Cat. No. 88-006XIB-99003

An analysis of science and technology workers: deployment in the Canadian economy

Statistics Canada Statistique Canada

Canada

An Analysis of Science and Technology Workers

Deployment in the Canadian Economy

Acknowledgement

This report has been prepared by Wendy Hansen, Senior Research Associate, MERIT. Data was provided by the Science, Innovation and Electronic Information Division of Statistics Canada. English editing services were provided by Bob Lyle, Ottawa, Canada.

Every effort has been made to provide accurate interpretations of the data sets. The author assumes full responsibility for any misrepresentation or errors.

Wendy K. Hansen
MERIT
Telephone: (31) 43 388 3868
Facsimile: (31) 43 321 6518
E-mail: w.hansen@merit.unimaas.nl

ST-99-03

January 1999

S&T knowledge workers in Canada, 1996

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/english/research/scilist.htm.

S&T knowledge workers in Canada, 1996

PREFACE

People are the key to the knowledge society. They generate knowledge through research, they transmit knowledge by publishing and by migrating, and they use knowledge to generate wealth. Knowing where people are, and where they have been, provides insight into what is actually happening in the economy, and in the society, and into how knowledge flows.

People who are educated in subjects related to science and technology contribute to technological change in society. They play a significant role in the information and communication technology sector: industries that move, process and display information electronically. The industries in which these people work, and the change in their location over time are the subjects of four working papers and a summary paper, all of which are based on data from the Canadian Census of Population.

The first paper is '**An Analysis of Science and Technology Workers: Deployment in the Canadian Economy**'. It examines the industrial distribution, and levels of unemployment of people who were educated in S&T subjects at college, Bachelor, Master's and Ph.D. levels. While unemployment is derived from the labour force,(i.e. the working aged population employed or seeking work the week before the census), the distribution is done for the work force, the total population 15 years of age or over, whether participating in the labour force or not, but restricted to those with a qualification in an S&T subject.

Then, there are three related papers, '**The Work Force in the Computer Services Industry**', '**The Work Force in the Telecommunication Carriers Industry**' **and 'The Work Force in the Communication and Electronic Equipment Industry**', each subtitled **'A Skill Base in Transition: 1986 to 1996**'. These papers look at the work force in specific industries and examine the distribution of people by level of qualification across occupations. As the data are available from three Censuses, it is possible to see the trends over time and the changes in the make up of the various occupations.

These Working Papers provide insights into what a particular segment of the skilled work force is doing and, for the industries that are part of the ICT sector, they show how the work force skill base is changing over time. The work is summarized in a fifth paper, An Overview of the transition of the skill base in three ICT industries: Telecommunication carrier services, Communication and electronic equipment, Computer services - Findings and Implications. The three industry papers and the summary are available at http://meritbbs.unimaas.nl/publications/ict.html.

Comments on the findings in the papers will be used to guide the analysis of data from the Census of Population for 2001 and they should be sent to the Director of the Science, Innovation and Electronic Information Division at Statistics Canada

All the papers were prepared by Wendy Hansen and they represent a collaborative undertaking on the part of Industry Canada, the Maastricht Economic Research Institute on Innovation and Technology (MERIT) in the Netherlands, and Statistics Canada.

CONTACTS FOR MORE INFORMATION

Science, Innovation and Electronic Information Division

Director Dr. F.D. Gault (613-951-2198)

Assistant Director Brian Nemes (613-951-2530)

The Science and Innovation Information Program

Chief, Indicators Development
Dr. Frances Anderson (613-951-6307)

Chief, Knowledge Indicators
Michael Bordt (613-951-8585)

Chief, Innovation
Daood Hamdani (613-951-3490)

Life Science Unit
Antoine Rose (613-951-9919)

Science and Technology Section

Senior Project Officer
Don O'Grady (613-951-9923)

Project Leader, Public Sector
Bert Plaus (613-951-6347)

Senior Project Officer
Janet Thompson (613-951-2580)

FAX: (613-951-9920)

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.

Table of Contents

S&T knowledge workers in Canada, 1996

Introduction

This report provides information on the economic activity of science and technology (S&T) knowledge workers. The S&T knowledge work force is examined in terms of the industry of employment of the worker. The industry of employment is presented in the traditional dichotomy dividing the work force between goods-producing industries and services-producing industries. The overall objective of this report is to provide information to improve the understanding of where S&T knowledge workers are deployed in the economy. More specifically, the aim of the report is to use the S&T knowledge worker as the starting point, and then follow them across the economic spectrum to assess in which industries they are employed. At the same time, examining the deployment of S&T knowledge workers exposes the demand by industries for particular skill sets.

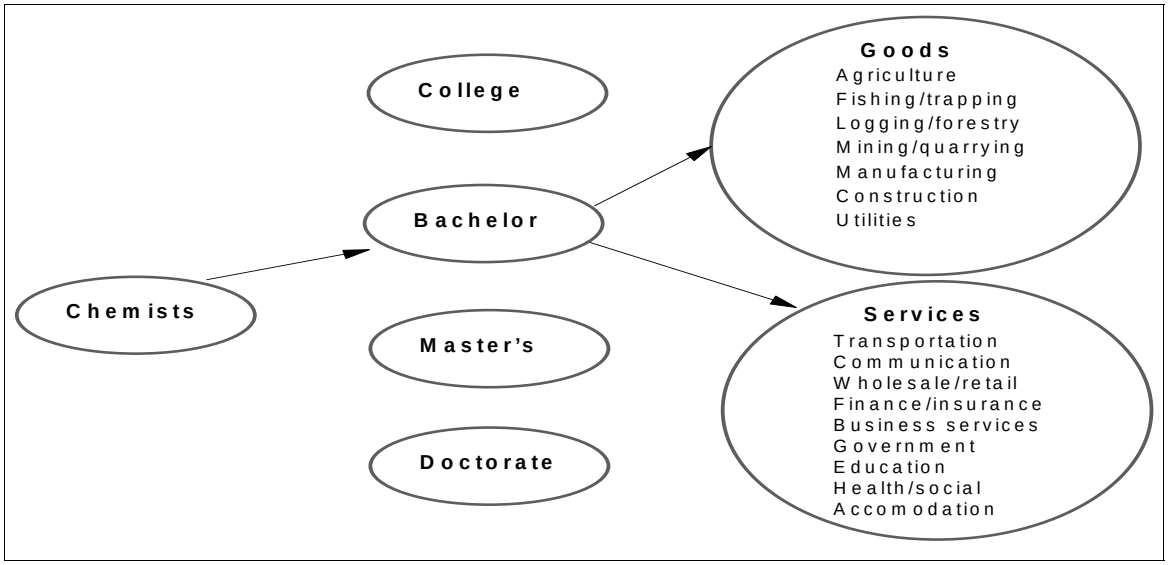
This study does not attempt to include every area of expertise of knowledge workers, as defined by the programs of study outlined in Canadian college and university guidelines. It does include a wide range of S&T expertise, including social sciences, agriculture and biological sciences, engineering and applied sciences and technologies, health sciences, and mathematics and physical sciences. Agriculture and biological sciences, engineering and applied sciences and technologies, and mathematics and physical sciences, grouped under the subject of natural sciences and engineering (NSE), are examined in detail. For the fields of NSE, a number of disciplines (specializations) within the field are provided. Details of the fields of specialization (discipline) are listed in the annex.

A description of the deployment of S&T knowledge workers would not be complete without presenting information on those who were unable to find work. Unemployment rates of the S&T knowledge workers are provided to augment current information on employability of particular skill sets, which can in turn contribute to discussion on demand for skilled workers.

Organization of the Report

S&T knowledge workers are defined according to their level of educational attainment (their highest formal credential) and the field of expertise or knowledge using the field (discipline) of the credential. Thus, the deployment of knowledge workers based on their field of expertise is examined, as well as the differences between the level of qualification. The diagram below provides an example of chemists. In the diagram, chemists (field of specialization) with a Bachelor degree (level of qualification) are followed to see if they are in goods-producing industries or services-producing industries. Once that is determined, the individual industries within these two sectors are identified. Further breakdowns are provided on manufacturing as well as business services. For details, refer to the annex industry list.

For comparison purposes, the same format is used throughout the report. This permits the reader, for



S&T knowledge workers in Canada, 1996

example, to see where chemists with a Bachelor degree are working, and also to see the variance in industry distribution according to the level of skill of their credential (e.g. college versus Bachelor versus Master's versus Doctorate credential).

Each vignette begins by presenting the total number of people in the work force (e.g. total number of chemists) which is followed by information on the level of qualification (percentage of chemists with a college credential, Bachelor degree, Master's degree or Doctorate). The work force includes everyone aged 15 years of age and over whether active in the labour force or not — it is a description of the pool of the skill set (e.g. the number of chemists in Canada's work force, whether active in the labour force and or not active in the labour force). The vignette continues with a description of the deployment of the S&T knowledge workers according to their level of qualification (e.g. which industries employ chemists with a Bachelor degree; which industries employ chemists with a Master's degree). [1]Are they concentrated in goods-producing industries or in services-producing industries? How many are not active in the labour force? Given current policy interest in work reorganization and structural change, within manufacturing individual industries utilizing S&T workers are elaborated. Similarly, for services-producing industries, extra attention is paid to those S&T workers reported in business services to see how many are in computer services or engineering/scientific/technical services. This latter industry group is where S&T consulting services are captured.

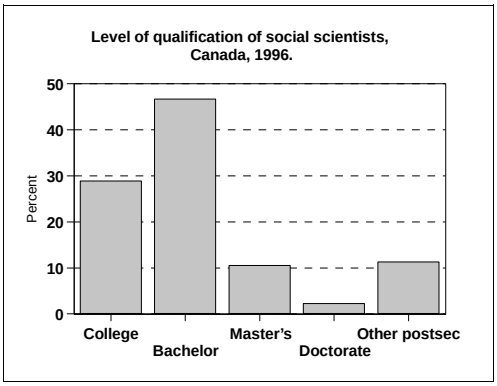
Brief information on the unemployment rate of S&T knowledge workers compared with the national average concludes each vignette. This will contribute to discussion about demand: for example, are S&T workers enjoying lower than average unemployment rates, or are they suffering higher rates of unemployment?

For comparison purposes and for a fuller picture, the report concludes with a table presenting the gross domestic product of the identified industries, as well as the industries' share of S&T knowledge workers.

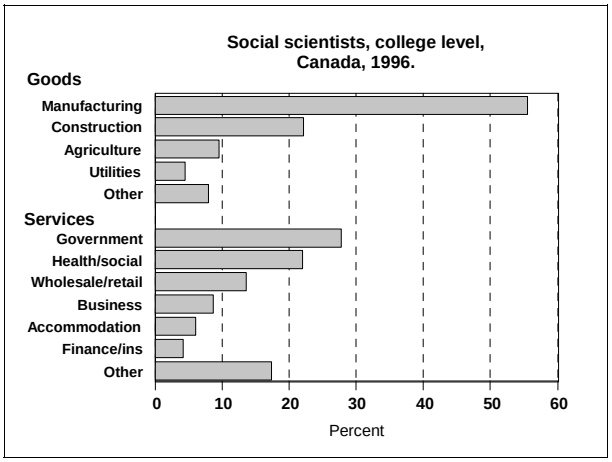
[1] The share not reported in goods-producing industries or services-producing industries reveals the size of the work force not active in the labour force.

Social Scientists

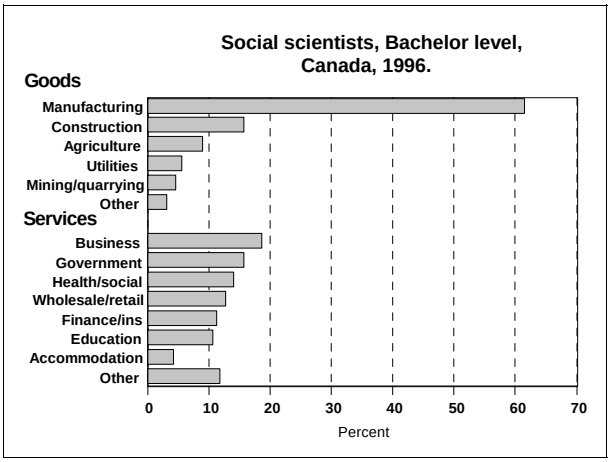
Industry of employment



- There were some 870,400 social scientists (FOS 125-187) in the work force in Canada in 1996. Most of them (47%) had a Bachelor degree, and the second largest group (29%) reported a college credential. At least one in ten had a Master's degree, and two in one hundred a Doctorate.
- Fewer than one in ten of the 251,675 college-trained social scientists were reported in goods-producing industries, and more than three quarters were in the services sector.
- More than half of the 23,745 college graduates in goods-producing industries were in manufacturing. Within manufacturing industries, they tended to be in industries like transportation (14%) and food pro- ducts or printing/paper/allied products (each with about one in ten). At least one in five were in con- struction, and about one in ten or so were in agriculture.
- In the services sector, over one quarter of the 191,840 college graduates were in government services, and more than one in five were in health/ social services. Wholesale/retail trade accounted for at least one in ten, and business services just under one in ten (only 8% of those in business services were in engineering/scientific/ technical services and an even smaller share — 5% — were in computer services.



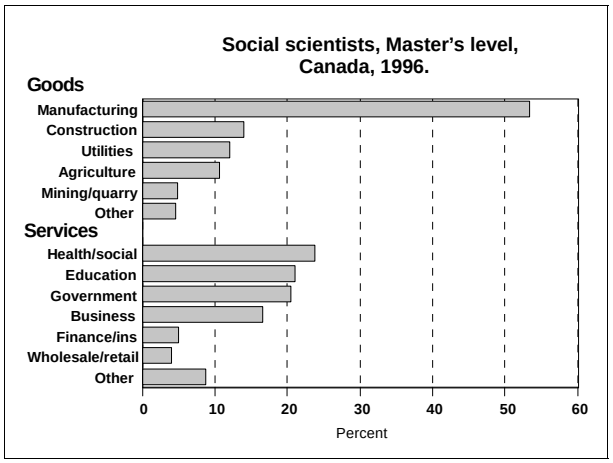
- There were 406,830 social scientists with a Bachelor degree. Fewer than one in ten were in goods-producing industries and four in five were in services-producing industries.
- At least three in five of the 35,690 Bachelor-qualified social scientists working in goods-producing industries were in manufacturing. The second largest share were in construction (16%). About one in ten were in agriculture industries. Within manufacturing, they tended to be in areas like printing/paper/allied products (at least one in five) and in food products or transportation (each accounting for about one in ten).



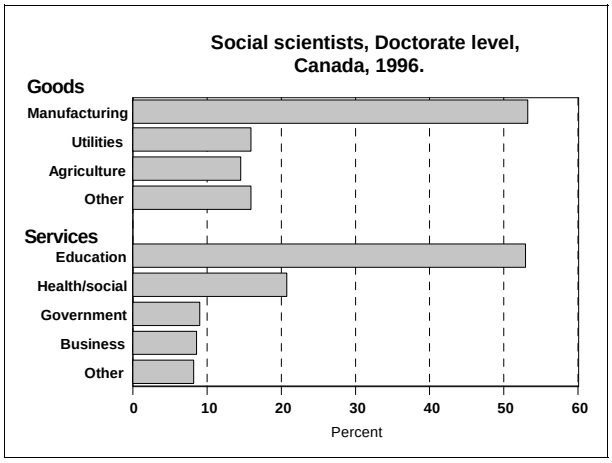
- The 329,690 Bachelor graduates in services-producing industries were found across a range of industries. Most were in business services (19%), followed by government services (16%), health/social services (14%), wholesale/retail trade (13%), and finance and education (each with about 11%). Of those in business services, fewer than one in ten were in engineering/scientific/technical services or computer services.
- There were 92,855 social scientists with a Master's degree. Few (5%) were in goods-producing industries, with about 85% in the services sector.

Social Scientists

- Most of the 4,225 Master's-qualified social scientists working in goods-producing industries were in manufactoring (53%), and some one in ten in construction, utilities or agriculture industries. Within manufacturing, most were in paper/printing/allied products (25%), with about one in ten working in electrical/ electronic industries.



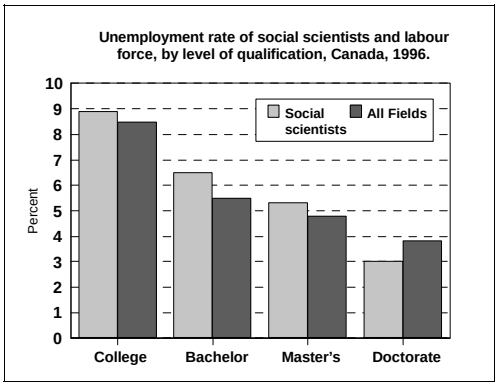
- One in four of the 78,470 Master's-qualified social scientists in the services sector were in health/social services; at least one in five were in education services or government services. Business services utilized slightly fewer than one in five. Of those in business services, only 6% were in engineering/ scientific/ technical services and more than twice that share (13%) were in computer services.



- Only 375 of the 19,720 social scientists with a Doctorate were in goods-producing industries, and more than half of them (53%) were in manufacturing. The second largest share was in utilities followed by agriculture. The few found in manufacturing were typically in paper/printing/allied products, electrical/ electronic industries or machinery industries.
- At least half (53%) of the 17,155 Doctorate-qualified social scientists in the services sector were in education services, and one in five in health/social services. Just under one in ten could be found in government services or business services. At least one in five of those in business services were in engineering/scientific/technical services, with only 5% in computer services.

Unemployment

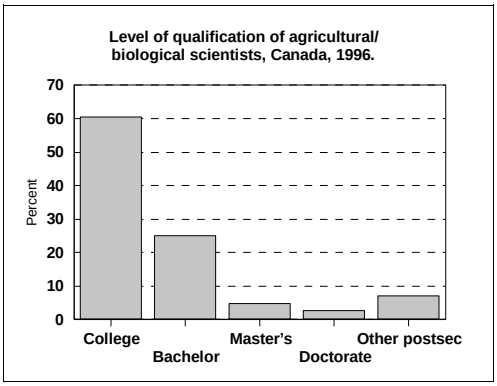
- With the exception of those with a Doctorate degree, the unemployment rate of social scientists was somewhat higher than that of the overall labour force when level of qualification is considered.



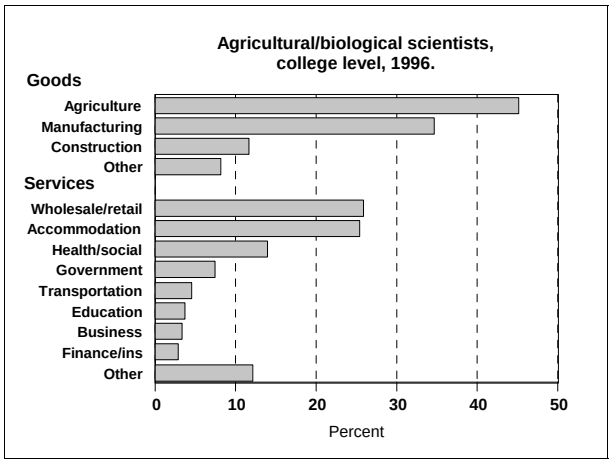
- College-qualified social scientists reported an unemployment rate of 8.9% in 1996, slightly above the 8.5% reported by all college graduates in the labour force. The gap between social scientists and their colleagues was somewhat greater among Bachelor graduates: social scientists had an unemployment rate of 6.5%, one percentage point higher than the 5.5% reported for all Bachelor degree holders in Canada's labour force. Among the Master's-qualified cohort, social scientists reported an unemployment rate of 5.3%, compared with 4.8% for all Master's degree holders.
- The Doctorate-qualified social scientists enjoyed a lower unemployment rate of 3.0%, compared with 3.8% for all Doctorate degree holders in Canada's labour force.

Agricultural and Biological Scientists

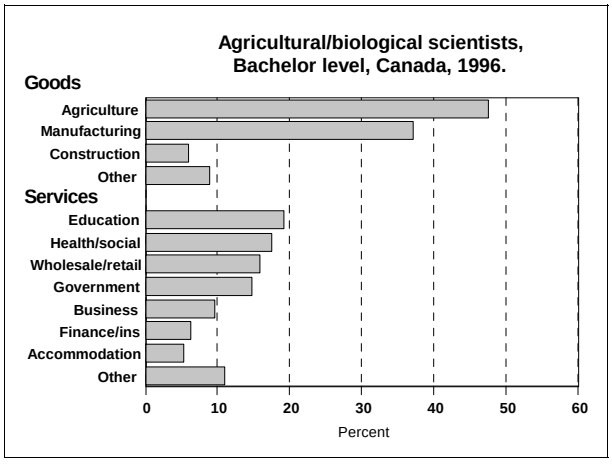
Industry of employment



- There were 428,230 agricultural/biological scientists[2] (FOS 221-266) in Canada's work force in 1996. Three in five reported a college credential, and one quarter had a Bachelor degree. Not many reported a graduate-level degree — 5% had a Master's degree and 3% a Doctorate.
- Almost one quarter (24%) of the college-qualified agricultural/ biological scientists/technologists were in goods-producing industries, and more than half (56%) were in services.
- As might be expected, most of the 62,840 college graduates working in the goods-producing sector were in agriculture (45%), and more than one third (35%) were in manufacturing industries. Within manufacturing, most (one third or so) were in food product industries, and about one in ten were in clothing industries.



- At least one quarter of the 143,620 college graduates with agricultural/biological expertise reported in the services sector were in wholesale/retail trade. Accommodation industries ranked second with a 26% share. Health/social services attracted 14% and government services 8%.
- More than one in five of the 106,585 agricultural/ biological scientists with a Bachelor degree were in goods-producing industries, and at least three in five were in services-producing industries.



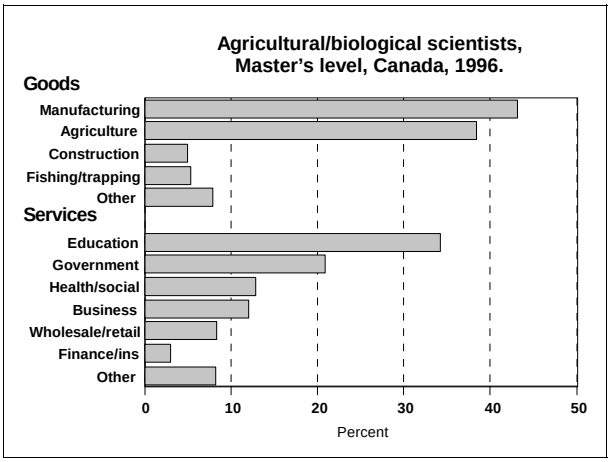
- Close to half (48%) of the 23,835 Bachelor-qualified agricultural/biological scientists in goods-producing industries were in agriculture industries. More than one third (37%) were in manufacturing industries. Among those in manufacturing industries, chemical products and food products accounted for most of them (each with 27% to 28% shares).
- It was education services which used most (19%) of the 67,295 Bachelor-qualified scientists reported in the services sector. Not far behind were industries like health/social services (18%), wholesale/retail trade (16%) and government services (15%). Close to one in ten were in business services (one third of those in business services were in engineering/scientific/ technical services).
- There were 20,630 agricultural/biological scientists with a Master's degree. Fifteen percent of them were reported in goods-producing industries, and more than two thirds (69%) in the services sector.
- At the Master's level, it was manufacturing which attracted the largest share (at least two in five) of the 3,030 agricultural/biological scientists reported in goods-producing industries. More than one third of those reported in manufacturing were in chemical products industries, and at least one quarter were in food products.

