistics Canada or any other statistics source.[1]

It was found that while social scientists are still heavy users of paper formats, there was a decline in the number of articles using these formats over the period covered. In other words, although the number of articles using the agency as a statistics source did not change significantly over the time period ($\rho = .578$), the percentage using paper formats declined in the latter half (i.e., 1988-1993). There

[1] Significance of the relationship between date of publication and each type of source was separately determined using chi-square analyses. Results are as follows: Statistics Canada ($\rho = .578$); other Canadian federal government ($\rho = .183$); provincial government ($\rho = .568$); municipal government ($\rho = .635$); U.S. government ($\rho = .885$); intergovernmental organizations ($\rho = .600$); Canadian nongovernmental ($\rho = .682$); U.S. nongovernmental ($\rho = .943$).

was no change in the number of individual paper issues or computer readable products used, per user.

The decline in the number of articles using paper formats might be attributed to the declining publication of paper formats at Statistics Canada, rather than any absolute preference. As noted above, growth in the number of articles using computer readable formats which can be observed in the sample (from 28% in 1982-1987 to 39% in 1988-1993) is not statistically significant (ρ = .290). However, the rate of growth on a year-to-year basis in use of computer readable formats has been accelerating since 1990 (see Figure 5).

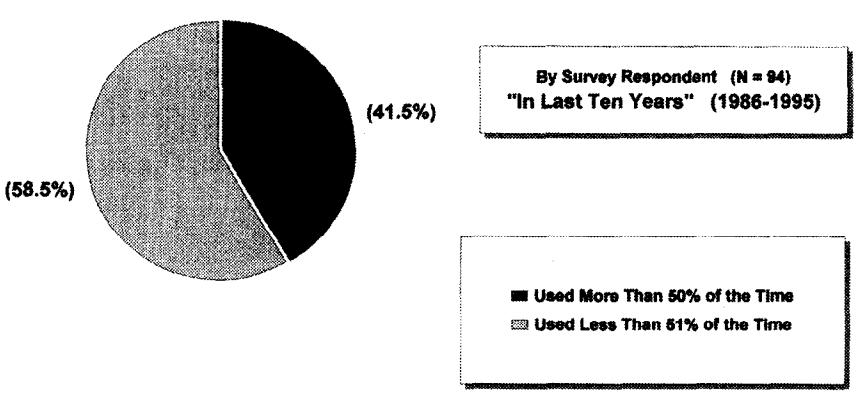
Perhaps the most interesting finding was that Statistics Canada was *not* used in almost 60% of articles written with a Canadian focus or setting. Given that the agency is the major producer of social and economic statistics in Canada, one would expect greater use of agency data in this sample. The implications of this finding deserve further examination. While language differences were not the focus of this research, the data do show that social scientists writing in French rely more heavily on provincial data than do those writing in English. Data on language differences await further analysis and have not been included in this article.

The Survey

The investigator sent a questionnaire to 163 Canadian academics identified in the bibliometric research as writing on Canadian topics and using published statistics. Ninety-seven responded, a return rate of 59.5%.

Survey respondents were active academic researchers, 69 of them (72.6%) stated that they spend more than 40% of their time doing research. While 50 (51.6%) received their highest degrees in Canada, 36 (37.1)% received their highest degree in the United States. They were heavy users of statistics, with 71 (74%) indicating

FIGURE 6
Use of Statistics Canada's Statistics



that they used them more than 50% of the time in their research or writing. Survey respondents in Education were less likely to use published statistics often, which is consistent with the bibliometric findings.