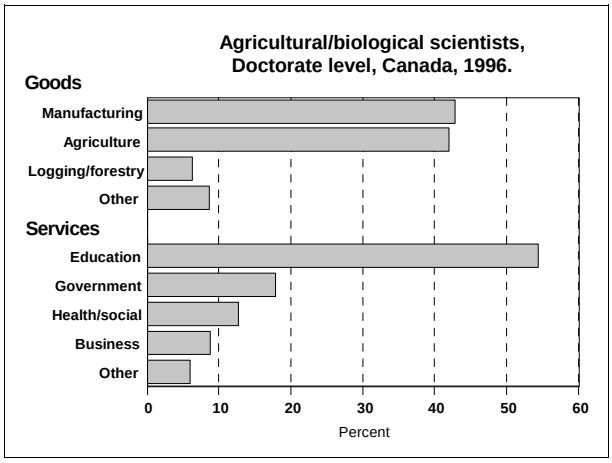
---

[2] Includes technologists/technicians.

Agricultural and Biological Scientists

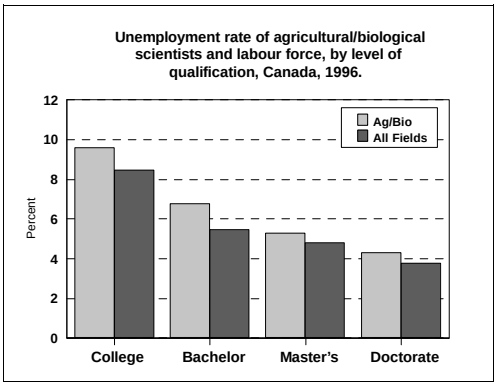
- Education services accounted for most of the 14,260 agricultural/biological Master's graduates reported in service-producing industries. At least one in five were in government services, and more than one in ten were in health/social services or business services. Of those in business services, half were reported in engineering/scientific/technical services.
- One in ten of the 12,085 agricultural/biological scientists with a Doctorate degree were in goods-producing industries, while three quarters were in the services sector.
- Manufacturing industries accounted for more than two in five of the 1,270 Doctorate-qualified agricultural/biological scientists reported in goods-producing industries. Within the manufacturing industries, most of them were in chemical products (more than half) and food products (one quarter). Taken together, natural resource-based industries (agriculture and related industries with 42%, logging/forestry with 6%) accounted for almost half of the Doctorate-qualified agricultural/biological scientists in goods-producing industries.
- Fifty-five percent of the 9,250 agricultural/biological Doctorate graduates in the services sector were in education services. The next largest shares were found in government services (18%) and health/social services (13%).





Unemployment

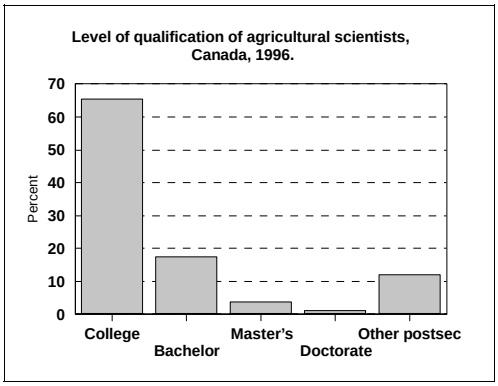
- Among agricultural/biological scientists, the higher the level of qualification the lower the unemployment rate.
- Regardless of level of qualification, the unemployment rates of agricultural/biological scientists were higher than the national average. The unemployment rate of agricultural/biological college graduates was 9.6% in 1996 compared with 8.5% for all college graduates in Canada's labour force.
- The greatest gap in unemployment between people with agricultural/biological expertise and the labour force as a whole was at the Bachelor level — the unemployment rate for agricultural/biological Bachelor graduates was 6.8% compared with only 5.5% for Bachelor graduates across Canada.



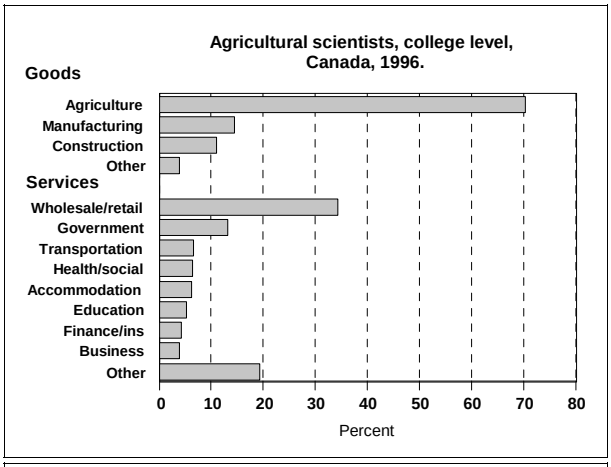
- The gaps were narrower at the graduate level. Agricultural/biological Master's graduates had an unemployment rate of 5.3% compared with the national figure for Master's graduates of 4.8%. The unemployment rate for agricultural/biological Doctorate graduates was 4.3% compared with 3.8% for all Doctorate graduates.

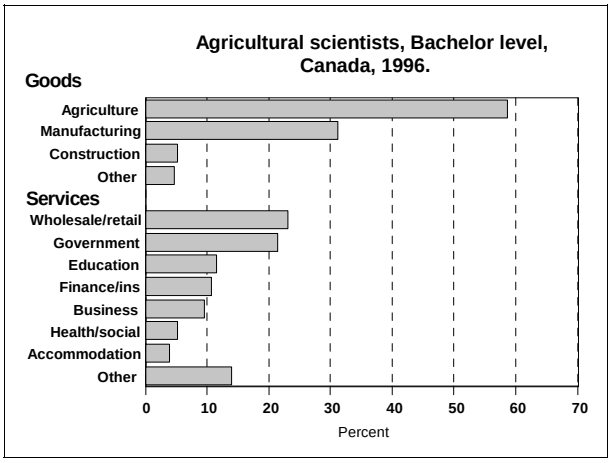
Agricultural Scientists

Industry of employment



- Almost two thirds of the 117,565 agricultural scientists[3] (FOS 221-238) had a college credential. Close to one in five (18%) had a Bachelor degree. Few had a graduate degree — 4% reported a Master's degree and 1% a Doctorate.
- Close to half (46%) of the 76,960 agricultural scientists with a college credential were in goods-producing industries, and 39% were in the services sector.
- As might be expected, seven in ten of the 35,630 college-qualified agricultural scientists were in agriculture industries. Manufacturing ranked second, utilizing 15% of them (more than one quarter of them were in food products). At least one in ten were in construction.
- Wholesale/retail trade attracted the largest share (34%) of the 30,175 college-qualified agricultural scientists working in the services sector. The next largest share was in government services (13%).
- More than one third (36%) of the 20,665 Bachelor-qualified agricultural scientists were in goods-producing industries and 49% were in the services sector in 1996.
- Again it was agriculture industries which attracted the largest share of the 7,535 agricultural scientists with a Bachelor degree working in goods-producing industries — 59%. Manufacturing attracted the second largest share at 31%. Within manufacturing, at least half were in food products, and one in five were in chemical products.
- There were two industries which accounted for at least one in five of the 10,155 Bachelor-qualified agricultural scientists working in the services sector: wholesale/retail trade with 23%, and government services with 22%. At least one in ten were in education services or finance.
- Close to one quarter (23%) of the 4,490 agricultural scientists with a Master's degree were in goods-producing industries, and 61% were in the services sector.



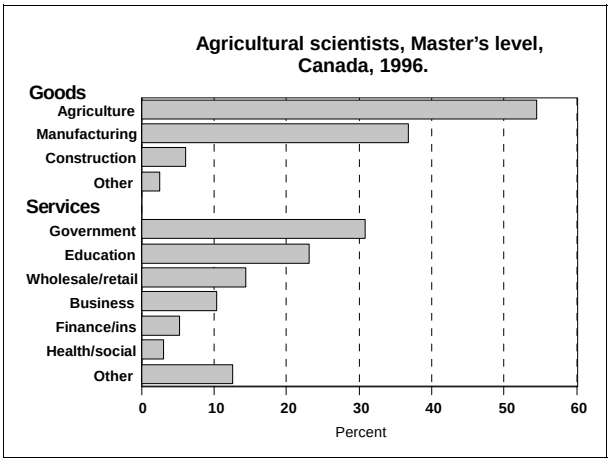


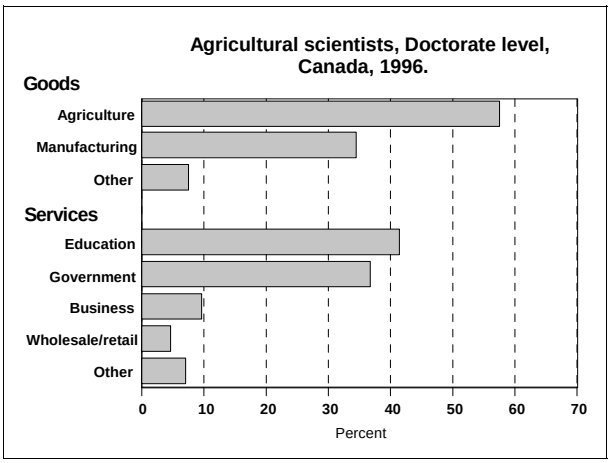
- The trend seen at the college level and Bachelor level continued: agriculture industries accounted for more than half of the 1,045 Master's-qualified agricultural scientists working in goods-producing industries, followed by manufacturing with a 37% share. Within manufacturing, more than half (53%) were in food products and one in ten were in chemical products.
- Government services utilized the largest share (31%) of the 2,715 Master's-qualified agricultural scientists working in the services sector, followed by education services accounting for 23%. At least one in ten could be

[3] Includes technologists/technicians.

found in wholesale/retail trade or business services. Of those in business services, two in five were in engineering/scientific/technical services.

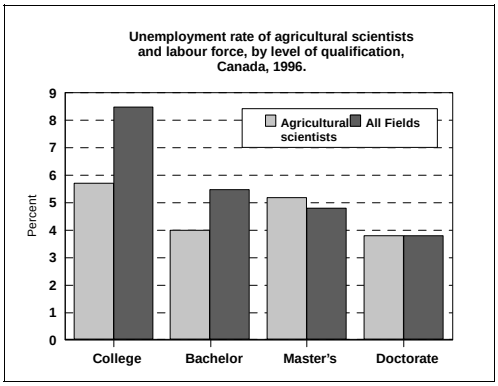
- About one in five of the 1,390 agricultural scientists with a Doctorate were in goods-producing industries, and 69% were in the services sector.
- More than half of the 260 or so Doctorate-qualified agricultural scientists working in goods-producing industries were in agriculture/related industries, followed by 35% found in manufacturing industries. Within manufacturing, two in five were either in food products or chemical products.
- At least two in five of the 965 agricultural scientists with a Doctorate working in the services sector were in education services. The second largest share was in government services (37%), and at least one in ten were in business services (half of them in engineering/scientific/ technical services).





Unemployment

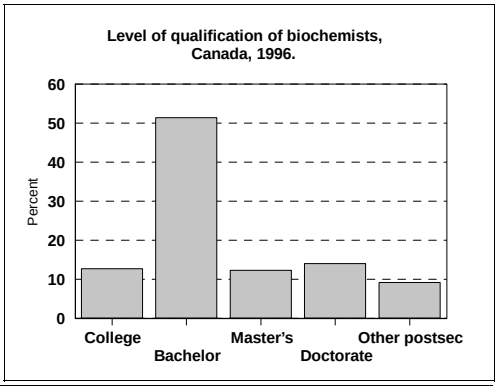
- At the college and Bachelor level of qualification, agricultural scientists enjoyed lower unemployment than the national average. For people with a college qualification, agricultural scientists reported an unemployment rate of only 5.7%, compared with a national average for college graduates of 8.5%.
- For Bachelor-equipped agricultural scientists, the unemployment rate of 4.0% was also lower than the 5.5% reported for all Bachelor graduates in the labour force in Canada in 1996.
- It was among those with a Master's degree where the unemployment rate of agricultural scientists crept above the national average: 5.2% for agricultural scientists and 4.8% for all Master's graduates across Canada, whereas the 3.8% unemployment reported by Doctorate-qualified agricultural scientists matched the national average.



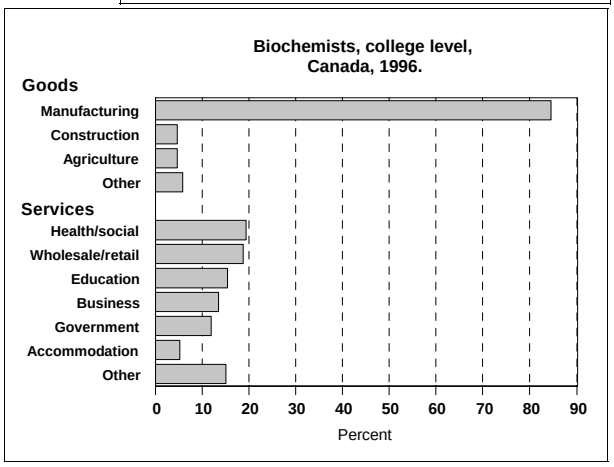
Biochemists

Industry of employment

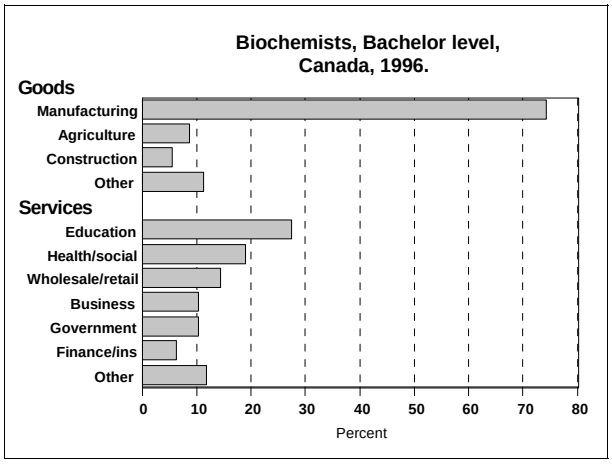
- There were some 19,000 biochemists (FOS 239) in the work force in Canada in 1996. Slightly more than one in ten had a college credential. At least one in every two had a Bachelor degree and more than one quarter had a graduate-level degree (12% a Master's degree and 14% a Doctorate).



- Among the 2,405 biochemists reporting a college credential as their highest formal qualification, 18% were in goods-producing industries and 69% were in services-producing industries.
- Almost all of the 425 college-qualified biochemists in the goods-producing sector were in manufacturing industries (85%), with a few found in agriculture or construction. Within manufacturing, most were in chemical products industries (about one third) or in food products industries (about one in five).
- There were 1,670 biochemists with college training working in the services sector. Health/social services and wholesale/retail trade each attracted about one in five. Between 13% and 16% were in educational services, business services or government services. Within business services, at least half were in engineering/scientific/technical services and only 7% were in computer services.



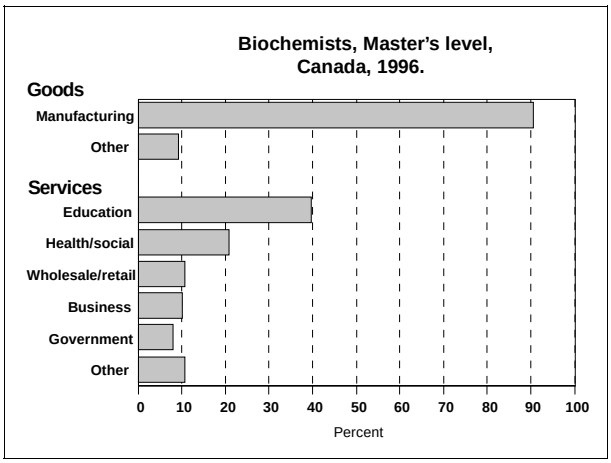
- There were 9,710 biochemists in the work force in 1996 with a Bachelor degree. Again, the majority were in services industries (70%), with 16% in the goods-producing sector.
- Manufacturing industries utilized three quarters of the 1,595 Bachelor-qualified biochemists in the goods-producing sector. Slightly fewer than one in ten could be found in agriculture industries. Among those in manufacturing industries, chemical products industries attracted at least half, and around one in ten were in food products industries or paper/publishing/allied industries.
- More than one quarter (28%) of the 6,770 Bachelor-ualified biochemists in services industries were in education services, with the next largest share in health/social services (close to one in five). There were 14% in wholesale/retail trade. Business services and government services each attracted about one in ten of them. Close to half (47%) of those in business services were in engineering/scientific/technical services, and 17% were in computer services.

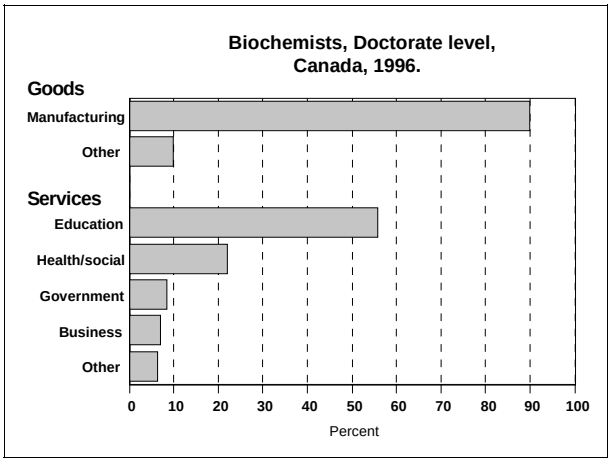


- At least seven in ten of the 2,335 biochemists with a Master's degree were in the services sector, and just under one in ten were in the goods-producing sector.
- Of the 215 Master's-qualified biochemists in goods-producing industries, almost all of them were in manufacturing industries (at least nine in ten). A few were reported in agriculture industries or construction. Within

manufacturing, they were utilized principally by chemical products industries (two thirds of them), whereas about one in ten were in food products industries or electrical/electronic products industries.

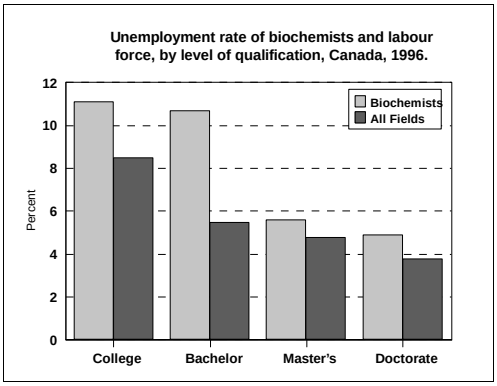
- Two in five of the 1,670 Master's-qualified biochemists in services industries were in educational services, and at least one in five were in health/social services. One in ten were in wholesale/retail trade or business services. Again, most of those in business services were in engineering and engineering/scientific/ technical services (42%) and 15% were in computer services.
- In 1996, there were 2,680 biochemists with a Doctorate. Almost four in five of them were in the services sector, with only 7% in the goods-producing sector.
- Of the 200 Doctorate-qualified biochemists in goods-producing industries, nine in ten were in manufacturing industries Chemical products industries attracted most of those reported in manufacturing (72%) and about one in ten were in food products industries.
- More than half (56%) of the 2,105 Doctorate-qualified biochemists in the services sector were in education services, and at least one in five were in health/social services. Slightly fewer than one in ten were in government services. Only 7% were in business services (at least three quarters of them were in engineering/scientific/ technical services).





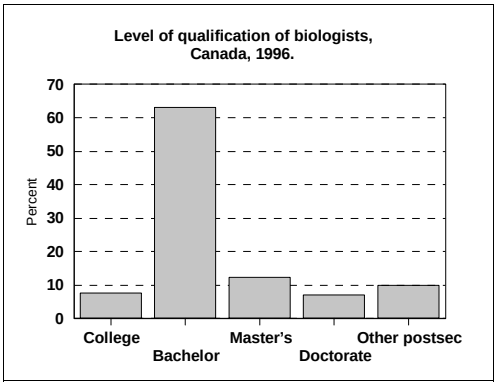
Unemployment

- In 1996, biochemists suffered higher unemployment than their colleagues across the economy, regardless of level of qualification.
- Biochemists with a college credential had an unemployment rate of 11.1%, compared with 8.5% for college graduates across the Canadian economy.
- The picture did not improve for those with a university degree. Biochemists with a Bachelor degree had an unemployment rate almost double that of their colleagues overall: for biochemists, it was 10.7%, but for all Bachelor graduates in Canada, it was only 5.5%. Biochemists with a Master's degree had an unemployment rate of 5.6% in 1996, compared with 4.8% for all Master's degree holders in Canada. Even at the Doctorate level, biochemists showed higher unemployment than the Canadian average for Doctorate degree holders: 4.9% versus 3.8%.

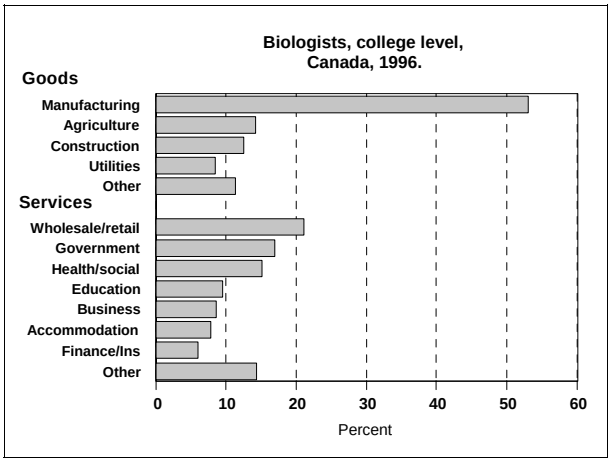


Biologists

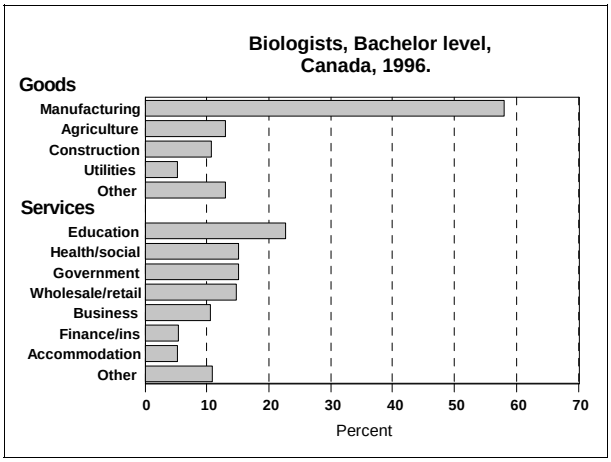
Industry of employment



- In 1996, there were 64,940 biologists (FOS 240-244) in the work force in Canada. Slightly fewer than one in ten had a college credential. Sixty-three percent reported a Bachelor degree, and almost one in five had a graduate-level degree (12% a Master's degree and 7% a Doctorate).
- Of the some 5,000 biologists with a college credential, close to one in five (18%) were in goods-producing industries and 68% were in the services sector.
- More than half (53%) of the 875 biologists working in goods-producing industries were in manufacturing. Within the manufacturing industries, they tended to be in chemical products (20%) or food products (14%). Agriculture industries accounted for the second largest share of 14%, followed by construction with 13%.