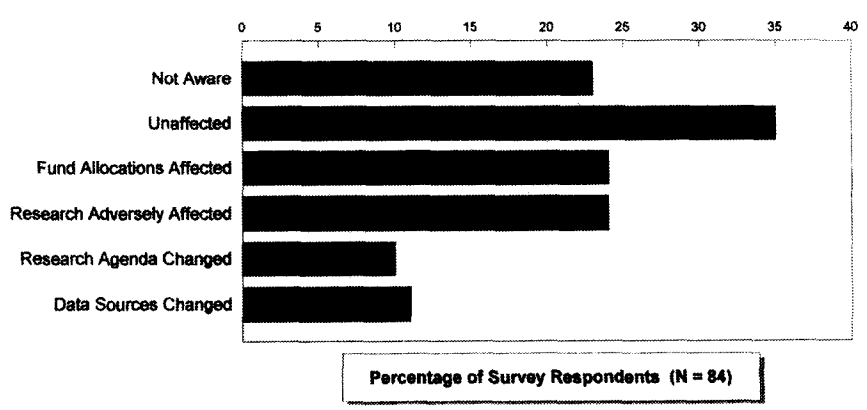
Most respondents (83, 85.6%) had used Statistics Canada as a statistics source at some time, but only 39 (41.5% used the agency's statistics more than 50% of the time in the ten years preceding the survey (to 1995). The survey findings suggest that almost 60% of the researchers do not find the agency's statistics very useful, in that 55 (58.6%) of them use agency statistics less than 51% of the time or not at all (see Figure 6). This supports the bibliometric finding that 60% of the articles examined did not use the agency's statistics.

Respondents generally claimed to use various sources to a greater extent than was shown in the bibliometric analysis, with the exception of nongovernmental sources for which less use was indicated than the bibliometric research found. These variations might be accounted for by the fact that the bibliometric analysis was based on examples of use evident in single articles, while the survey questioned lifetime use. Disciplinary differences among survey respondents in their use of statistics sources were consistent with the bibliometric findings.

High prices of Statistics Canada materials appeared to affect about 20% of respondents. Nineteen (22.6%) of all respondents indicated that their use of Statistics Canada data had changed over time because it is too costly, and nine (10.7%) noted lack of funding. High prices for Statistics Canada statistics also drove 20 respondents (20.8%) to allocate their available funds differently, and some indicated they could no longer hire student assistants to work on the data (see Figure 7).

Twenty-two respondents (22.7%) indicated that they make less use of the agency's data because of price increases and 28 (28.8%) of all respondents agreed that Canadian researchers in their discipline are going abroad for their data because they no longer could afford Canadian data. This represented 51.9% of those with

FIGURE 7
Extent Affected by Statistics Canada Price Changes



an opinion on the subject. Asked if they agreed or disagreed with the statement, "Statistics Canada prices are reasonable," 31 (70.7% of those with an opinion on the subject) disagreed or strongly disagreed. Though the survey revealed that social science researchers are unhappy with the price increases, most did not indicate any change in the statistics sources they use as a result.

The movement of statistical information into electronic formats is well received, though more respondents (in 1995) still used paper products more than electronic ones. Seventy-four respondents (76.3%) still obtained statistics in paper format, while 59 (60.8%) used computer readable products, or both formats. More "younger" researchers (those who began to do research after 1980) had used Statistics Canada computer readable data at some time than those who began to do research earlier. Fifty respondents (64.9% of question respondents) indicated they would most prefer to use computer readable files in order to obtain data, and most would prefer to purchase their own computer readable files or use data libraries. While Statistics Canada has moved heavily into making much data available only through special tabulations which must be individually paid for, and 36 (37.1%) normally obtain data in this way, only one respondent (1.3%) most prefers to use special tabulations. Though 60 (61.9%) normally collect their own data, only 18 (22.8% of 79 respondents to this question) indicated they would most prefer to acquire data in this way. Nineteen respondents (19.2%) stated that they normally acquired statistics on the Internet, though only 2.5% indicated that they most prefer to use this method of data acquisition. Those publishing in Education journals were least likely to use computer readable files, while those in Economics and Geography were most likely to do so. While these Fall 1995 findings provide baseline data, further research needs to be undertaken given the vast growth in Internet use since 1995.

The survey component of this research was designed to supplement the bibliometric analysis described above. The findings of the survey generally support the bibliometric findings. High prices for data have *not* driven most social science researchers away from using Statistics Canada data. It is possible that electronic formats are attracting more use of the agency's data by some researchers, masking decline in use by other researchers because of price increases.

DISCUSSION

The government information policy of restraint and cost-recovery had a clear impact on Statistics Canada. The agency mission was reinterpreted, the "public good" vision was downplayed, and commercialization of information products was encouraged. This resulted in increased prices for paper and computer readable data. Social scientists expressed concerns, suggesting that such moves would have negative effects on research in Canada. However, this research found that the pricing and format changes had no effect on these researchers in terms of their use of Statistics Canada as a statistics source. But this does not mean that social scientists

are unconcerned about the cost of the data they use. There is ample evidence in the survey responses that most are unhappy with the prices charged by Statistics Canada. The findings might be explained by a number of factors. Statistics Canada's monopoly on socio-economic statistics might result in inelasticity of demand. Further, the training of social scientists leads to habitual research patterns which might not easily be changed. Changing habitual work patterns could be too costly, in terms of time and energy expended, and researchers might, therefore, find some way to pay for increased data charges. Elasticity in the allocation of research funding might permit researchers to cope with increased prices. Given the fact that this research showed that there has been no change in the extent of use of Statistics Canada materials, these researchers must be acquiring funding somewhere or making other adjustments to their research allocations. Twenty respondents (20.8%) noted changes in funding allocations because of price increases.

The examination of use of paper formats versus use of computer readable formats does show a statistically significant decrease ($\rho = .045$) in the number of articles using paper products. It is possible that the use of paper products declined because there are fewer paper products produced, or the decline might be price related. The lack of a corresponding statistically significant increase in the number of articles using computer readable products suggests that price is more important than format in accounting for the decline in use of paper products. As more Statistics Canada data become accessible over the Internet, further declines in use of paper products can be expected.

Within the research data there are some hints of possible other effects which, while not statistically significant, deserve exploration in subsequent research. For example, it is possible that social science researchers might be using Statistics Canada's data with less intensity than they once did, and not exploring in them as widely.

Though there was no evidence of a decline in the amount of research on Canadian topics, some social science researchers might be responding to price increases by writing more on foreign topics and publishing in foreign journals. This research did not consider the extent to which researchers wrote on foreign topics and were published abroad. This is a logical next step in considering pricing effects. Additionally, future research of a more qualitative nature might examine researcher motivations and practices with respect to use of statistics sources through interviews or focus groups.

CONCLUSION

At first glance, Statistics Canada, or any organization which changes its information policies would be pleased with the findings of this research. It suggests to them that that raising prices or changing formats for their information products are unlikely to have any real effect on users. A closer look at the findings suggests that jumping to this conclusion would be unwarrented because there is evidence of

dissatisfaction with agency pricing. A European example is enlightening in this respect. Moore notes that a European survey revealed a "widespread perception that information is too expensive." He notes that "the survey seems to suggest that this perception is holding back the development of the European [information] market and constraining demand" (Moore, 1996, p. 215). As noted, many respondents to the survey conducted for the research described in this article suggested that Statistics Canada's information is too expensive. Moore reiterates that while the costs of creating information products are high, the marginal costs of sales are very low. He argues that "the way to reduce unit costs in such circumstances is to expand the market. Policies to support the expansion of the market could, therefore, be very valuable" (p. 215).

When governments implement policies such as the Canadian federal government's cost-recovery and restraint initiatives of the mid-1980s, they are driven by fiscal concerns. These concerns arise from revenue shortfalls, and/or from a deficit and debt reduction mandate. The particular policy instruments chosen depend upon the political, structural, and bureaucratic environments. While such policies might or might not achieve their goals, they can have unexpected effects or impacts unanticipated by policy analysts. This research illustrates how such policy measures can affect a government agency and its information priorities, in terms of pricing, format and dissemination. Further research might consider how these policies affected the agency's information collection, or other aspects of its information's life cycle.

Other government policies such as across-the-board budget cuts, department and agency restructuring, staff or budget reallocations, etc. can have similar effects on government information. Thus, government-wide policies need to be seriously examined as *de facto* information policies. A good example is the 1993 elimination in Canada of the Department of Communications, a department which focused on all aspects of communication and information. Two unrelated departments were subesequently created, one focused on Industry, the other on Canadian Heritage. The Industry department looks at information from a business/ market perspective, while Canadian Heritage is concerned with the cultural aspects of information. While it is beneficial to have a single department focusing on cultural policy, the different orientations of these two departments have proven particularly challenging to the policy discussions surrounding Information Highway development and goals. Restructuring of the former Department of Communications was clearly an information policy though it was never defined as such by the government or by policy thinkers, and it had real downstream effects on further information policy development.