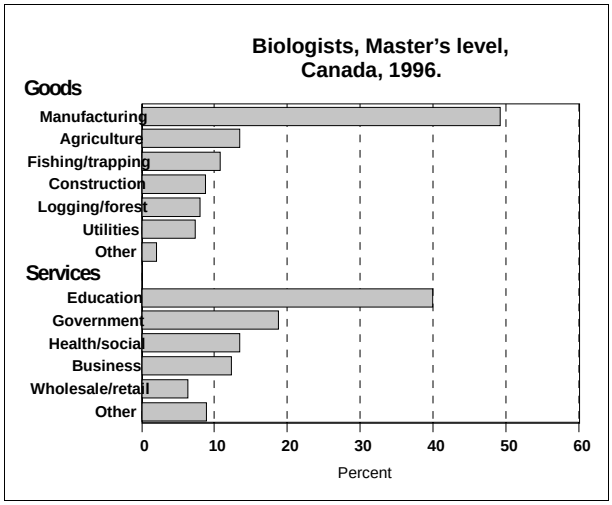
- About 3,300 of the college graduates were in the services sector. It appears that their training provided flexibility for them to work in a range of service industries. In the lead was wholesale/retail trade, where at least one in five were working. Between 15% and 17% were either in health/social services or government services. Some one in ten were in education services or business services. Within business services, about two in five were in engineering/ scientific/technical services and one in ten were in computer services.
- There were 41,070 biologists who reported a Bachelor degree as their highest qualification in 1996. Fifteen percent of them were in goods-producing industries, and almost three quarters (73%) of them were in the services sector.

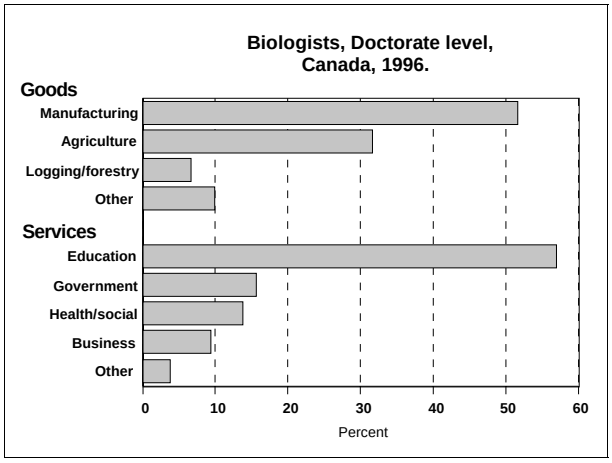


- Fifty-eight percent of the 6,195 Bachelor-qualified biologists in goods-producing industries were in manufacturing. They were reported in chemical product industries (29%), while food product industries utilized 17% of those in manufacturing, and printing/pub- lishing/allied industries 10%. Besides manufacturing, more than one in ten of those in goods- producing industries were in agriculture/related industries (13%) or construction (11%).
- Close to one quarter (23%) of the 30,175 Bachelor-trained biologists reported in the services sector were in education services. About 15% were in health/social services, government services or wholesale/retail trade. At least one in ten were in business services (two in five of them were in engineering/scientific/ technical services and some one in five were in computer services).
- One in ten of the 7,915 biologists with a Master's degree were in goods-producing industries, with three quarters in the services sector.

Biologists

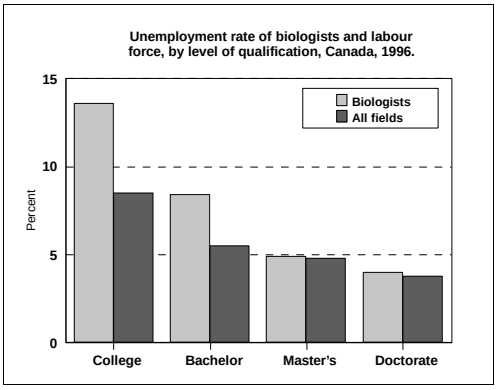
- As with the other levels of qualification examined, for biologists with a Master's degree, it was manufacturing which utilized most of the 740 in goods-producing industries — 49%. Most of those in manufacturing were in chemical product industries (46%), with close to one in ten in food products. In the goods-producing sector, agriculture utilized 14% of them, with 11% in fishing/trapping.
- Two in five of the 6,020 biologists with a Master's degree working in the services sector were in education services. The next largest shares were found in government services (19%), health/social services (14%) or business services (12%). More than half (56%) of those in business services were in engineering/ scientific/technical services and about one in ten were in computer services.
- Few of the 4,615 biologists with a Doctorate degree were in goods-producing industries — only 7%, and half of them were in manufacturing. Again, as with their Master's-qualified colleagues, Doctorate graduates working in manufacturing industries were captured for the most part by chemical products (61%), and 16% were in food products.
- There were 3,815 biologists with a Doctorate degree in the services sector, and 57% of them were in education services. Smaller shares were in industries like government (16%) or health/social services (14%). Just under one in ten were in business services and, of those, three quarters were in engineering/scientific/ technical services.





Unemployment

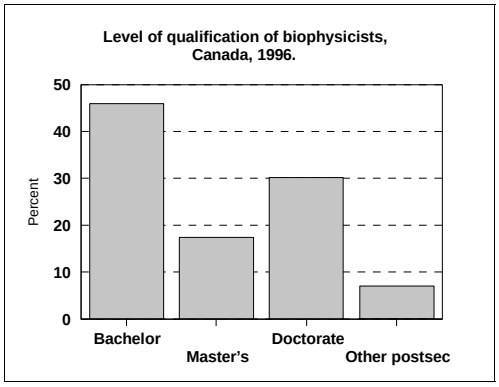
- At each level of qualification, biologists had higher unemployment rates in 1996 than their colleagues in the economy in general.
- The largest gap was at the college level, where the unemployment rate for biologists was 13.6%, compared with only 8.5% for all college graduates in Canada.
- The gap was also substantial between biologists with a Bachelor degree compared with all Bachelor graduates in Canada — 8.4% versus 5.5%.
- Among those with graduate-level degrees, unemployment rates of biologists were similar to their colleagues across the economy. For biologists with a Master's degree, in 1996 their unemployment rate was 4.9%, compared with 4.8% for all Master's degree holders in Canada. And among Doctorate degree holders, for biologists the unemployment rate was 4.0%, compared with 3.8% for the economy overall.



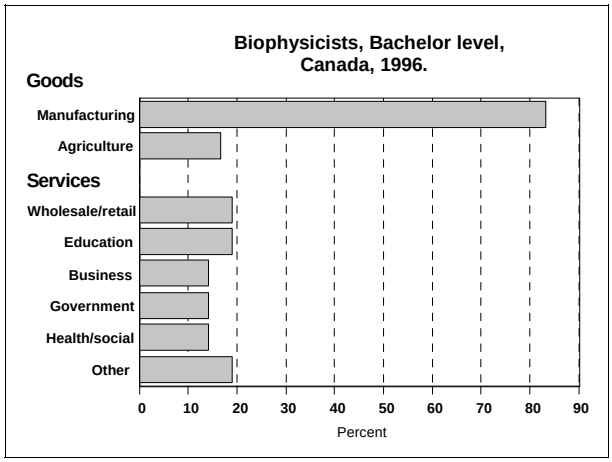
Biophysicists

Industry of employment

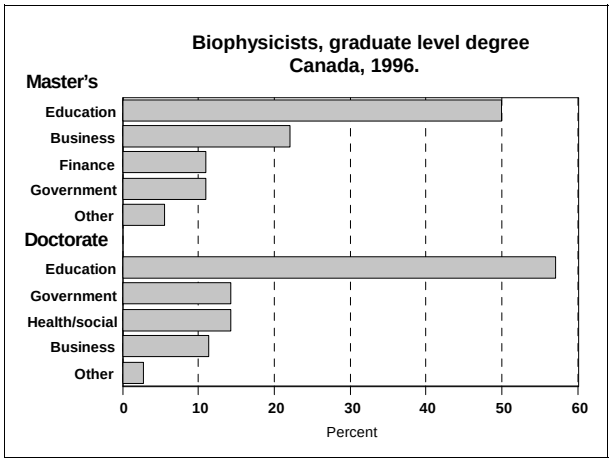
- There were not many biophysicists (FOS 245) in Canada — only some 630. All had university credentials. Almost half of them (46%) had a Bachelor degree but an even larger percentage reported a graduate-level degree — 48% (18% had a Master's degree and 30% had a Doctorate).



- Of the 300 or so biophysicists with a Bachelor degree, about one in five were in goods-producing industries and 72% were in services-producing industries.
- Almost all of the 60 or so Bachelor-qualified biophysicists working in goods-producing industries were in manufacturing industries (83%); the rest were reported in agriculture industries.



- Of the 210 or so Bachelor-qualified biophysicists reported in the services sector, it appears they appealed to a wide range of service industries. Most were reported in wholesale/retail industries or education, with slightly fewer than one in five reported in each. More than one in ten were reported in business services, government or health/social services. Almost all of those in business services were in computer services.
- One in ten of the 110 or so biophysicists with a Master's degree were in goods-producing industries; four in five of them were in services.
- Of the 90 or so in the services sector, about half of them were in education, and at least one in five were in business services. In business services, most of them were in computer services.

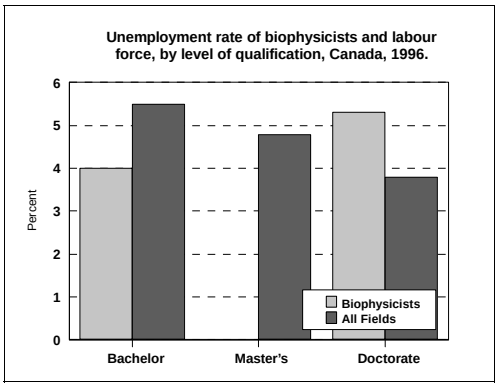


- This is one of the rare fields of expertise in S&T where the number of graduates with a Doctorate degree outnumber those with a Master's degree. There were 190 biophysicists with a Doctorate. Almost no one was reported in goods-producing industries; at least nine in ten were in services-producing industries.
- Of the 175 Doctorate-qualified biophysicists working in the services sector, the largest share were working in education services (57%). Unlike other S&T fields, few of the biophysicists with a Doctorate degree were in business services — only one in ten or so. Those in business services were typically in engineering/scientific/technical services.

Biophysicists

Unemployment

- Biophysicists enjoyed lower unemployment than other S&T knowledge workers in Canada's labour force in 1996 when level of qualification is considered. For a biophysicist with a Bachelor degree, the unemployment rate was only 4.0%, compared with a Bachelor graduate national average of 5.5%.

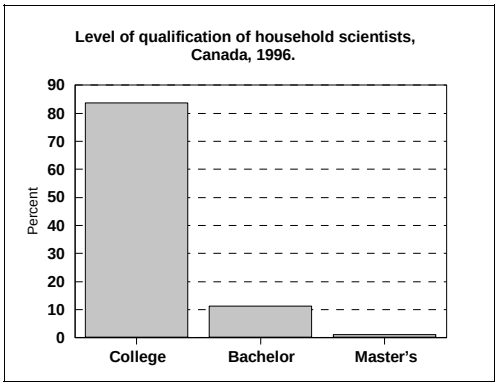


- There weren't many biophysicists with a Master's degree. However, the figures indicate they enjoyed full employment, compared with 4.8% unemployment reported for Canada's Master's-qualified labour force overall.
- The biophysicists with a Doctorate outnumbered those with a Master's degree, and they suffered higher than average unemployment in 1996. The unemployment rate of biophysicists with a Doctorate was 5.3%, compared with 3.8% for all Doctorate degree holders.

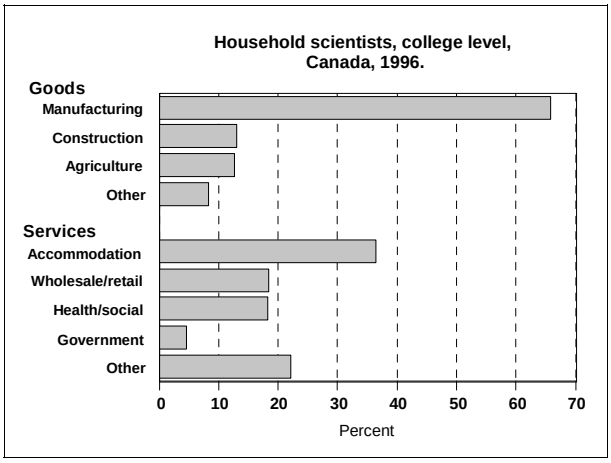
Household Scientists

Industry of employment

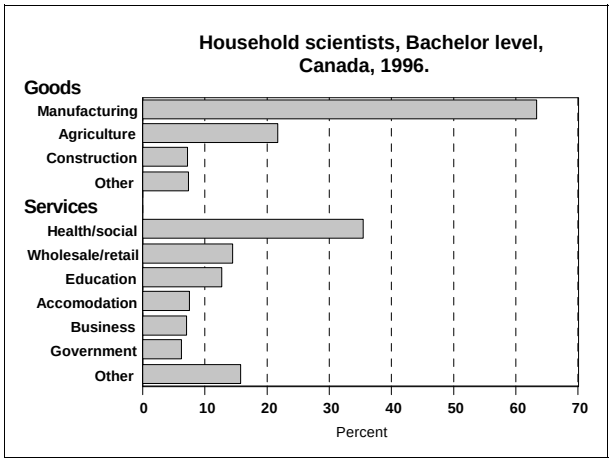
- There were 169,410 household scientists[4] (FOS 249-254) in Canada in 1996. At least four in five (84%) had a college credential, with around one in ten or so having a university degree (11% had a Bachelor degree and 1% a Master's degree; fewer than 1% reported a Doctorate).



- Some one in ten (12%) of the 141,655 college graduates were in goods-producing industries, and 63% were in services industries.
- Two thirds of the 17,145 college graduates in goods-producing industries were in manufacturing; at least one in ten were in agriculture or construction. Within manufacturing, it was food products which utilized one quarter of the college graduates, and clothing industries utilized one in five.



- Over one third of the 89,820 college graduates in service industries were in accommodation services, which includes food and beverage industries. Wholesale/retail trade and health/social services accounted for 18% each.
- Just under one in ten of the 19,325 Bachelor degree holders were in goods-producing industries, and just over two thirds were in services-producing industries.
- As with their college-trained colleagues, most of the 1,655 Bachelor graduates in goods-producing industries were in manufacturing. The only other industry which attracted a large share (at least one in five) was agriculture. Within manufacturing, food industries accounted for 30% of the Bachelor graduates, chemical products 17%, and clothing industries 11%.
- There were 13,085 people with a Bachelor degree working in services, and most of them (35%) were in health/social services. Another 15% were in wholesale/retail trade and 13% were in educational services. Within the small share (fewer than one in ten) in business services, only one in ten or so were in engineering/ scientific/technical services.

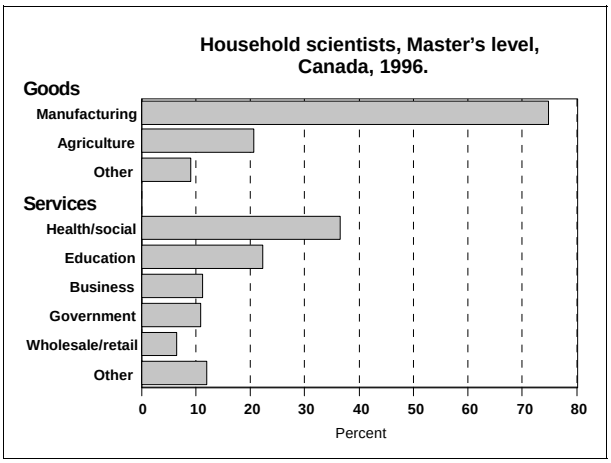


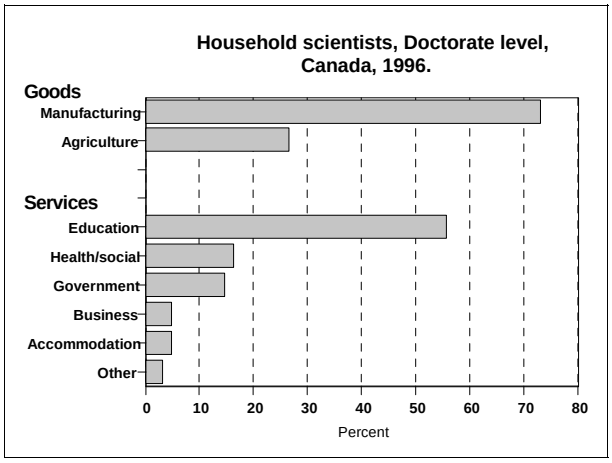
- In 1996, there were 1,835 people with a Master's degree. Only 13% were in goods-producing industries and 67% in services.
- Three quarters of the 240 found in goods-producing industries were in manufacturing, with food products accounting for half of the group in manufacturing. One in five were in agriculture.

[4] Includes technologists/technicians.

Household Scientists

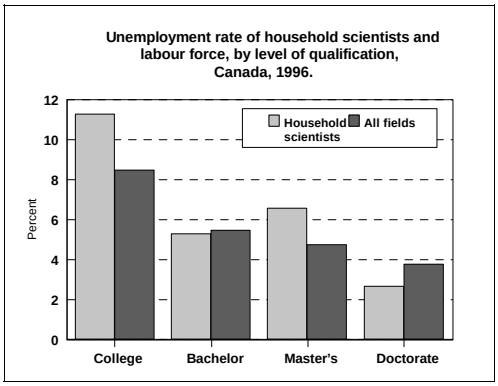
- At least two thirds (37%) of the 1,230 Master's graduates working in services-producing industries were in health/social services, with another one in five in educational services. Business services (with most in engineering/scientific/technical services) and government services each attracted at least one in ten of them.
- As mentioned earlier, there were few people with a Doctorate — some 420. One in five of them were in goods-producing industries, and 73% in services-producing industries.
- Among the 75 Doctorate degree holders in goods-producing industries, three quarters of them were in manufacturing and the other one quarter were in agriculture industries. In manufacturing, they were generally in food products or chemical products.
- There were 305 people with a Doctorate working in the services sector, and more than half (56%) of them were in education services. Health/social services and government services each accounted for about 15-16%.





Unemployment

- Depending on the level of qualification, household scientists at times showed lower unemployment rates (Bachelor-qualified and Doctorate-qualified) than the national average, and at times, higher rates (college level and Master's degree).
- In 1996, household scientists with a college credential reported an unemployment rate of 11.3%, considerably higher than the 8.5% reported by all college graduates across Canada's economy.
- Household scientists with a Bachelor degree reported a slightly lower unemployment rate than Bachelor graduates overall in the labour force: 5.3% versus 5.5%. But then, the household scientists with a Master's degree had a considerably higher unemployment rate (6.6%), compared with all Master's graduates in Canada's labour force (4.8%).

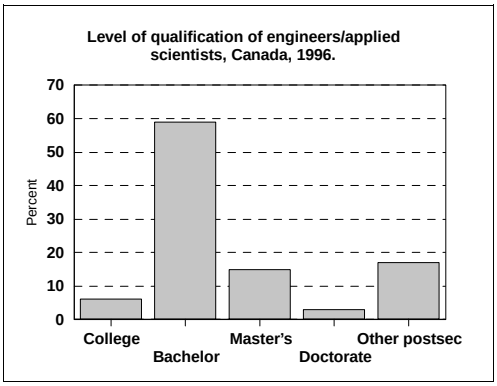


- Among those with a Doctorate degree, household scientists reported a lower than national average unemployment rate — 2.7% for household scientists, compared with 3.8% for all Doctorate degree holders.

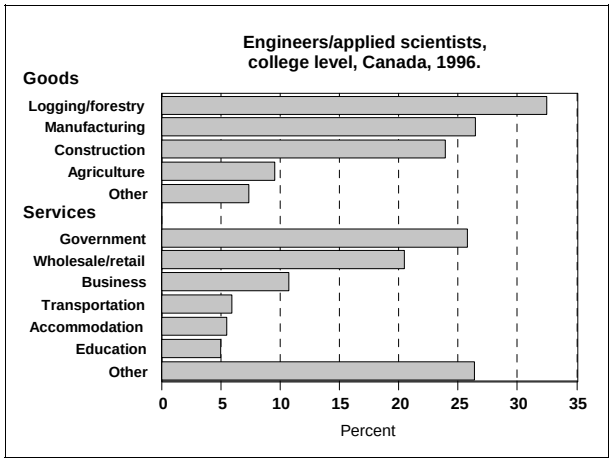
Engineers and Applied Scientists

Industry of employment

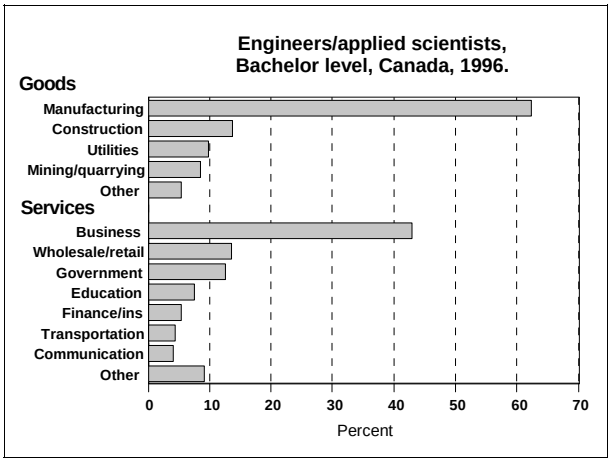
- In 1996, there were 373,625 engineers/applied scientists[5] (FOS 267-301). Few reported a college credential as their highest qualification — only 6%. Sixty percent of the engineers/applied scientists reported a Bachelor degree, 15% a Master's degree, and 3% a Doctorate degree.



- Goods-producing industries and services-producing industries had almost the same share of college-trained engineers/ applied scientists: 44% in goods and 47% in services.
- One third of the 9,140 engineers/applied scientists in goods-producing industries were in logging/forestry industries. About one quarter of them were reported in manufacturing or construction. Of those reported in manufacturing, more than one third were in wood industries, and the second largest share of 16% were in paper/allied products.



- One quarter of the 9,610 college-qualified engineers/ applied scientists in the services sector were in government services. At least one fifth were in wholesale/retail trade. Only some one in ten were in business services, and almost all of them were in engineering/scientific/technical services, with a few in computer services.
- There were more than 220,000 engineers/applied scientists with a Bachelor degree. One third of them were in goods-producing industries, and slightly more than half (52%) were in the services sector.
- At least three in five of the 75,010 Bachelor-trained engineers/applied scientists in goods-producing industries were in manufacturing. One quarter of those in manufacturing were in electrical/electronic products; the second largest share of 16% were reported in transportation equipment industries. At least one in ten were in construction, and just under one in ten were in utilities or mining/quarrying industries.

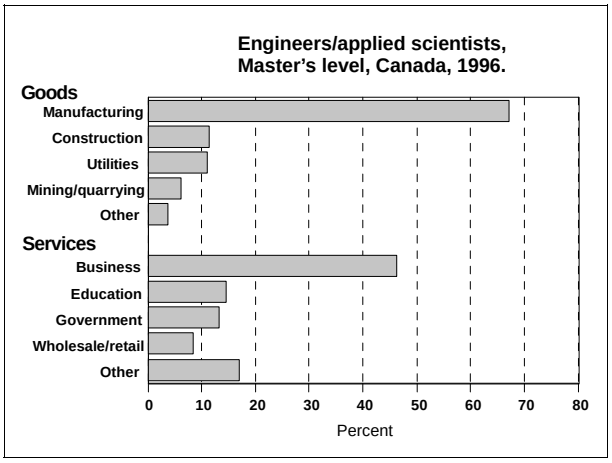


- There were some 115,000 Bachelor-equipped engineers/applied scientists in the services sector. Here, it was clear that business services attracted the lion's share (43%). At least one in ten were in wholesale/retail trade or government services. Of those in business services, seven in ten were in engineering/scientific/technical services, with 16% reported in computer services.
- Of the 57,300 engineers/applied scientists with a Master's degree, 27% were reported in goods-producing industries and 61% in the services sector.

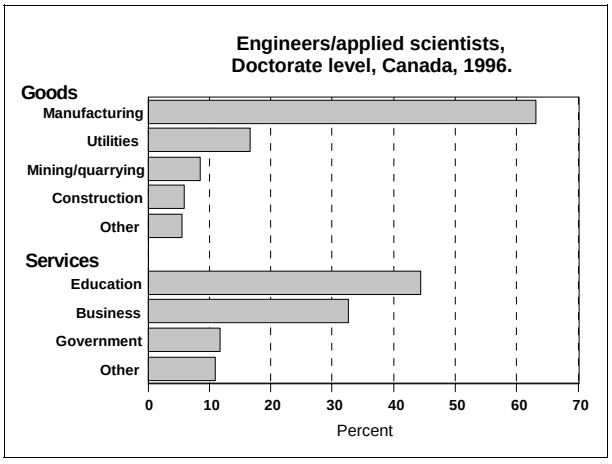
[5] Includes technicians/technologists.

Engineers and Applied Scientists

- Two thirds of the 15,575 reported in goods-producing industries were in manufacturing. Within manufacturing, the largest share of 31% were reported in electrical/electronic products and 18% in transportation equipment . At least one in ten of those in goods-producing industries were in construction or utilities.



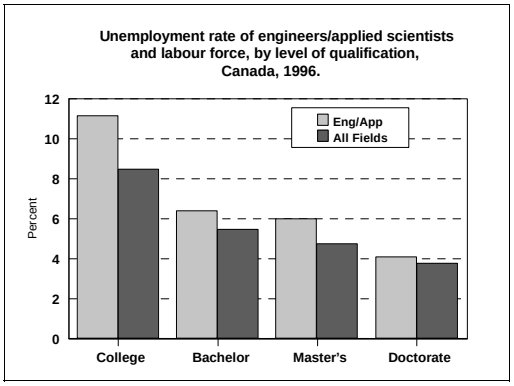
- Almost half (46%) of the 35,030 Master's-qualified engineers/applied scientists in the services sector were in business services, and most of those in business services (71%) were in engineering/ scientific/technical services, with only 16% in computer services. Some 13-14% were in government or education services.



- Only 16% of the 11,810 engineers/applied scientists with a Doctorate were in goods-producing industries, while 75% were reported in the services sector.
- Again, it was manufacturing which attracted most (63%) of the 1,875 Doctorate graduates working in goods-producing industries. Another 17% were reported in utilities. Of those in manufacturing, as with the other levels, most were reported in electrical/electronic products (41%), with the second largest share of 15% in transportation equipment.
- There were 8,810 Doctorate-qualified engineers/ applied scientists reported in services-producing industries. Most of the Doctorate graduates (44%) were in education, with the second largest share of one third reported in business services. Within business services, seven in ten were in engineering/ scientific/technical services, with some 15% in computer services. At least one in ten of those in the services sector were reported in government services.

Unemployment

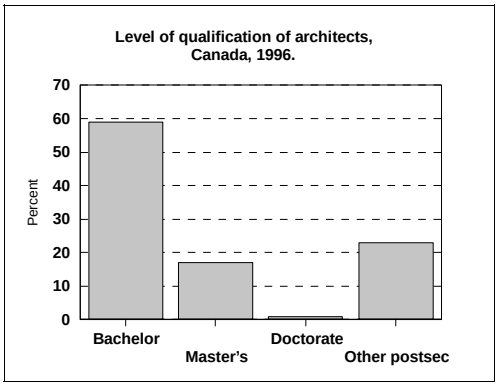
- Regardless of level of qualification, people with engineering/applied science expertise reported higher unemployment rates in 1996 than their counterparts across the economy. For the few with college credentials in engineering/applied science, the unemployment rate was 11.1%, considerably higher than the 8.5% reported by college graduates across the economy.



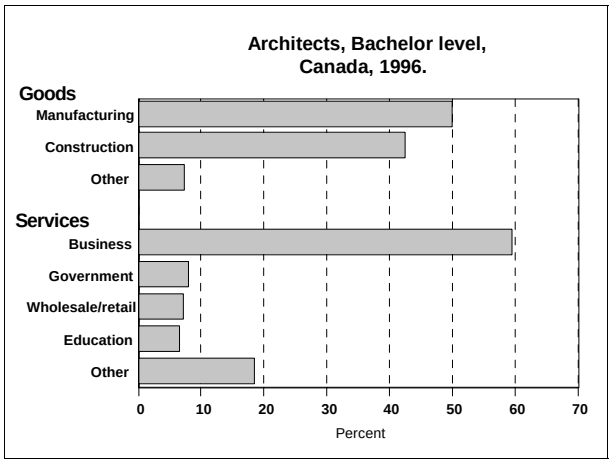
- The unemployment rate of Bachelor-qualified engineering/ applied scientists was 6.4%, compared with a national figure for Bachelor graduates of 5.5%. The gap was wider among Master's graduates — for those with engineering/applied science expertise the unemployment rate was 6.0%, compared with only 4.8% for all Master's graduates in Canada's labour force. It was among Doctorate graduates that the gap was narrowest — for those with engineering/applied science expertise, it was 4.1%, compared with 3.8% economy-wide.

Architects

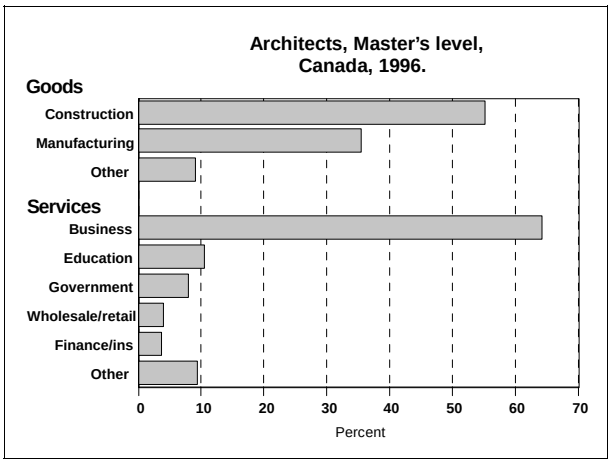
Industry of employment



- In 1996, there were 26,175 architects[6] (FOS 267-269) in Canada's work force. Most (59%) had a Bachelor degree as their highest qualification. Seventeen percent reported a Master's degree and only 1% reported a Doctorate degree.
- Slightly more than one in ten of the 15,535 architects with a Bachelor degree were in goods-producing industries, whereas three quarters of them were reported in services-producing industries.
- The almost 2,000 Bachelor-trained architects in goods-producing industries were shared basically by two industry groups — manufacturing accounted for 50% of them and construction for 43%. Within the manufacturing industries, they tended to be in industries like fabricated metal products, printing/publishing/allied industries, electric/ electronic products or transportation equipment, each of these accounting for anywhere from 10% to 14%.



- For the 11,510 architecture Bachelor graduates working in the services sector, business services clearly attracted most of them — 60% in 1996. Another 7-9% were in service industries like education, government or wholesale/retail trade. Of those working in business services, almost all (nine in ten) were reported in engineering/scientific/technical services.
- There were 4,335 architects with a Master's degree. Few of them (9%) were reported in goods-producing industries, while 80% were reported in services-producing industries.
- The 380 Master's-qualified architects reported in goods-producing industries were in either construction (a 55% share) or manufacturing (a 36% share). In manufacturing, they were typically reported in the electrical/ electronic products, printing/publishing/ allied products, furniture/fixtures products or leather/allied products industries.



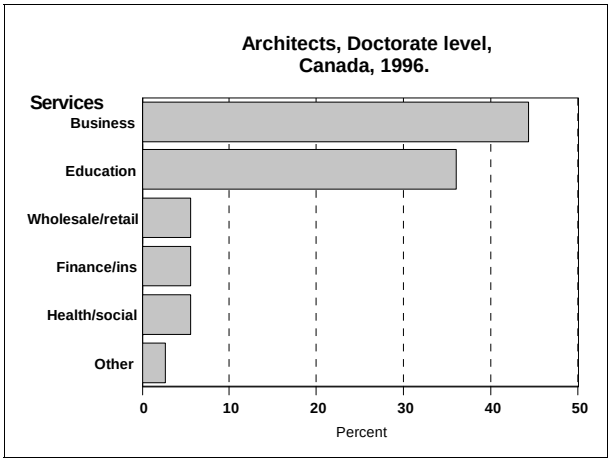
- In service industries, there were 3,485 architects, and as might be expected, most of them were in business services (64%). Some one in ten were in education and almost one in ten were in government services. And as with the Bachelor-qualified colleagues, almost all of the Master's-trained architects reported in business services were in engineering/scientific/technical services (nine in ten).
- There weren't many architects with a Doctorate reported in 1996 — 255. There weren't any reported in goods-producing industries, while 71% were in services-producing industries.

---

[6] Includes architectural engineers.

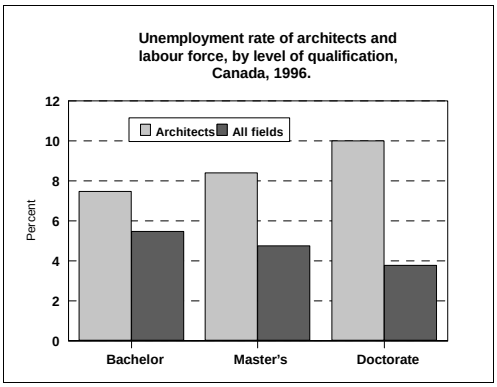
Architects

- Among the 180 or so in the services sector, the trend continued in that most of them (44%) were in business services, although at this level of qualification, education services accounted for more than one third as well. Predictably, within business services, nine in ten of the Doctorate-qualified graduates were in engineering/scientific/technical service industries.



Unemployment

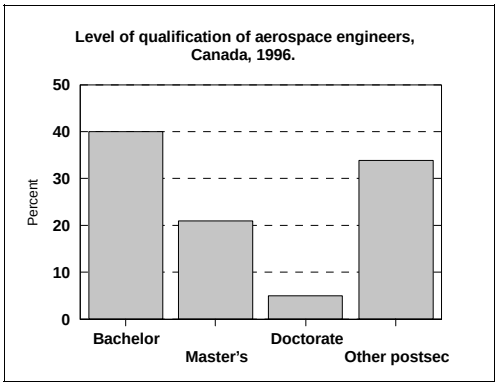
- Architects had much higher rates of unemployment in 1996 than national averages when level of qualification is considered. Moreover, the higher the degree level, the wider the gap between architects and the national average.
- Among Bachelor graduates, for architects the unemployment rate was 7.5%, compared with a national figure of 5.5%. At the Master's level, the unemployment rate of architects was 8.4%, compared with a national unemployment rate for all Master's graduates of 4.8%. However, at 10.0% unemployment in 1996, the unemployment rate of architects with a Doctorate was more than twice the average for all Doctorate degree holders in Canada's labour force, which was only 3.8%.



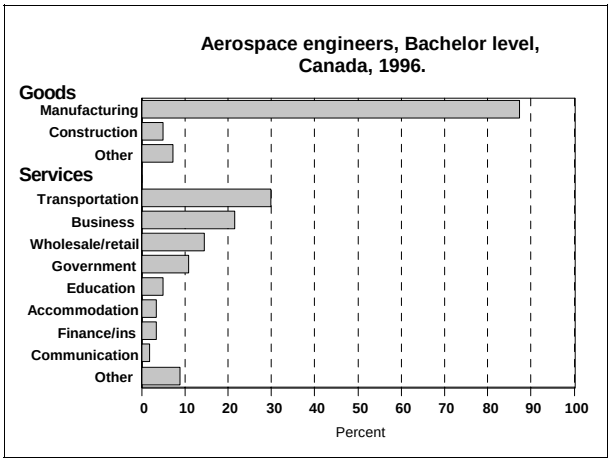
Aerospace Engineers

Industry of employment

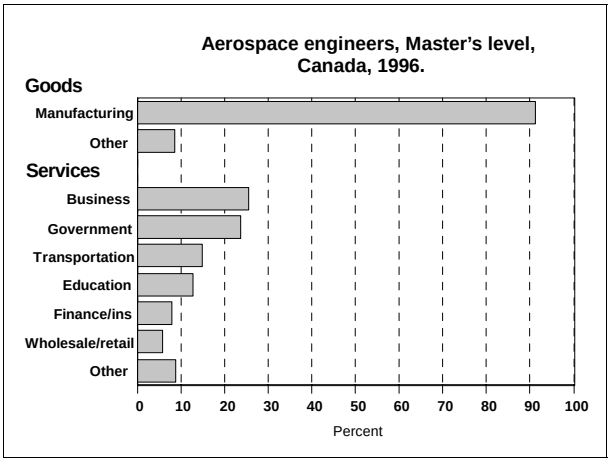
- In 1996, there were 5,000 aerospace engineers[7](FOS 270) in Canada's work force. Two in five of the aerospace engineers had a Bachelor degree. More than one quarter of them reported a graduate-level degree — 21% with a Master's degree and 5% with a Doctorate.



- One third of the 1,995 aerospace engineers with a Bachelor degree were in goods-producing industries, and half of them were in services-producing industries.
- Almost all of the aerospace engineers in goods-producing industries were in manufacturing (87%). Within manufacturing, they were concentrated in transportation equip- ment (61%), with about one in ten in electrical/ electronic products.
- The largest share of the 1,000 or so aerospace engineers in the services sector were in transportation industries (30%). At least one in five were in business services. More than one in ten were in wholesale/ retail industries or government services. At least half of those working in business services were in engineering/scientific/technical services, and about one in ten were in computer services.



- More than one third (38%) of the 1,060 aerospace engineers with a Master's degree were in goods-producing industries, and almost half (48%) were in services-producing industries.
- Again, almost all of the 400 aerospace engineers with a Master's degree in goods-producing industries were in manufacturing (91%). As with their Bachelor-equipped colleagues, most of the aerospace engineers with a Master's degree in manufacturing were in transportation equipment industries (77%), and about one in ten were in electrical/electronic products.
- About one quarter of the 505 Master's-qualified aerospace engineers in the services sector each were in either business services or government services. More than one in ten were in either transportation or education services. Close to 60% of those reported in business services were in engineering/scientific/technical services and about 15% were in computer services.

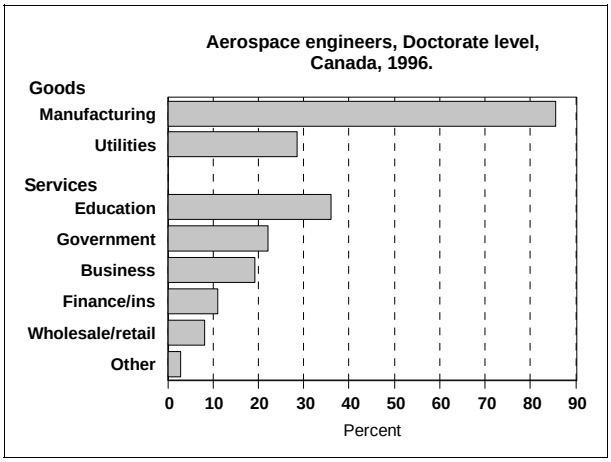


- There were only 245 or so aerospace engineers with a Doctorate in Canada's work force in 1996. Only 14% of them were in goods-producing industries, and 74% were in services-producing industries.
- Of the few aerospace engineers (about 35) with a Doctorate working in goods-producing industries, indications

[7] Includes aeronautical engineers.

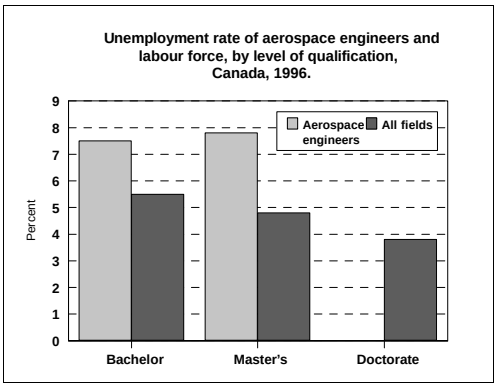
are that they were almost all in manufacturing (in transportation equipment industries); a few were reported in utilities.

- More than one third (36%) of the 180 or so Doctorate-equipped aerospace engineers in the services sector were in education services. At least one in five were in government services, and just under one in five were reported in business services. Around one in ten each were in either finance or wholesale/retail trade. Of those working in business services, about half were in engineering/scientific/ technical services, with hardly any in computer services.



Unemployment

- Aerospace engineers did not number many, and it appears they suffered higher unemployment than their counterparts across the economy when level of qualification is examined, except for those with a Doctorate. For example, aerospace engineers with a Bachelor degree had an unemployment rate of 7.5% in 1996, compared with only 5.5% for all Bachelor degree holders in Canada's labour force.

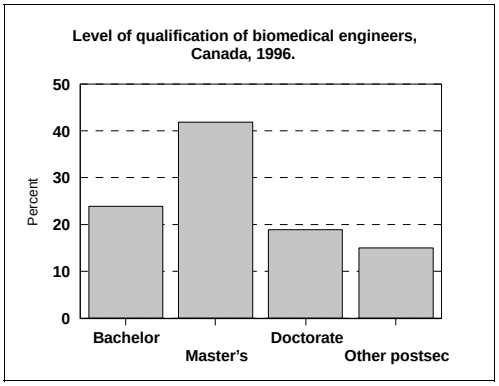


- The gap was even wider among Master's graduates: aerospace engineers had an unemployment rate of 7.8%, compared with only 4.8% for all Master's graduates in the labour force in Canada. The figures for aerospace engineers with a Doctorate are small, but it seems they enjoyed full employment, whereas the unemployment rate was 3.8% for all Doctorate graduates in Canada's labour force.

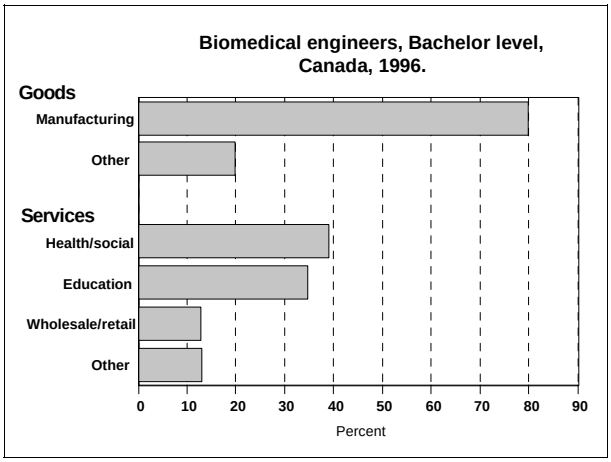
Biomedical Engineers

Industry of Employment

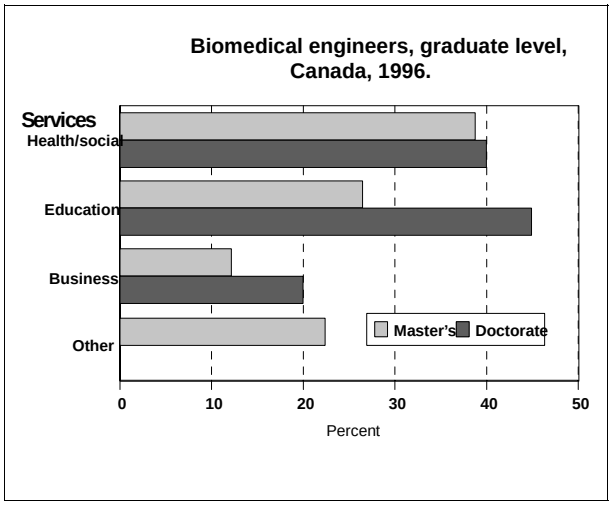
- There weren't many biomedical engineers[8] (FOS 272) reported in the 1996 Census — 685. About one quarter of them had a Bachelor degree. Two in five of the biomedical engineers reported a Master's degree and one in five a Doctorate.



- Of the 165 or so biomedical engineers with a Bachelor degree, about 15% were in goods-producing industries and 70% were in services-producing industries.
- It appears the 25 or so Bachelor-equipped biomedical engineers in goods-producing industries were in manufacturing (in electrical/electronic products or transportation or chemical products).
- Health/social services accounted for the largest share (39%) of the 115 or so Bachelor-equipped biomedical engineers working in the services sector. Education services accounted for at least one third of them, and small numbers were in wholesale/retail trade or business services (almost all of those in business services were in computer services).



- It was people with a Master's degree who dominated the biomedical engineering ranks. One in ten of the 285 biomedical engineers with a Master's degree were in goods-producing industries, and almost nine in ten were in services-producing industries.
- Of the 30 or so Master's-equipped biomedical engineers in goods-producing industries, almost all of them were in manufacturing.
- Health/social services accounted for 39% of the 245 biomedical engineers with a Master's degree working in the services sector. The next largest share of 27% were in education services, while at least one in ten reported business services. Computer services and engineer-ing/scientific/technical services shared those reported in business services.



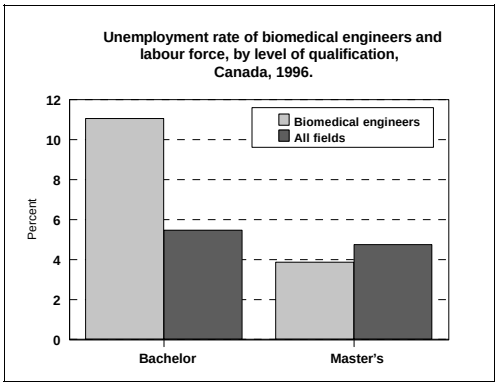
- There were 130 Doctorate-trained biomedical engineers, with no one reported in goods-producing industries and 77% reported in services-producing industries.
- The 100 or so biomedical engineers with a Doctorate reported in services-producing industries were shared by education services or health/social services, each accounting for about two in five, and the other one in five were in business services. Again, Doctorate-qualified biomedical engineers working in business services were shared almost evenly by computer services and engineering/scientific/technical services.

[8] Includes biological and clinical engineers.

Biomedical Engineers

Unemployment

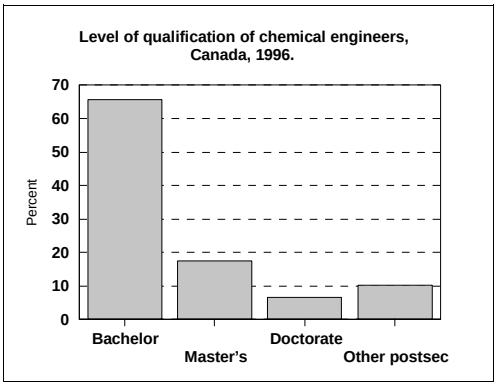
- The number of biomedical engineers was small and information on the unemployment rate is limited. Based on the information available however, it seems that biomedical engineers tended to have higher unemployment rates than the national average. An unemployment rate of 11.1% was calculated for biomedical engineers with a Bachelor degree, which compares with a 5.5% unemployment rate for all Bachelor graduates in Canada's labour force.
- Biomedical engineers with a Master's degree appeared to fare better. In 1996, they had an unemployment rate of 3.9%, compared with the 4.8% reported by all Master's degree holders in Canada's labour force. An unemployment rate for Doctorate-qualified biomedical engineers is not available.