This research illustrates that organizational-level information policy (in this case at Statistics Canada) arises in a macro-level policy environment. Macro-level policy makers appear often to be unaware of policy impacts on organizational-level information policy, and are probably uninterested. Information-policy thinkers need to be ever alert to these wider *de facto* information policies and take them into consideration in analysis and research.

APPENDIX A. TYPOLOGY OF USE OF STATISTICS AND GOVERNMENT PUBLICATIONS: BY DISCIPLINE

On the basis of the INFROSS research, which has been substantiated by other research discussed in the literature review, the following typology of use of statistics and government publications is suggested:

1. Disciplines which seldom or never use statistics:
   Anthropology, History.
2. Disciplines which seldom or never use government publications:
   Anthropology, History, Psychology
3. Disciplines which sometimes or often use statistics:
   Economics, Education, Geography, Political Science, Psychology, and Sociology[1]
4. Disciplines which use self-collected statistics:
   Psychology[2]
5. Disciplines which use primarily published statistics:
   Economics, Education, Geography, Political Science, and Sociology
6. Disciplines which sometimes or often use government publications:
   Economics, Education, Geography, Political Science, and Sociology[3]

APPENDIX B. LIST OF SOURCE JOURNALS (*N*=21)

L'actualité économique. Écoles des hautes études commerciales, Societé canadienne de science économique, and Association des économistes Québécois. v.1- 1925- . (4x yr).

Alberta Journal of Educational Research. Faculty of Education, University of Alberta. v.1- 1955- . (4x yr).

Cahiers de géographie du Québec. Département de géographie, Université Laval. v. 1- 1956- . (3x yr).

Cahiers Québécois de démographie. Association des démographes du Québec. vol.1- 1971- . (2x yr).

Canadian Geographer. Canadian Association. of Geographers. v.1- 1951- . (4x yr).

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1 Based on INFROSS results and including only those in which 60% or more of respondents indicated that they use statistics.

2 Economists, social geographers, sociologists and some political scientists also use experimentally derived data, but to a lesser extent.

3 Based on INFROSS results and including those in which 20% or more of researchers claim they use government publications.

Canadian Journal of Agricultural Economics. Journal of the Canadian Agricultural Economics Society. v.1- 1952- . (4x yr).

Canadian Journal of Criminology. Canadian Criminal Justice Association. v.1- 1958- . (4x yr).

Canadian Journal of Economics. University of Toronto Press for the Canadian Economics Association. v.1- 1968- . (4x yr).

Canadian Journal of Education. Canadian Society for the Study of Education. v.1- 1976- . (4x yr).

Canadian Journal of Higher Education. Canadian Society for the Study of Higher Education. v.1- 1971- . (3x yr).

Canadian Journal of Political Science. University of Toronto Press for the Canadian Political Science Association. v.1- 1968- . (4x yr).

Canadian Journal of Regional Science. Regional and Urban Studies Centre, Institute of Public Affairs, Dalhousie University. v.1- 1978- . (4x yr).

Canadian Journal of Sociology. Department of Sociology, University of Alberta. v. 1- 1975/76- . (4x yr).

Canadian Public Administration. Institute of Public Administration of Canada. v.1- 1958- . (4x yr).

Canadian Public Policy. University of Toronto Press. v.1- 1975- . (4x yr).

Canadian Review of Sociology and Anthropology. University of Alberta. v.1- 1964- . (4x yr).

Canadian Studies in Population, Population Research Laboratory, Department of Sociology, University of Alberta. v.1- 1974- . (2x yr).

McGill Journal of Education. Faculty of Education, McGill University. v.1- 1966- . (3x yr).

Recherches sociographiques. Département de sociologie, Université Laval. v.1- 1960- . (3 x yr).

Revue des sciences de l'éducation. L'enterprise commune des facultés, départements, instituts et écoles universitaires francophones d'éducation au Canada. v.1- 1975- . (3x yr).

Sociologie et sociétés. Département de sociologie, Université de Montréal. v.1- 1969- . (2x yr).

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