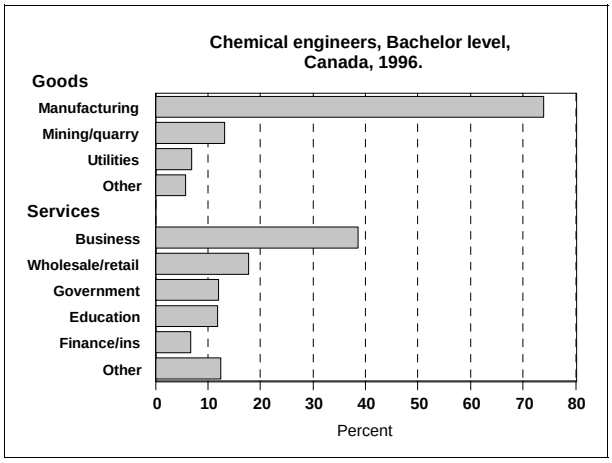
Chemical Engineers

Industry of Employment

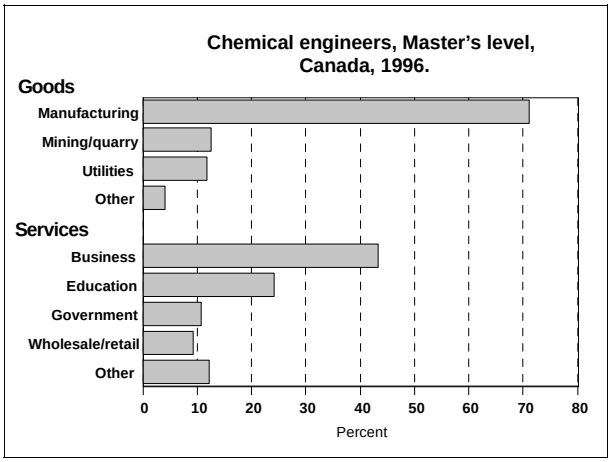
- In 1996, there were 23,035 chemical engineers (FOS 273) in Canada's work force. Two thirds of them had a Bachelor degree. About one quarter reported a graduate-level degree: 18% reported a Master's degree and 6% a Doctorate.



- Goods-producing industries and services-producing industries each utilized about the same share of the 15,155 chemical engineers with a Bachelor degree — 42%.
- Almost three quarters of the 6,330 Bachelor-qualified chemical engineers working in goods-producing industries were in manufacturing. More than one in ten were in mining and about 7% were in utilities. Almost one third of those in manufacturing industries were in chemical products, and more than one in ten were in paper/allied products.



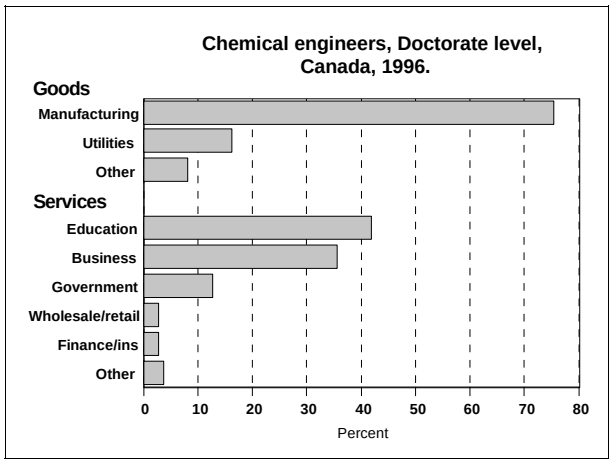
- It was business services which attracted the largest share of the 6,305 Bachelor-qualified chemical engineers working in the services sector — 39%. Eighteen percent of chemical engineers with a Bachelor degree reported in services-producing industries were in wholesale/retail trade. At least one in ten were in government or education services. Within business services, at least seven in ten of the chemical engineers with a Bachelor were in engineering/ scientific/technical services and one in ten were in computer services.
- Considering chemical engineers with a Master's degree, 35% were in goods-producing industries, while 50% were in services-producing industries.
- As with their Bachelor-qualified colleagues, for the 1,430 chemical engineers with a Master's degree, it was in manufacturing industries where most of them were found (71%). At least one in ten were in mining industries or utilities industries. As with their Bachelor-qualified colleagues, of the Master's-qualified chemical engineers in manufacturing industries, chemical products accounted for most of them (33%) of them and paper/allied product industries accounted for more than one in ten.



- Business services accounted for 43% of the 2,015 chemical engineers with a Master's degree working in the services sector. Another quarter of the Master's-qualified engineers were in education services. About one in ten each were in either government services or wholesale/retail trade. Again, within business services, the trend set at the Bachelor level of qualification for chemical engineers continued at the Master's level; that is, close to three quarters of Master's-qualified chemical engineers reported in business services were in engineering/scientific/technical services and at least one in ten were in computer services.

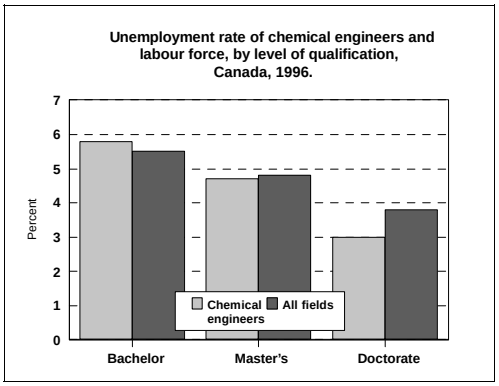
Chemical Engineers

- There were 1,495 chemical engineers with a Doctorate: one in five were in goods-producing industries and seven in ten were in services-producing industries.
- As with the other levels of qualifications, most of the 305 chemical engineers with a Doctorate working in goods-producing industries were in manufacturing. There were 16% in utilities. At least half of those in manufacturing were in chemical products, and one in ten were in refined petroleum/coal products.
- Education services accounted for the largest share of the 1,050 chemical engineers with Doctorates working in services-producing industries; education services accounted for 42% of them. Business services ranked second in terms of share, accounting for 36% of those in services-producing industries. Government services had a 13% share. Eight in ten of those in business services were in engineering/scientific/technical services, and only 6% were in computer services.



Unemployment

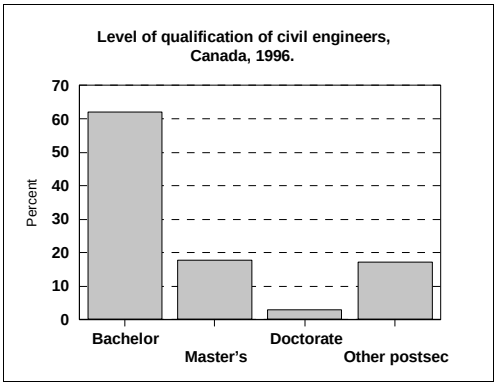
- The unemployment rate of chemical engineers with a Bachelor degree was marginally above the national average for all Bachelor graduates: 5.8% for chemical engineers, compared with 5.5% for all Bachelor graduates in the labour force.
- It was the chemical engineers with a graduate degree who enjoyed lower unemployment than their counterparts in the economy when level of degree is considered. Chemical engineers with a Master's degree reported an unemployment rate of 4.7%, compared with the national average for Master's graduates of 4.8%.
- Among the Doctorate degree holders, there was almost one percentage point difference between chemical engineers and all Doctorate degree holders. The unemployment rate of chemical engineers with a Doctorate was 3.0%, compared with a Doctorate degree holder national unemployment rate of 3.8%.



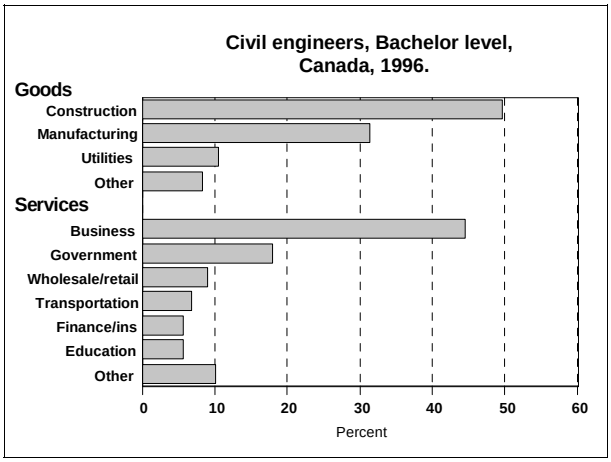
Civil Engineers

Industry of Employment

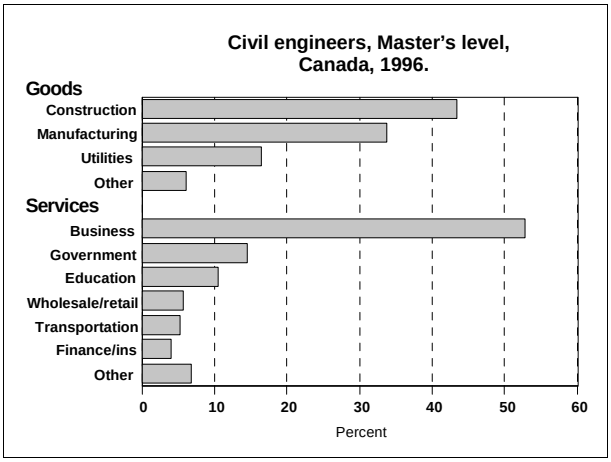
- There were 55,105 civil engineers (FOS 274) in Canada in 1996. At least three in five had a Bachelor degree, and more than one in five had a graduate-level degree — 18% reported a Master's degree and 3% a Doctorate.



- More than one quarter (26%) of the 34,200 civil engineers with a Bachelor degree were in goods-producing industries whereas 59% were in the services sector.
- As might be expected, half of the 8,930 Bachelor-qualified civil engineers working in goods-producing industries were in construction, and close to one third were in manufacturing. At least one in ten were in utilities industries. Of those working in manufacturing industries, the larger shares were in fabricated metal products (16%) and transportation equipment (12%), while about one in ten were in electrical/electronic products or non-metallic mineral products.



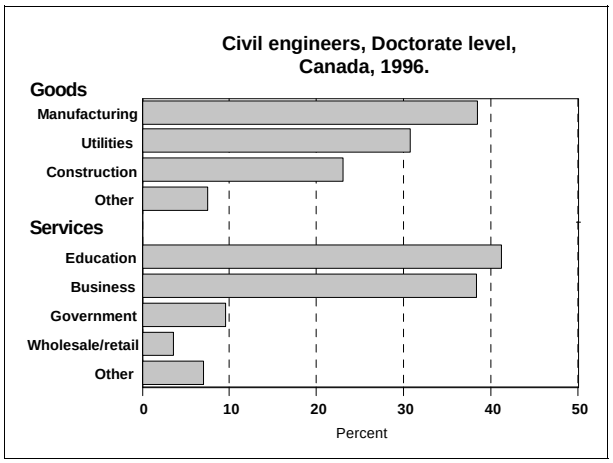
- Most of the 20,075 civil engineers with a Bachelor degree working in the services sector were in business services (45%). As expected, 84% of those in business services were in engineering/scientific/technical services. Close to one in five were in government services, and a few less than one in ten were in wholesale/retail trade.
- The number of civil engineers with a Master's degree was approaching the 10,000 mark — in 1996, there were 9,735. Eighteen percent of these skilled workers were in goods-producing industries and 70% were in the services sector.
- In goods-producing industries, the industry distribution of civil engineers with a Master's degree was not unlike that of their Bachelor-equipped colleagues. That is, most of the 1,700 Master's-equipped civil engineers were in construction (44%), and manufacturing ranked second, absorbing 34% of them. More than one in ten of the civil engineers in goods-producing industries with a Master's degree were in utilities. At this level of qualification, among the civil engineers in manufacturing, the most popular industries were transportation (17%), followed closely by fabricated metal products (15%). Electrical/electronic products and non-metallic mineral product industries each drew about one in ten.



- As with their bachelor-qualified colleagues, it was business services which drew more than half (53%) of the 6,810 Master's-qualified civil engineers in the services sector; of those in business services, almost all were in engineering/scientific/technical services (84%). Government drew the second largest share of those in the services sector — some 15% — and about one in ten were in education services.

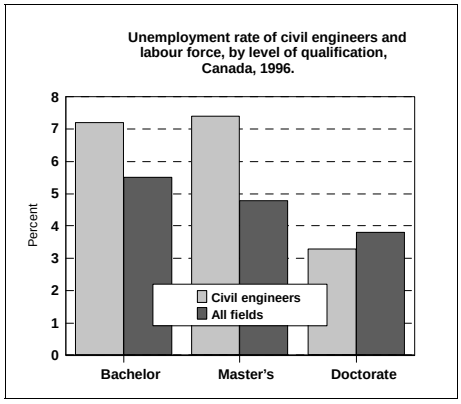
Civil Engineers

- In 1996, there were about 1,700 civil engineers with a Doctorate degree. Only 8% were in goods-producing industries, whereas 83% were in the services sector.
- Of the 130 or so civil engineers with a Doctorate working in goods-producing industries, it was once again manufacturing that utilized the majority of them (39%), followed by utilities (31%) and construction (23%). In the manufacturing industries, it was transportation industries that drew the largest share.
- There were 1,405 civil engineers with a Doctorate working in the services sector, and by a narrow margin, education services accounted for most of them (41%), followed by business services (38%). Some one in ten were in government services. True to the trend, of those in business services, at least eight in ten were in engineering/scientific/technical services.



Unemployment

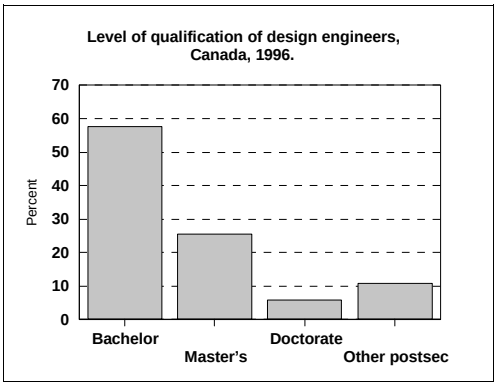
- In 1996, at the Bachelor and Master's degree level, the unemployment rate of civil engineers was higher than that of their counterparts across the economy. For a civil engineer with a Bachelor degree, the unemployment rate was 7.2% in 1996, compared with 5.5% for all Bachelor graduates in Canada's economy.
- The gap was wider when the Master's level is examined: civil engineers reported an unemployment rate of 7.4%, compared with only 4.8% for all Master's degree holders.
- It was civil engineers with a Doctorate degree who enjoyed lower unemployment than Doctorate graduates in general: for civil engineers the unemployment rate was 3.3%, but for all Doctorate degree holders it was 3.8%.



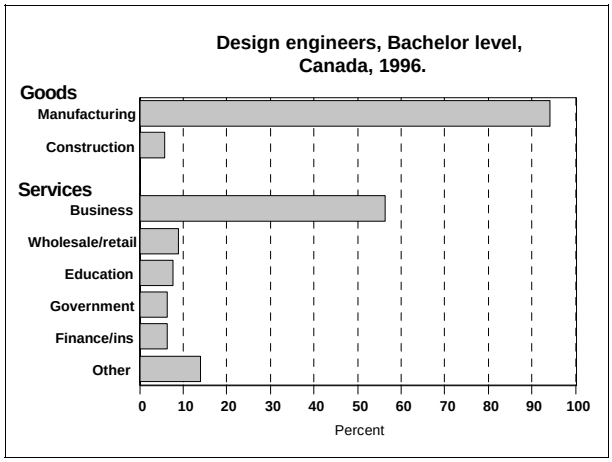
Design Engineers

Industry of employment

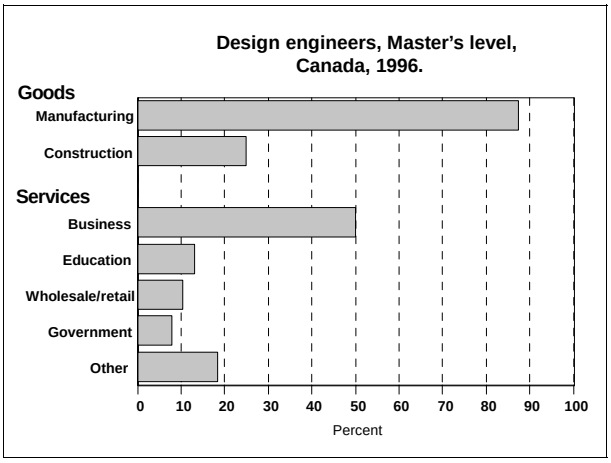
- There weren't many design engineers[9] (FOS 275) in Canada's work force in 1996, only 1,020. Fifty-eight percent of them had a Bachelor degree. Almost one third of them had a graduate-level degree: 25% reported a Master's degree and 6% reported a Doctorate.



- Twenty-nine percent of the 590 design engineers with a Bachelor degree were in goods-producing industries and 66% were in services-producing industries.
- Almost all of the 170 Bachelor-equipped design engineers in goods-producing industries were in manufacturing industries. Those in manufacturing were typically in electrical/electronic product industries.



- More than half (56%) of the 390 Bachelor-equipped design engineers in the services sector were in business services. Close to one in ten were in wholesale/retail trade. Most of those in business services were working in computer services (59%) and about one quarter were in engineering/scientific/ technical services.
- There were 255 design engineers with a Master's degree. Only 16% were in goods-producing industries, whereas 75% were in the services sector.
- Of the 40 or so Master's-qualified design engineers in the goods-producing sector, almost four in five were in manufacturing and one quarter were in construction. Again, most of those in manufacturing were in electrical/ electronic product industries, with a few in transportation equipment products.



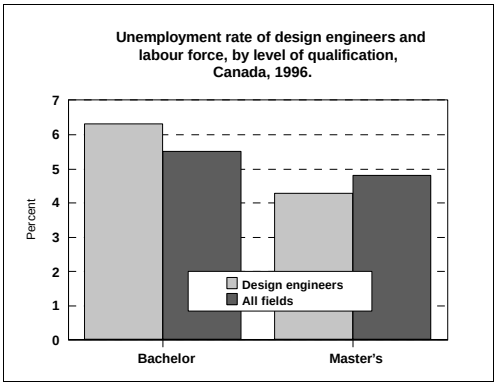
- Half of the 190 design engineers with a Master's degree working in the services sector were in business services, and at least one in ten were in education services or wholesale/retail trade. At this level of qualification, it was engineering/scientific/ technical services using most of the design/systems engineers working in business services (47% of them), and 42% were in computer services.
- There were very few design engineers with a Doctorate — some 60 or so. About one in ten were in goods-producing industries and the rest were in the services sector. Given the small number, there is no further information available on their activities in goods-producing industries. It appears that those in services-producing industries were focused in business services, and almost all of them were in computer services.

[9] Includes systems engineers and design/systems engineers.

Design Engineers

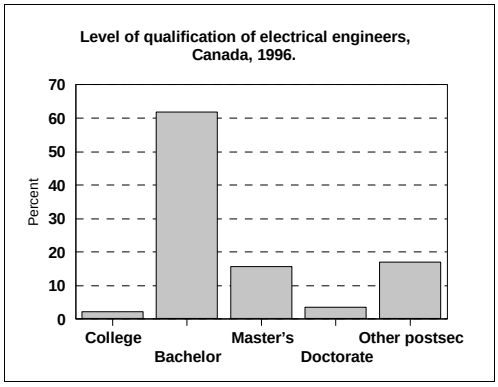
Unemployment

- Information on the unemployment of design engineers is limited to the Bachelor and Master's degree levels.
- It appears that design engineers with a Bachelor degree had an unemployment rate of 6.3% in 1996, which was higher than the 5.5% reported by all Bachelor degree holders in Canada's labour force.
- Design engineers with a Master's degree enjoyed lower than average unemployment. Figures show an unemployment rate of 4.3% for design engineers versus 4.8% for all Master's degree holders.

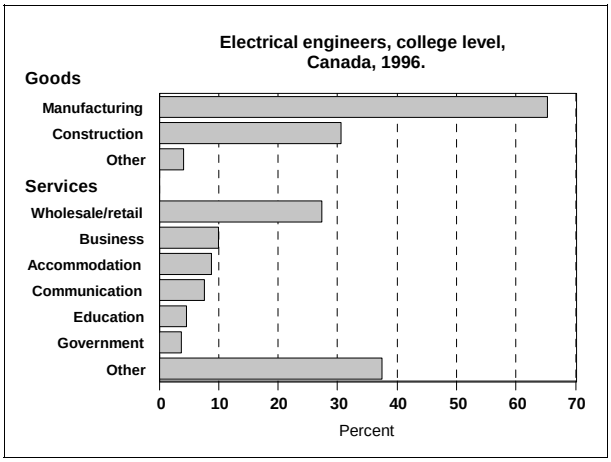


Electrical Engineers

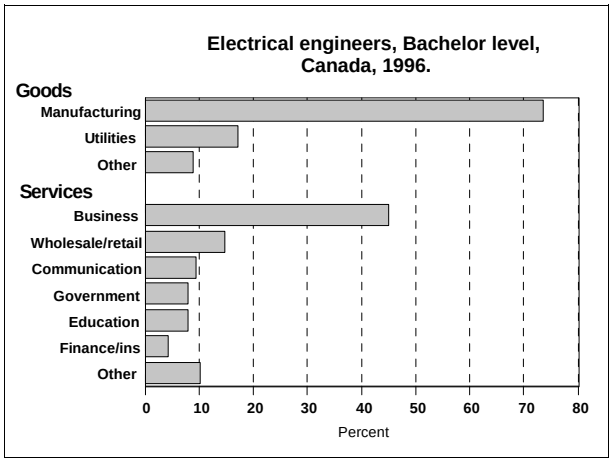
- In 1996, there were 73,445 electrical engineers (FOS 276-278) in Canada. Only 2% of them reported a college credential. Sixty-two percent had a Bachelor degree and close to one in five had a graduate level degree (16% had a Master's degree and 3% had a Doctorate).



- Sixteen percent of the 1,550 electrical engineers with a college credential were in goods-producing industries, and 77% were in the services sector.
- There were only 245 electrical engineers with a college credential in goods-producing industries, and they were for the most part in manufacturing industries (65%), most of them in electrical/electronic products, and 31% were in construction.
- Of the 1,200 or so college-trained electrical engineers in the services sector, at least one quarter (27%) of them were in wholesale/retail trade. About one in ten were in business services, accommodation or communication services.



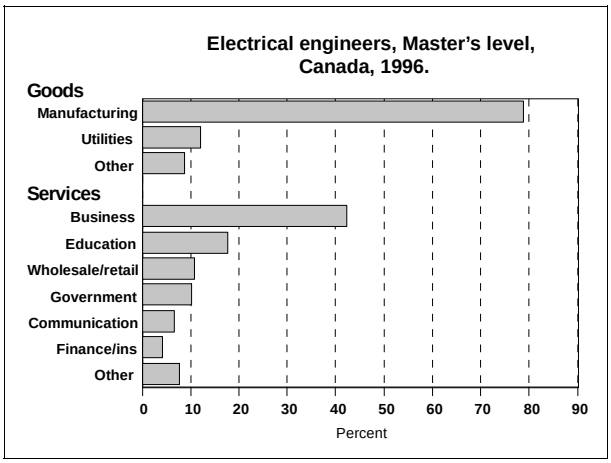
- One third of the 45,460 Bachelor-qualified electrical engineers were in goods-producing industries, and more than half (54%) were in the services sector.
- Almost three quarters of the 14,950 electrical engineers with a Bachelor degree working in goods-producing industries were in manufacturing. The next largest share of electrical engineers was in utilities (17%). Within manufacturing, most were utilized by electrical/electronic product industries (three in five), and one in ten were in transportation.
- Most of the 24,510 Bachelor-equipped electrical engineers in the services sector were in business services: most of those in business services were in engineering/scientific/technical services (48%) or in computer services (39%). Another 15% were in wholesale/retail trade, which is where computer sales are captured. Just shy of one in ten were in either communications, government services or education services.

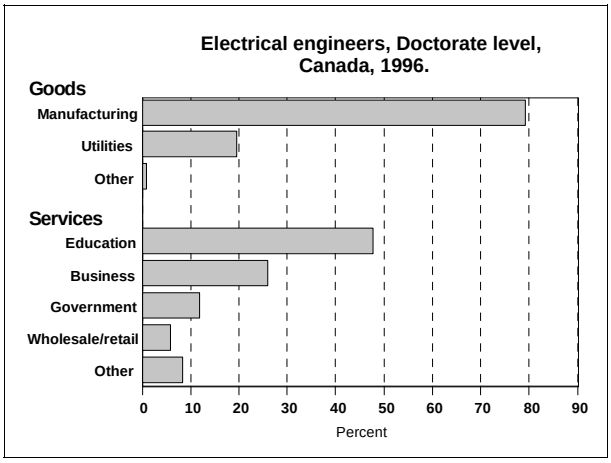


- About the same share of the 11,425 electrical engineers with a Master's degree were in goods-producing industries (30%) as their Bachelor-qualified colleagues. Sixty percent of them were in the services sector.
- Almost all (four in five) of the 3,430 electrical engineers with a Master's degree working in goods-producing industries were in manufacturing. At least one in ten were in utilities. Of those in manufacturing, electrical/ electronic product industries utilized seven in ten of them.
- At least two in five of the 6,840 Master's-trained electrical engineers in the services sector were in business services, and just under one in five were in education services. About one in ten were in either wholesale/ retail trade or government services. Engineering/ scientific/technical services accounted for almost half (47%) of

those in business services, and computer services accounted for at least at least two in five.

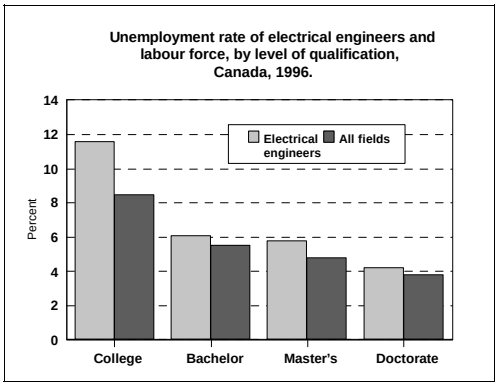
- Only one in five of the 2,515 electrical engineers with a Doctorate were in goods-producing industries, and more than 70% were in the services sector.
- As with their colleagues with a Bachelor or Master's degree, most of the 510 electrical engineers with a Doctorate working in goods-producing industries were in manufacturing (most of them in electrical/electronic products). One in five or so were in utilities industries.
- At the Doctorate level, it was education services which accounted for almost half (48%) of the 1,790 electrical engineers with a Doctorate found in the services sector, followed by business services, which utilized at least one quarter of them. Within business services, the largest share was utilized by engineering/scientific/technical services (61%), followed by computer services (29%). Government services was another part of the services sector, which accounted for at least one in ten of the electrical engineers with a Doctorate.





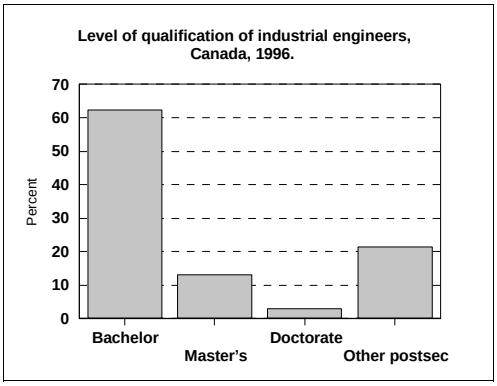
Unemployment

- Perhaps unexpectedly, in 1996 the unemployment rate of electrical engineers was somewhat higher than that of their counterparts across the economy, regardless of qualification.
- Electrical engineers with a college credential had an unemployment rate of 11.6%, compared with only 8.5% for all college graduates in the labour force in Canada.
- Among those with a university degree, the gap was narrower. Electrical engineers with a Bachelor degree reported an unemployment rate of 6.1%, compared with 5.5% for all Bachelor graduates. Then for Master's graduates the gap widened a bit: for electrical engineers the unemployment rate was 5.8%, compared with 4.8% for all Master's graduates.
- The smallest gap was among those with a Doctorate: electrical engineers reported an unemployment rate of 4.2%, compared with 3.8% for all Doctorate graduates in Canada's work force in 1996.

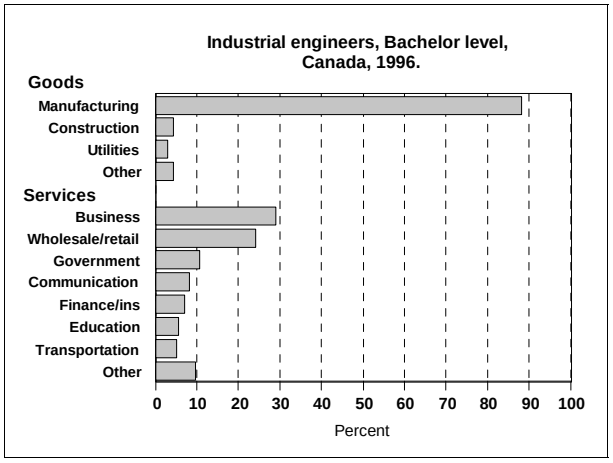


Industrial Engineers

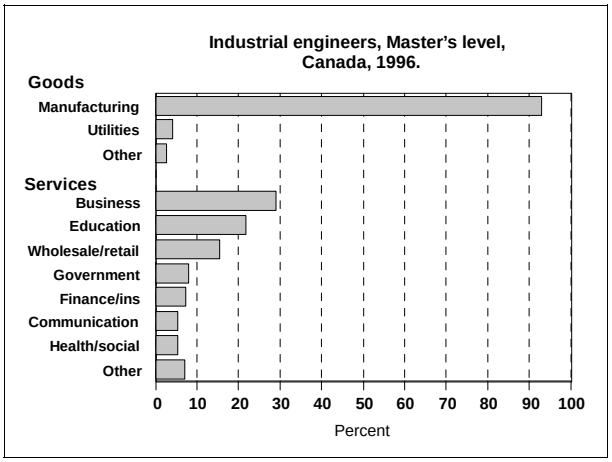
Industry of employment



- In 1996, there were 8,075 industrial engineers (FOS 279) in Canada's work force. Sixty-two percent of the industrial engineers had a Bachelor degree. Sixteen percent of the industrial engineers had a graduate-level degree: 13% with a Master's degree and 3% with a Doctorate.
- Two in five of the 5,035 industrial engineers with a Bachelor degree were in goods-producing industries, and one in two were in the services sector.
- Almost all of the 2,030 industrial engineers with a Bachelor degree working in goods-producing industries were in manufacturing industries (88%). The largest share of those in manufacturing industries were in transportation equipment (25%)



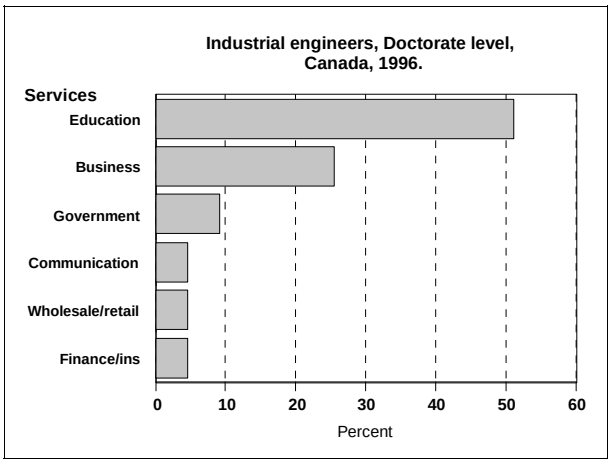
- As with engineers in general, most of the 2,580 industrial engineers working in the services sector were in business services — 29%. The next largest share of 24% were in wholesale/retail trade. At least one in ten of them were in government services, with 7-8% in communication industries or finance services. Three in ten of the Bachelor-equipped industrial engineers working in business services were in either engineer-ing/scientific/technical services or computer services.
- At least one third (34%) of the 1,060 industrial engineers with a Master's degree were in goods-producing industries and one half (52%) in services-producing industries.



- In 1996, 93% of the 360 industrial engineers with a Master's degree working in goods-producing industries were in manufacturing. Within manufacturing, they were typically in transportation equipment (18%), electrical/electronic products (16%) and fabricated metal products (12%).
- More than one quarter (29%) of the 550 industrial engineers with a Master's degree working in the services sector were in business services. At least one in five (22%) were in education services, and 15% were in wholesale/retail trade. Between 7% and 8% each were either in government services or finance services. Within business services, the Master's-equipped industrial engineers were shared equally by computer services and engineering/scientific/technical services.
- In 1996, there were only some 255 industrial engineers equipped with a Doctorate reported in Canada's work force. Fewer than one in ten were in goods-producing industries, and at least four in five were in services-producing industries.

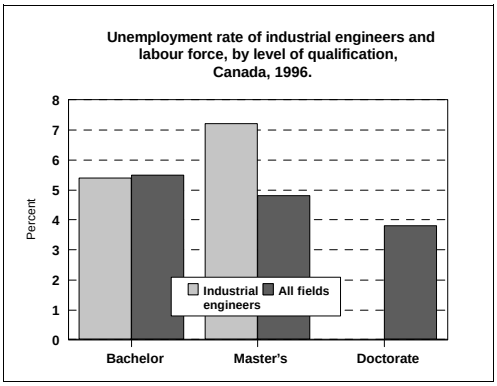
Industrial Engineers

- Of the 20 or so industrial engineers with a Doctorate working in goods-producing industries, it appears they were in either manufacturing or utilities.
- At least half of the 200 or so industrial engineers with a Doctorate working in services-producing industries were in education services, with one quarter in business services. At least one third of those in business services were in computer services and more than half were in engineering/scientific/technical services.



Unemployment

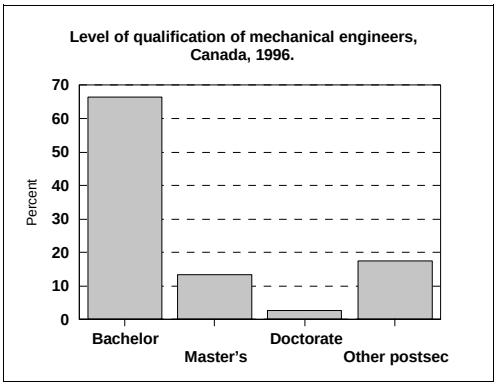
- In 1996, industrial engineers with a Bachelor degree had about the same unemployment rate as the national average for all Bachelor degree holders: 5.4% versus 5.5%.
- At the Master's level of qualification however, industrial engineers had higher unemployment than their counterparts across the economy. The unemployment rate for industrial engineers with a Master's degree was 7.2%, compared with only 4.8% for all Master's degree holders in Canada.
- The number of Doctorate-equipped industrial engineers was small (only 255), and it appears that they did enjoy full employment in 1996, compared with a 3.8% unemployment rate reported by all Doctorate degree holders in Canada's labour force.



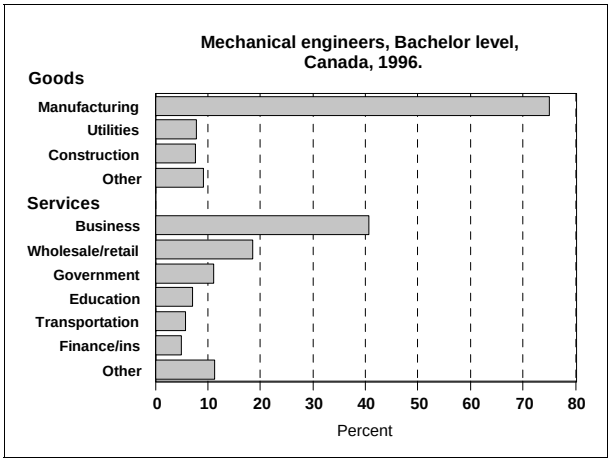
Mechanical Engineers

Industry of employment

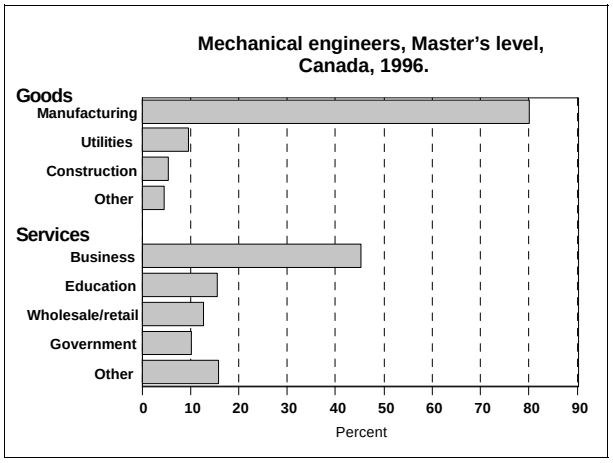
- Mechanical engineers (FOS 280-282) are one of the larger contingents of engineers in Canada's work force. In 1996, there were 57,345 mechanical engineers in Canada's work force. Two thirds of the mechanical engineers reported a Bachelor degree, 13% a Master's degree and 3% a Doctorate.



- Goods-producing industries utilized a slightly larger share of the mechanical engineers with a Bachelor degree than did services-producing industries. Forty-five percent of the Bachelor-qualified engineers were in goods-producing industries, and 42% were in the services sector.
- Three quarters of the 17,130 Bachelor-qualified mechanical engineers working in goods-producing industries were in manufacturing. Within manufacturing, they were concentrated in industries of transportation equipment (24%), machinery industries (13%), electrical/electronic products (13%) and fabricated metal products (10%).



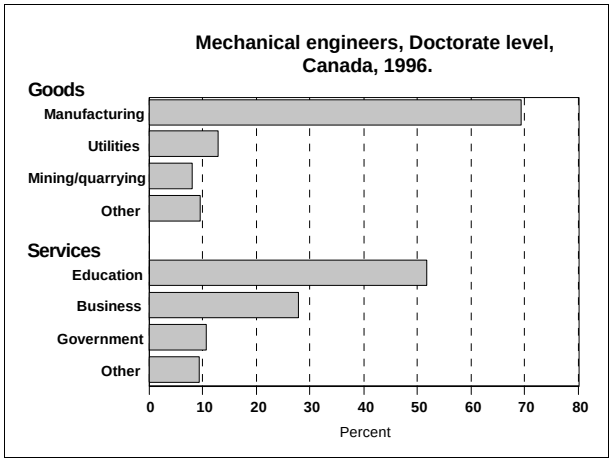
- Two in five of the 15,990 mechanical engineers with a Bachelor degree working in the services sector were in business services. Within business services, three quarters were in engineering/scientific/technical services and at least one in ten were in computer services. Close to one in five were in wholesale/retail trade and about one in ten were in government services.
- The higher the degree, the larger the share of mechanical engineers that were in the services sector. In 1996, 38% of the 7,670 mechanical engineers with a Master's degree were in the goods-producing sector and 50% were in services-producing industries.



- Compared with their colleagues with a Bachelor degree, an even larger share of the 2,925 Master's-qualified mechanical engineers working in goods-producing industries were in manufacturing — 80%. However, like their Bachelor-trained colleagues, it was transportation equipment industries which drew most of them (33%), with industries like machinery, fabricated metal products and electrical/electronic products each drawing more than one in ten of them.
- Forty-five percent of the 3,845 Master's-qualified mechanical engineers in the services sector were in business services. At this level of qualification within business services, three quarters of them were in engineering/ scientific/technical services and only 13% or so were in computer services. The second most popular area within services-producing industries was education services with a 16% share. At least one in ten each were in wholesale/retail or government services.

Mechanical Engineers

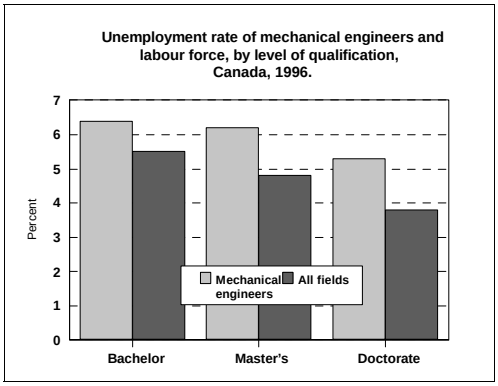
- There were 1,600 mechanical engineers with a Doctorate in Canada's work force in 1996. At this level it was clear once again that it was the services sector which utilized most of them (73%), with just under one in five working in goods-producing industries.
- There were only 300 or so Doctorate-qualified mechanical engineers in the goods-producing sector, and 69% of them were in manufacturing industries. In manufacturing, almost half of them were in transportation equipment, with about one in five in electrical/electronic products. At least one in ten were in utilities.



- At the Doctorate level of qualification, more than half (52%) of the 1,165 mechanical engineers were in education services, with the second largest share of 28% in business services. Within business services, almost all of them (85%) were in engineering/scientific/technical services, and about one in ten were in computer services. Government services utilized at least one in ten of the Doctorate mechanical engineers in the services sector.

Unemployment

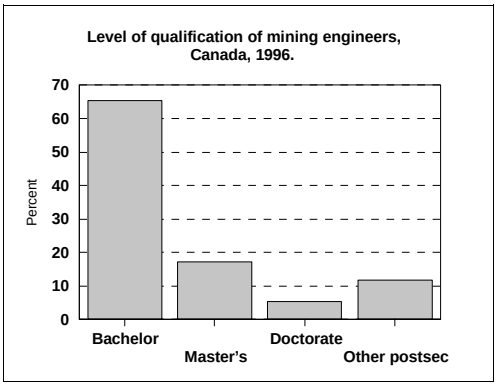
- Regardless of level of qualification, mechanical engineers had higher unemployment rates than their counterparts across the economy when level of qualification is considered.
- In 1996, the unemployment rate of a mechanical engineer with a Bachelor degree was 6.4%, compared with an unemployment rate of 5.5% for all Bachelor degree holders in Canada's labour force.
- The gap between unemployment rates was even greater among the Master's degree holders: for mechanical engineers it was 6.2%, compared with a national average of 4.8% for all Master's degree holders. A similar gap existed at the Doctorate level — the unemployment rate for mechanical engineers was 5.3%, compared with 3.8% for all Doctorate degree holders.



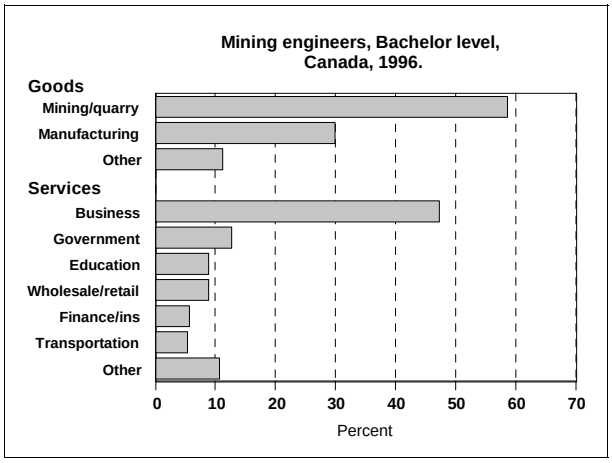
Mining Engineers

Industry of employment

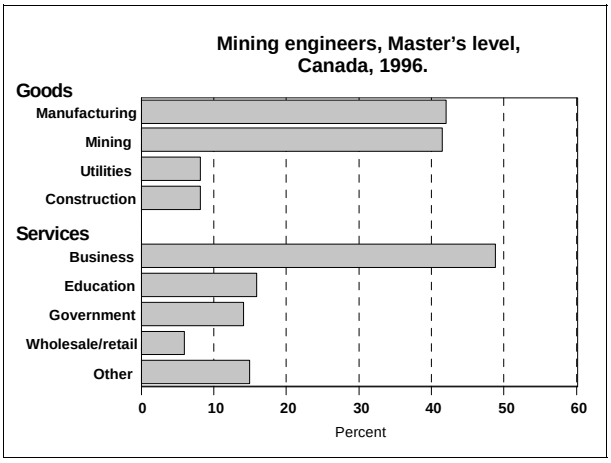
- In 1996, there were 12,930 mining engineers[10] (FOS 283-286) in Canada's work force. Close to two thirds of them had a Bachelor degree. More than one in five had a graduate level degree: 17% had a Master's degree and 5% had a Doctorate.



- Interestingly, exactly the same share of the 8,455 mining engineers with a Bachelor degree were in goods-producing industries as were in services-producing industries (41%).
- As might be expected, 59% of the 3,465 mining engineers with a Bachelor degree working in goods-producing industries were in mining/quarrying industries.[11] Three in ten were in manufacturing. Of those in manufacturing industries, one third were in primary metal industries, and some one in ten were in fabricated metal products, transportation equipment or non-metallic products.



- Almost half (47%) of the 3,490 mining engineers with a Bachelor degree working in the services sector were reported under business services, and at least eight in ten of them were in engineering/scientific/technical services. At least one in ten of those in the services sector were in government services, and just under one in ten were in education services or wholesale/ retail trade.
- A smaller share of the 2,240 mining engineers with a Master's degree were in goods-producing industries (35%) compared with their Bachelor-equipped colleagues. Fifty-two percent of the Master's-trained mining engineers were in services-producing industries.
- The same share of the 795 Master's-qualified mining engineers in goods-producing industries were in manufacturing industries as in mining/quarrying — 42%. Those reported in manufacturing industries tended to be in primary metal industries (at least two in five) and in machinery industries or transportation equipment industries, each accounting for at least one in ten of them. Another 8% or so of those in the goods-producing sector were in utilities and construction.

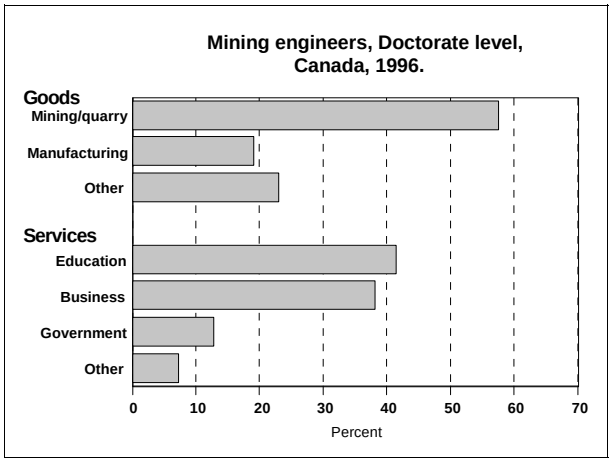


- As among the Bachelor-qualified mining engineers, it was again business services which utilized most (49%) of the 1,165 Master's-qualified mining engineers. Between 14% and 16% were in education services or government services. Again, it was engineering/scientific/technical services which drew almost all of the Master's-qualified engineers reported in business services (85% of them).
- There were 680 mining engineers with a Doctorate, and they followed the general trend of the higher the qualification, the smaller the share in goods-producing

[10] Includes metallurgical engineers and petroleum engineers.

[11] Includes oil wells.

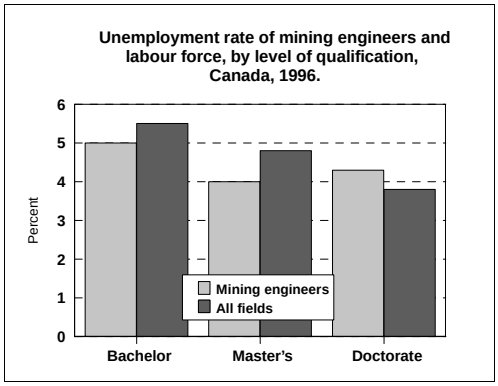
industries. In the case of mining engineers, one in five of those with a Doctorate were in goods-producing industries and at least two thirds were in services-producing industries.



- Fifty-eight percent of the 130 mining engineers with a Doctorate working in goods-producing industries were in mining/quarrying, with only one in five or so in manufacturing (most of them in non-metallic mineral products). At least one in ten were in utilities or agriculture.
- It was education services which utilized most (42%) of the 470 mining engineers with a Doctorate working in the services sector. More than one third were in business services, and at least one in ten were reported in government services. Within business services, almost all of them were in engineering/ scientific/technical services.

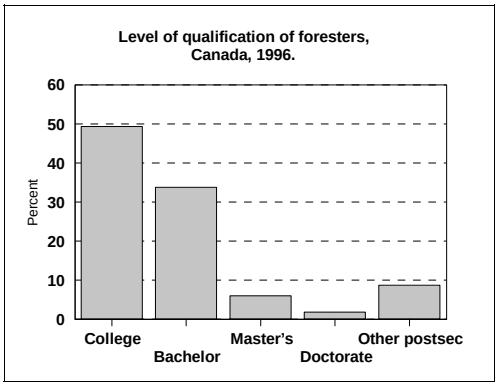
Unemployment

- At both the Bachelor and Master's levels, mining engineers enjoyed below average unemployment rates when level of qualification is considered.
- In 1996, mining engineers with a Bachelor degree reported an unemployment rate of 5.0%, compared with the 5.5% reported for all Bachelor degree holders in Canada's labour force. The gap was even wider among those with a Master's degree: for mining engineers, the unemployment rate was 4.0%, and the national average was 4.8%.
- It was the mining engineers with a Doctorate who had an unemployment rate somewhat higher than the national average for Doctorate degree holders: for mining engineers, the unemployment rate was 4.3%, compared with 3.8% for all Doctorate degree holders in Canada's labour force.

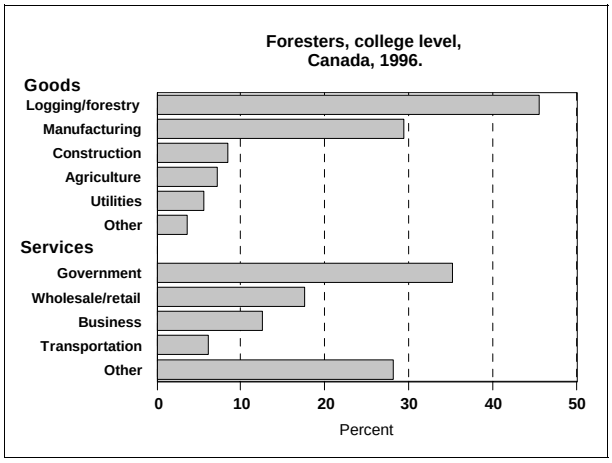


Foresters

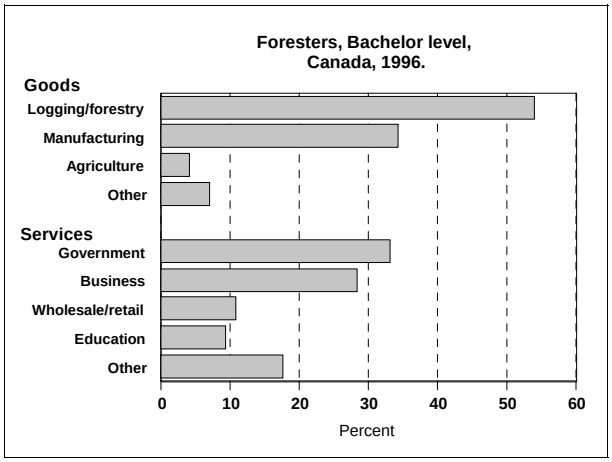
Industry of employment



- In 1996, there were 26,765 foresters (FOS 294-298) in Canada's work force. Almost half of them (49%) reported a college credential as their highest qualification. Thirty-four percent had a Bachelor degree. Not many reported a graduate-level degree — 6% had a Master's degree, and 2% a Doctorate.
- For foresters with a college credential or Bachelor degree, goods-producing industries accounted for the largest share, whereas among graduate degree holders, most were reported in services-producing industries.
- Forty-eight percent of the 13,225 college-qualified foresters were in goods-producing industries and 43% were in services- producing industries.



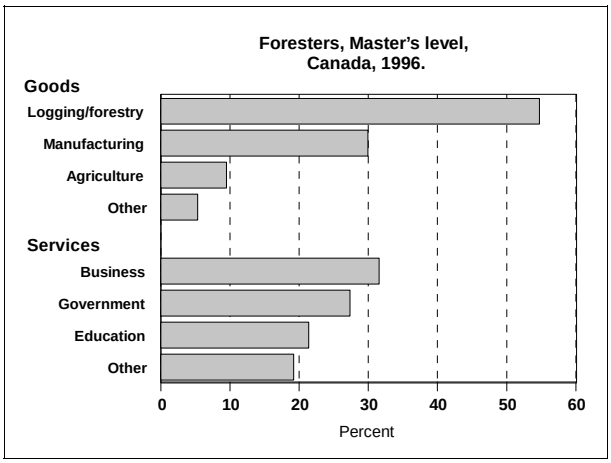
- Not surprisingly, it was logging/forestry which accounted for the largest share (46%) of the 6,420 college-trained foresters working in goods-producing industries. Nearly three in ten of them were in manufacturing industries, and almost one in ten were in construction. Those working in manufacturing were found mostly in wood products (46%) or paper/publishing/allied industries (18%).
- Government services accounted for most (35%) of the 5,635 college-trained foresters working in the services sector. Close to one in five were in wholesale/retail trade, and more than one in ten were in business services. Two thirds of those in business services were in engineering/scientific/technical services.

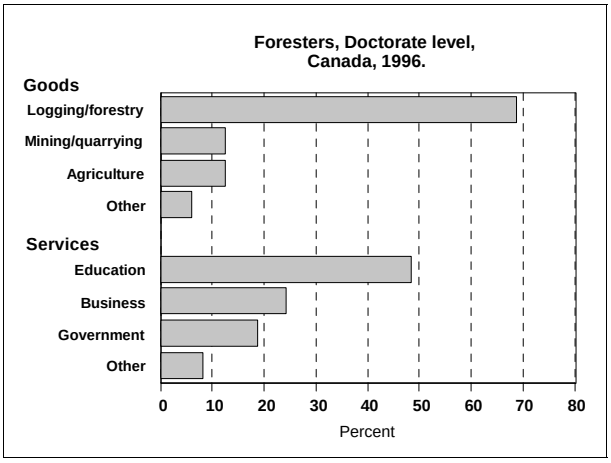


- Forty-four percent of the 9,040 foresters with a Bachelor degree were in goods-producing industries and 42% were in services-producing industries.
- More than half (54%) of the 3,985 foresters with a Bachelor degree working in goods-producing industries were in logging/forestry. The second largest share (34%) were in manufacturing. Wood products utilized 61% of those in manufacturing industries, and more than one quarter were in paper/publishing/allied products.
- One third of the 3,750 Bachelor-equipped foresters in services-producing industries were in government services, followed by business services with a 29% share. Around one in ten were in either wholesale/retail trade or education services. Three quarters of the foresters with a Bachelor degree working in business services were in engineering/scientific/ technical services.
- A bit more than one quarter (28%) of the 1,650 foresters with a Master's degree were in goods-producing industries, whereas 56% of them were in services-producing industries.

Foresters

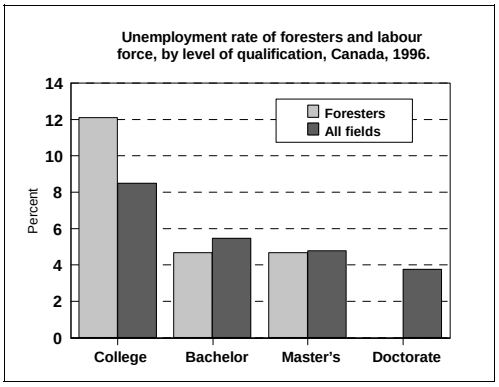
- More than half (55%) of the 465 Master's-qualified foresters in goods-producing industries were in logging/forestry and three in ten were in manufacturing industries. At least four in ten of those in manufacturing were in paper/publishing/allied industries, and at least one in five were in wood products.
- At the Master's level of qualification, it was business services which accounted for the largest share of the 930 foresters in the services sector — 32%. More than one quarter were in government services and at least one in five were in education services. As with their colleagues with a Bachelor degree, it was engineering/scientific/technical services which employed three quarters of the Master's-trained foresters.
- There were 520 foresters with a Doctorate degree. Only 15% of them were in goods-producing industries, whereas at least seven in ten were in services-producing industries.
- Logging/forestry utilized at least two thirds of the 80 or so foresters with a Doctorate degree working in goods-producing industries, and at least one in ten each were in mining/quarrying and agriculture.
- Almost half (49%) of the 370 foresters with a Doctorate degree working in the services sector were in education services. At least one quarter were in business services, and almost one in five were in government services. Following the trend, almost all of the foresters with a Doctorate working in business services were in engineering/scientific/technical services.





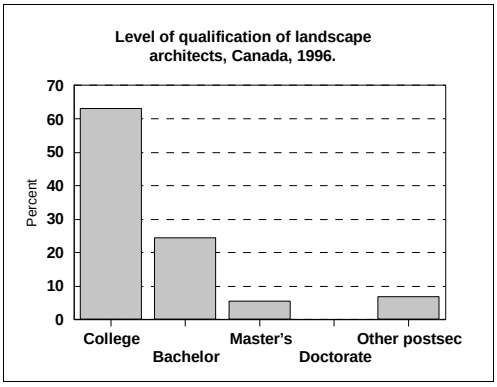
Unemployment

- With the exception of those with a college credential, foresters enjoyed lower unemployment than the national average when level of qualification is considered.
- Foresters with a college credential reported an unemployment rate of 12.1% in 1996, compared with only 8.5% by all college graduates in Canada's labour force.
- For foresters with a Bachelor degree, their unemployment rate was only 4.7%, compared with the national average of 5.5% for all Bachelor graduates. Those with a Master's degree had similar unemployment rates: for foresters the unemployment rate was 4.7%, and for all Master's graduates it was 4.8%.
- The figures suggest that foresters with a Doctorate enjoyed full employment in 1996, while all Doctorate degree holders in Canada's labour force reported an unemployment rate of 3.8%.

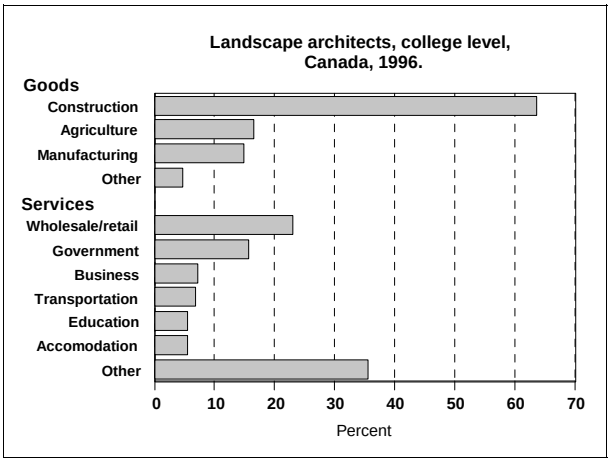


Landscape Architects

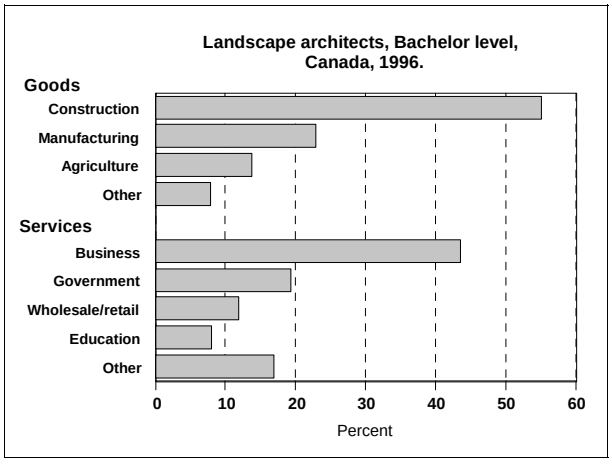
Industry of employment



- There were 9,255 landscape architects (FOS 299-301) in Canada's work force in 1996. Most of them (63%) had a college credential as their highest post secondary qualification. Twenty-four percent of them had a Bachelor degree and 6% reported a Master's degree. Fewer than half of one percent had a Doctorate.
- Forty-two percent of the 5,830 college-trained landscape architects were in goods-producing industries, and 48% were in services-producing industries.
- Not surprisingly, it was construction which utilized most of the 2,465 college-trained landscape architects working in goods-producing industries — 64%. Some 15-17% each were in agriculture and manufacturing industries. Those in manufacturing tended to be in transportation equipment industries (18%) and printing/publishing/allied industries (14%), with the rest showing up in a wide range of manufacturing industries.



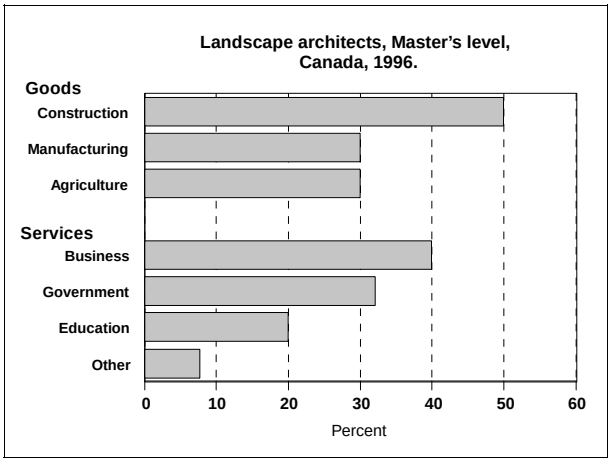
- In the services sector, most of the 2,800 college-trained landscape architects were in wholesale/retail trade (23%), followed by a 16% share reported in government services. Between 6% and 7% were in transportation/storage, finance/insurance industries or education services. Within business services, more than half of them were in engineering/scientific/technical services.
- Unlike the trend at the college level, for the Bachelor level, a small share (19%) of the 2,255 landscape architects were in goods-producing services, whereas 74% were in the services sector.



- More than half (55%) of the 430 Bachelor-qualified landscape architects in goods-producing industries were in construction, with another one quarter in manufacturing. Those in manufacturing were reported across the range of industries.
- More than four in ten of the 1,675 Bachelor-trained landscape architects reported in the services sector were in business services, and one in five were in government services. Wholesale/retail trade attract 12% of them and education services 8%. Within business services, almost all of them (85%) were in engineering/scien-tific/technical services.
- There weren't many landscape architects with a Master's degree — 530. Only one in ten (50 or so) were in goods-producing industries, with close to nine in ten reported in services-producing industries.
- Within goods-producing industries, most tended to be reported in construction, manufacturing industries or agriculture.
- Business services accounted for the largest share (40%) of the 450 or so reported in the services sector.

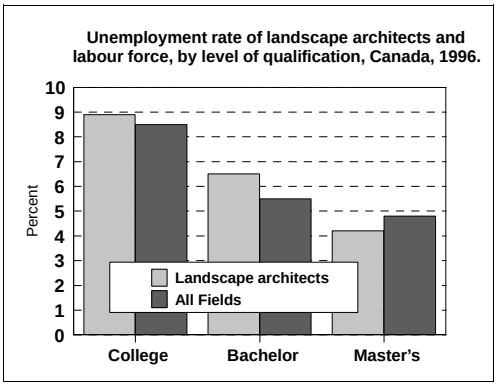
Government services followed with a one third share, and education services with a one fifth share. Within business services, 83% of the Master's-qualified landscape architects were in engineering/scientific/ technical services.

- Only 10 or so people reported a Doctorate in landscape architecture.



Unemployment

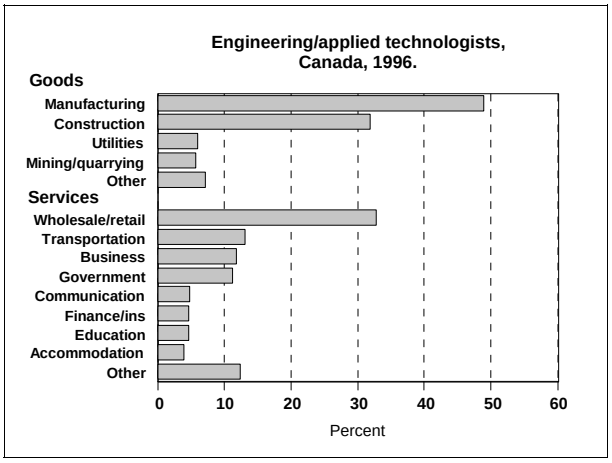
- College-trained landscape architects had an unemployment rate of 8.9% in 1996, slightly above the 8.5% reported by all college graduates in Canada's labour force.
- Bachelor-qualified landscape architects fared less well than their college-trained colleagues, compared with the national average. For instance, at the Bachelor level of qualification, landscape architects reported an unemployment rate of 6.5%, which was one percentage point higher than the national average for all Bachelor graduates.
- It was landscape architects with a Master's degree who enjoyed lower than average unemployment. In 1996, landscape architects with a Master's degree had an unemployment rate of 4.2%, slightly below the 4.8% reported for all Master's graduates in Canada's labour force.



Engineering and Applied Technologists

Industry of employment

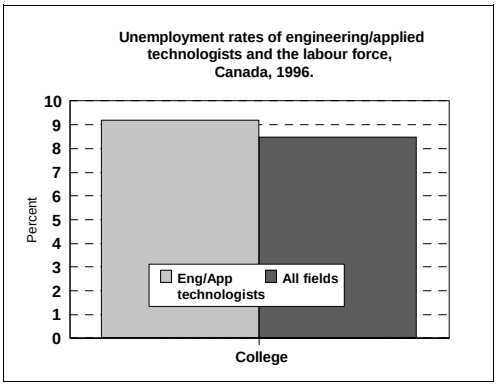
- In 1996, there were almost 2 million (1,999,720) engineering/applied technologists (FOS 302-369)[12] in Canada's work force. These programs are almost exclusively college-level, and only 7,000 or so reported credentials other than college. Examination of engineering/applied technologists is limited to people with college creden- tials.



- Of the 1,992,710 engineering/applied technologists, 40% were in goods-producing industries, with a slightly higher share of 45% reported in the services sector.
- Close to half of the 797,940 engineering/applied technologists with college training working in goods-producing industries were utilized by manufacturing industries. Almost one third of them were in construction. Within manufacturing, it was transportation equipment industries which accounted for the largest share (17%) of engineering/applied technologists. Fourteen percent were in fabricated metal products. Between 7% and 8% were in industries like electrical/electronic products, machinery or paper products/allied industries.
- One third of the 900,030 college-trained engineering/applied technologists working in the services sector were in wholesale/retail trade. Another 13% were in transportation. At least one in ten were in business services or government services. Of those working in business services, 30% were in computer/related services, whereas 38% were in engineering/scientific/technical services.

Unemployment

- The unemployment rate of engineering/applied technologists was slightly higher than the national average for college graduates in Canada's labour force in 1996: the unemployment rate for engineering/applied technologists was 9.2%, compared with 8.5% unemployment reported by all college graduates.

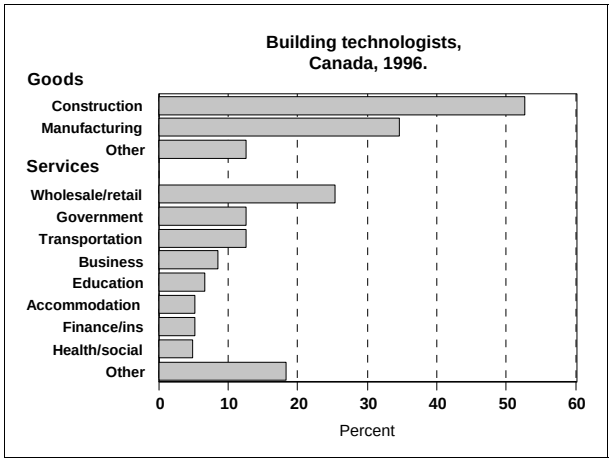


[12] Engineering and applied technologies (FOS 302-369) are limited to college-level credentials (i.e. degree-level technologists are captured in FOS 267-301).

Building Technologists

Industry of employment

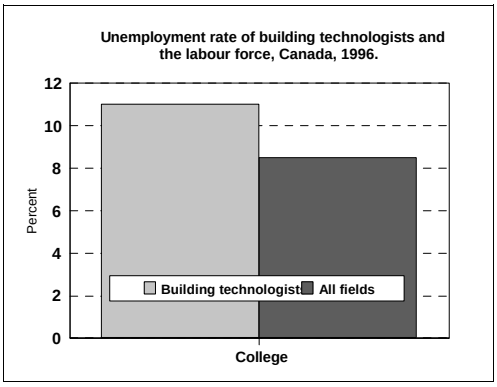
- There were 470,820 building technologists[13] (FOS 302, 303, 308-317) in Canada's work force in 1996 and almost all of them reported a college credential as their highest credential — 470,150.
- More than half (54%) of the building technologists were in goods-producing industries, whereas only 31% were reported in the services sector.
- Not unexpectedly, the largest share of the 252,255 building technologists was in construction industries. Manufacturing industries accounted for the second largest share — 35%. Within manufacturing, building technologists tended to be working in transportation equipment (18%), fabricated metal products (16%) or wood industries (11%).



- The largest share of the 144,035 building technologists working in the services sector were reported in wholesale/retail trade (25%). More than one in ten each were reported in transportation/storage industries and in government services. Slightly fewer than one in ten were in business services — of those, more than half (56%) were in engineering/scientific/technical ser- vices.

Unemployment

- The unemployment rate of college-trained building technologists was higher than the national average for college graduates in Canada's labour force in 1996: the unemployment rate for building technologists was 11.0%, compared with 8.5% unemployment reported by all college graduates.

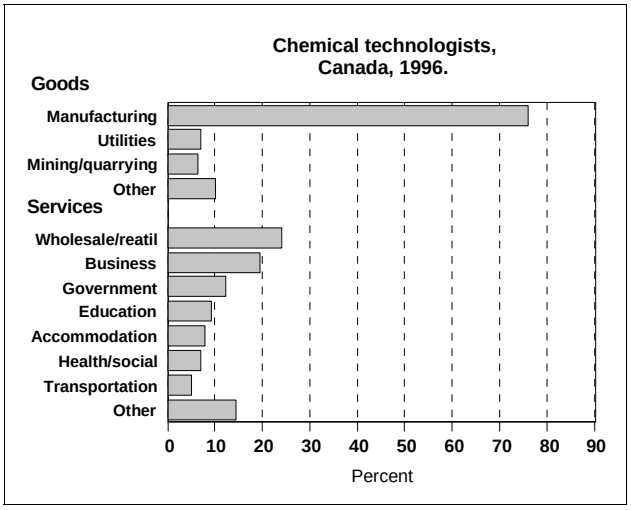


[13]Includes architectural technologists.

Chemical Technologists

Industry of employment

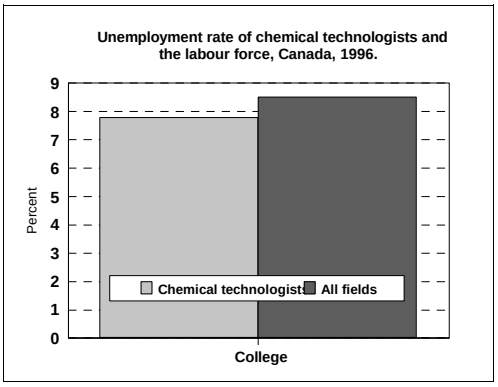
- In 1996, there were 15,645 chemical technologists (FOS 304-307) reported in Canada's work force. They all reported college credentials.
- A larger share of chemical technologists were working in goods-producing industries than in the services sector — 46% versus 41%.
- More than three quarters of the 7,125 chemical technologists working in goods-producing industries were in manufacturing. Within manufacturing, more than one quarter of the chemical technologists were working in chemical products and another 13% were in plastic products.



- Six thousand three hundred and seventy chemical technologists were in the services sector, and the largest share was in wholesale/retail trade. The second largest share was in business services (20%), with 13% or so reported in government services. At least two thirds of the chemical technologists reported in business services were in engineering/ scientific/technical services.

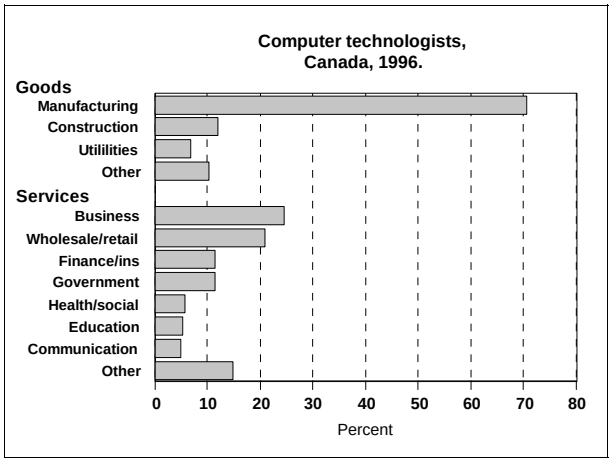
Unemployment

- The unemployment rate of chemical technologists was lower than the national average for all college-trained workers in Canada's labour force in 1996: 7.8% versus 8.5%.



Computer Technologists

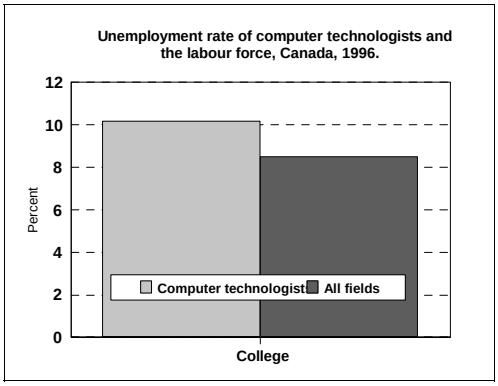
Industry of employment



- In 1996, there were 198,280 computer science technologists[14] (FOS 318-321) in Canada's work force. This classification is limited to college graduates only.
- Fewer than one in five of the computer technologists (17%) were in goods-producing industries, whereas 71% were in the services sector.
- Of the 33,895 computer technologists in goods-producing industries, it was manufacturing which utilized most of them (71%). There were, however, at least one in ten reported in construction industries as well. Within manufacturing industries, it was electrical/electronic products which accounted for most of the computer technologists (16%), while there were at least one in ten reported in printing/publishing/ allied industries or transportation equipment industries.
- Not surprisingly, it was business services which accounted for the largest share (25%) of the 141,075 computer technologists working in the services sector. At least one in five were in wholesale/retail trade, and finance services or government services each accounted for about one in ten of them. As might be expected, almost two thirds of the computer technologists working in business services were in computer services, with fewer than one in ten reported in engineering/ scientific/technical services.

Unemployment

- The unemployment rate of computer technologists in 1996 was almost two percentage points higher than the national average for all college graduates. In 1996, computer technologists reported an unemployment rate of 10.2%, compared with a national college graduate average of only 8.5%. It should be remembered, however, that this group includes data processing technologists as well as computer technologists.

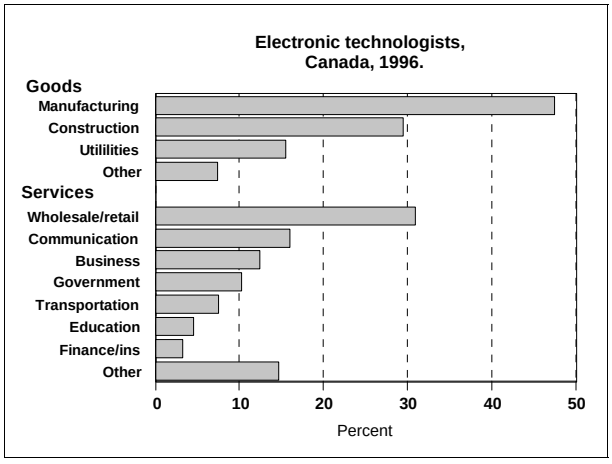


[14]Includes data processors.

Electronic Technologists

Industry of employment

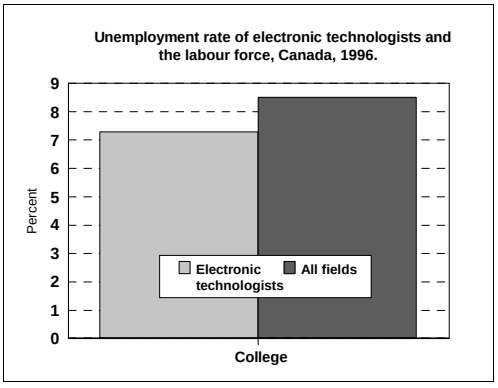
- In 1996, there were 287,210 electronic technologists[15] (FOS 322-327) in Canada's work force. But for several hundred, they all reported college credentials.
- Thirty-eight percent of the electronic technologists were in goods-producing industries and 48% were in services-producing industries.
- Almost half of the 108,015 electronic technologists working in goods-producing industries were in manufacturing. About one third of them were in construction industries. Sixteen percent or so were in utilities. Three in ten of the electronic technologists working in manufacturing industries were in electrical/electronic products, and some 15% were reported in transportation equipment industries.



- It was wholesale/retail trade which accounted for most (31%) of the 137,820 electronic technologists in the services sector. Sixteen percent were working in communication industries, another one in ten each were either in business services or government ser- vices. More than one third of those reported in business services were working in computer services, with another one quarter in engineering/scientific/technical services.

Unemployment

- Electronic technologists enjoyed lower unemployment in 1996 compared with other college graduates in the labour force. Electronic technologists reported an unemployment rate of 7.3%, compared with 8.5% reported for all college graduates in Canada's labour force.

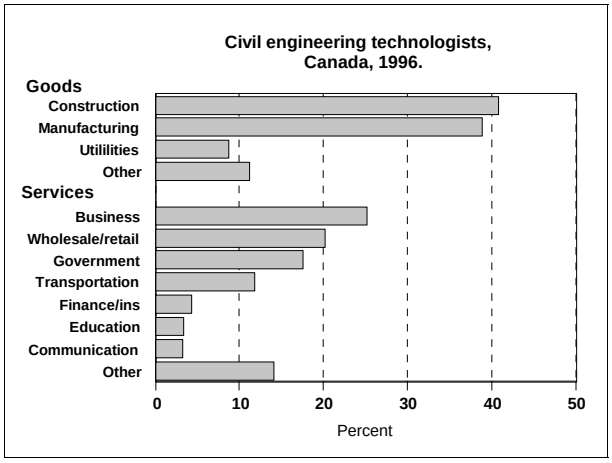


[15] Includes electrical technologists.

Civil Engineering Technologists

Industry of employment

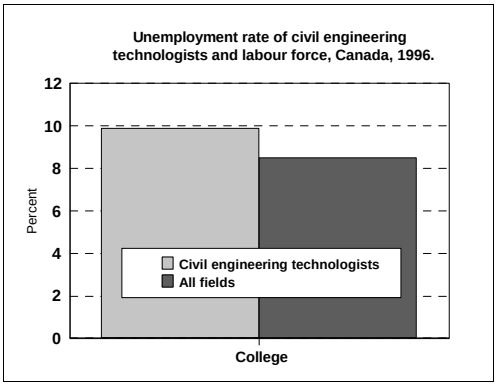
- There were 156,025 civil engineering technologists (FOS 333-339) in Canada's work force in 1996. They all reported college credentials.
- By a slight margin, goods-producing industries utilized the larger share (44%), compared with 43% reported in the services sector.
- As could be expected, most of the 68,135 civil engineering technologists (41%) were in construction industries. Manufacturing accounted for almost as many — 39%. Paper/publishing/allied industries and transportation equipment each accounted for a 13% share of civil engineering technologists working in manufacturing. Around one in ten were also reported in fabricated metal products or primary metal products.



- One quarter of the 66,955 civil engineering technologists working in the services sector were in business services. One in five civil engineering technologists in the services sector were in wholesale/retail trade , and a slightly smaller share (18%) were in government services. Of those in business services, almost all (four in five) were in engineering/scientific/technical services.

Unemployment

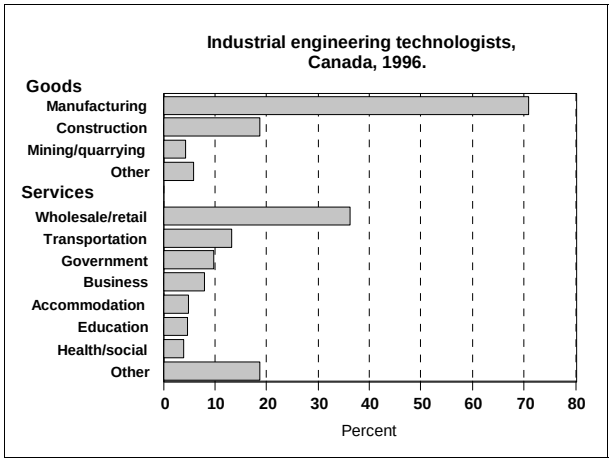
- Civil engineering technologists had an unemployment rate somewhat higher than the national average when all college-qualified workers in Canada's labour force are considered. In 1996, civil engineering technologists had a 9.9% unemployment rate, compared with the 8.5% of all college graduates in Canada's work force in 1996.



Industrial Engineering Technologists

Industry of employment

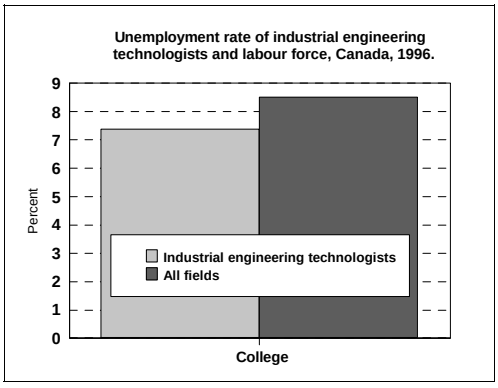
- Almost all (99%) of the 207,420 industrial engineering technologists (FOS 340-348) in Canada's work force in 1996 had a college credential.
- The majority of civil engineering technologists (59%) were in goods-producing industries, whereas about one quarter (26%) were in services-producing industries.
- Seven in ten of the 120,905 industrial engineering technologists working in goods-producing industries were in manufacturing, and around one in five were in construction industries. Fabricated metal products utilized one quarter of the industrial engineering technologists working in manufacturing, while about one in five were in transportation equipment and one in ten were in machinery products.



- Wholesale/retail trade accounted for 37% of the 52,615 industrial engineering technologists working in the services sector. More than one in ten were in transportation/storage services, and about one in ten were reported in government services. Not many of the industrial engineering technologists working in the services sector were in business services (fewer than one in ten); of those, most were in engineering/scientific/technical services, with only one in ten or so in computer services.

Unemployment

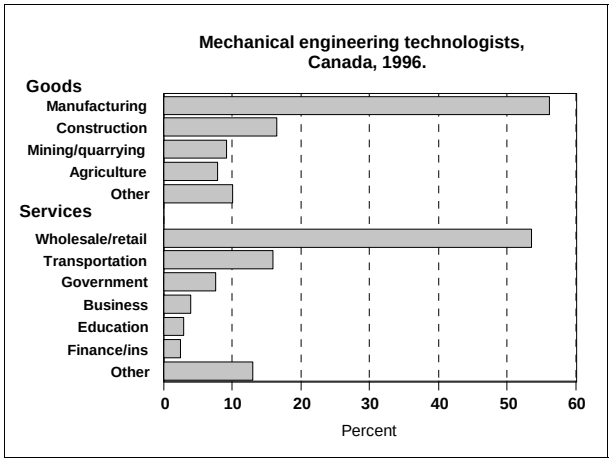
- Industrial engineering technologists enjoyed lower unemployment than college graduates in Canada's labour force overall. In 1996, industrial engineering technologists reported an unemployment rate of 7.4%, whereas the unemployment figure for all college graduates in Canada's labour force was 8.5%.



Mechanical Engineering Technologists

Industry of employment

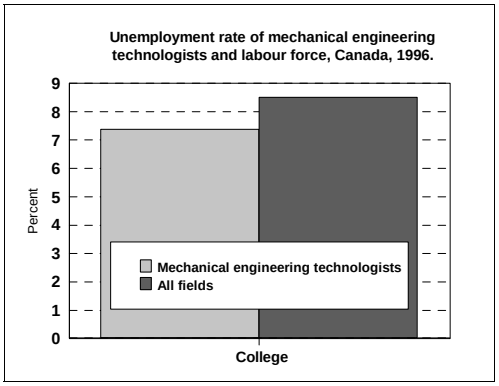
- In 1996, there were 456,105 mechanical engineering technologists (FOS 349-358) in Canada's work force.
- Thirty-one percent of the mechanical engineering technologists were in goods-producing industries and 55% were in the services sector.
- More than half (56%) of the 140,895 mechanical engineering technologists in goods-producing industries were in manufacturing industries. Sixteen percent were working in construction industries and almost one in ten were in mining/quarrying industries. Transportation equipment employed most mechanical engineering technologists in manufacturing industries (22%), and about one in ten each were in either fabricated metal industries or paper/publishing/allied products.



- Wholesale/retail trade utilized more than half (54%) of the 248,540 mechanical engineering technologists working in the services sector. Sixteen percent were working in transportation/storage industries and fewer than one in ten were in government services. Few were in business services.

Unemployment

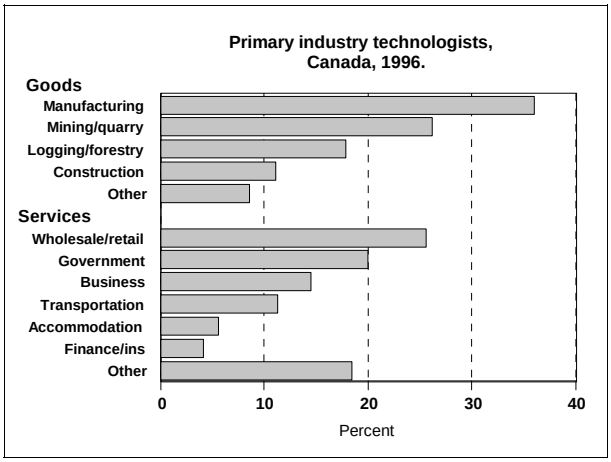
- Mechanical engineering technologists enjoyed lower unemployment in 1996 than all college graduates in Canada's labour force. The unemployment rate for college-trained mechanical engineering technologists was only 7.4%, compared with 8.5% reported by all college graduates in Canada's labour force.



Primary Industry Technologists

Industry of employment

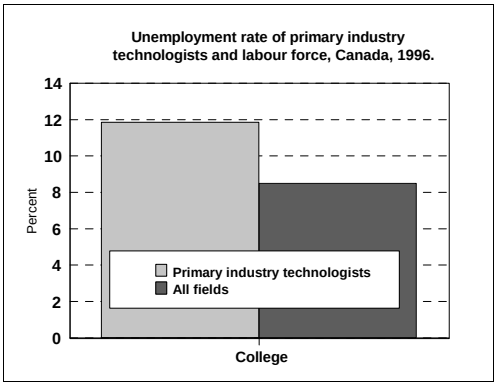
- There were 41,970 primary industry technologists[16] (FOS 359-362) in Canada's work force in 1996, all reporting college credentials.
- As expected, most of the primary industry processing technologists were in goods-producing industries (57%), while 29% were in the services sector.
- More than one third (36%) of the 23,790 primary industry technologists in goods-producing industries were in manufacturing, followed by mining/quarrying industries which employed 26% of them. There were almost one in five reported in logging/forestry industries, and at least one in ten were in construction industries. The primary industry technologists working in manufacturing industries were for the most part in wood industries (34%), while about one in five were in paper/publishing/allied products and one in ten or so in primary metal industries.



- At least one quarter of the 12,315 primary industry technologists in services-producing industries were in wholesale/retail trade. The next largest share (one in five) were in government services. Fourteen percent of them were in business services, and around one in ten were in transportation/storage services. Of those in business services, seven in ten were in engineering/scientific/technical services.

Unemployment

- Primary industry technologists suffered higher unemployment in 1996 than their college-educated colleagues across Canada's labour force. The unemployment rate of primary industry technologists was 11.9% in 1996, more than three percentage points higher than the 8.5% reported by all college graduates in Canada's labour force.

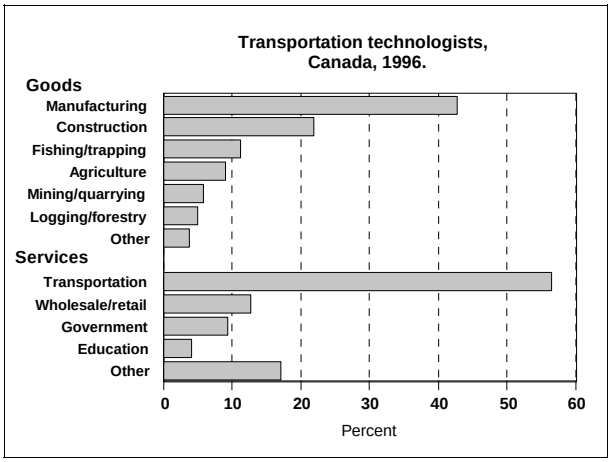


[16] Includes resource processing technologists.

Transportation Technologists

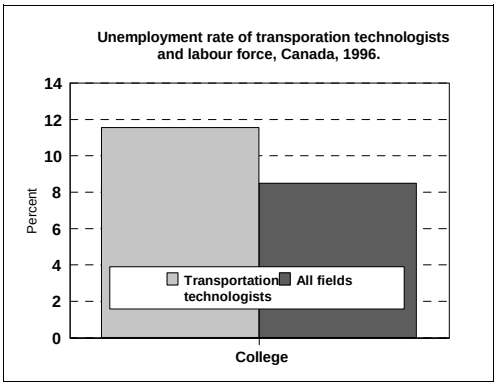
Industry of employment

- All of the 66,725 transportation technologists (FOS 363-368) reported in Canada's work force in 1996 were college-trained. About one in five of them were in goods-producing industries, and 65% were in the services sector.
- Two in five of the 12,620 transportation technologists in goods-producing industries were in manufacturing industries, and at least one in five were in construction industries. Around one in ten were in either fishing/ trapping industries or agriculture/related industries. Within the manufacturing industries, about the same share of transportation technologists (16-17%) were working in food industries as in transportation equipment industries.
- There were 43,655 transportation technologists working in services-producing industries in 1996, and as expected most of them (57%) were in transportation/storage services. Thirteen percent were in wholesale/retail trade, and around one in ten were in government services.



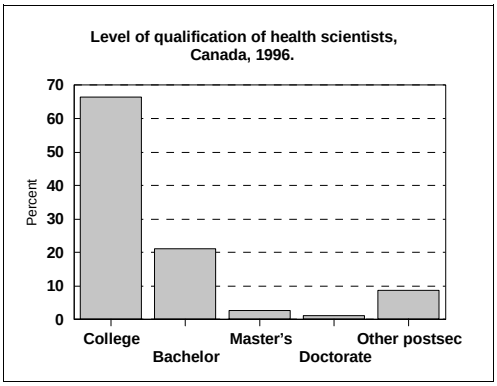
Unemployment

- The unemployment rate of transportation technologists was considerably higher than that of their college-trained colleagues across the economy. In 1996, the unemployment rate for college-trained transportation technologists was 11.6%, compared with a college-graduate national average of only 8.5%.

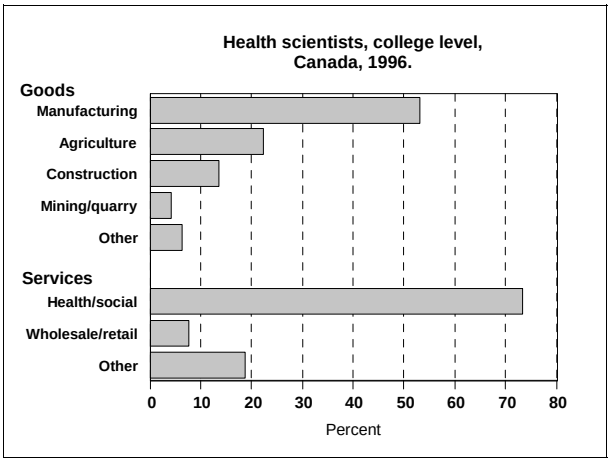


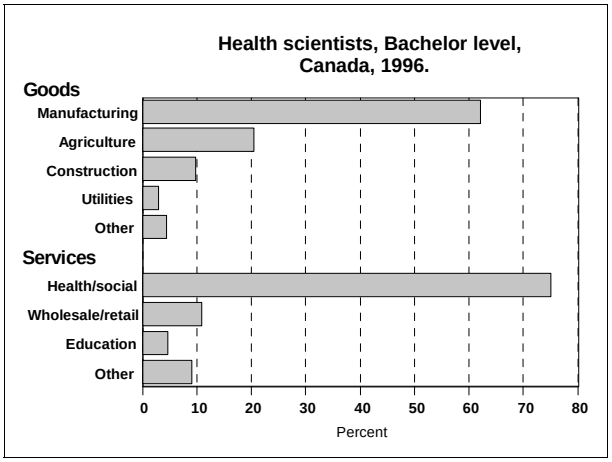
Health Scientists

Industry of employment



- In 1996, there were more than one million (1,027,065) health scientists[17] (FOS 370-441) in Canada's work force.
- Two thirds of the health professionals reported a college credential as their highest qualification, and about one quarter had a university degree (21% reported a Bachelor[18] degree, 3% a Master's and only 1% a Doctorate).
- Only 5% of the 681,710 college-trained health scientists were in goods-producing industries and 74% were in services-producing industries.
- More than half of the 35,480 college-trained health scientists in goods-producing industries were in manufacturing. At least one in five were reported in agriculture/related industries and one in ten in construction. Although those working in manufacturing were found in the range of industries, slightly higher shares (more than 10%) were reported in food products and transportation equipment industries as well as in industries like chemical products, electrical/electronic products, wood industries and clothing industries (each with between 6% and 7%).
- Almost three quarters of the 505,065 college-trained health scientists working in the services sector were, as might be expected, in health/social services. Slightly fewer than one in ten were in wholesale/retail trade.
- Only 2% of the 216,500 health scientists with a Bachelor degree were in goods-producing industries, and 84% were in the services sector.
- Of the 4,535 Bachelor-equipped health scientists in goods-producing industries, most of them (62%) were in manufacturing, with about one in five in agriculture and one in ten or so were in construction industries. Within manufacturing, it was chemical products which accounted for the largest share (29%) with some one in ten reported in food products or printing/publishing/allied products.





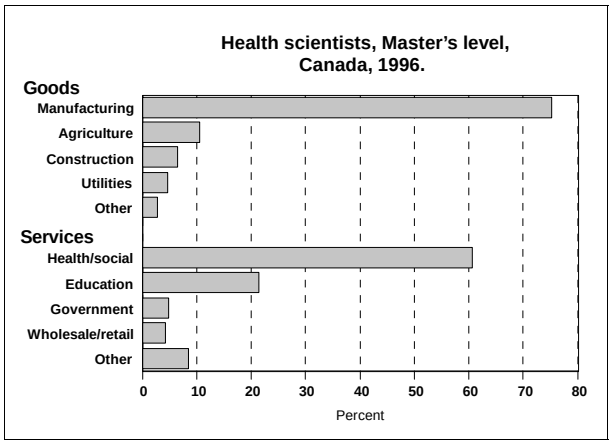
- As with their college-trained colleagues, three quarters of the 182,355 health scientists with a Bachelor degree working in the services sector were in health/social services, with about one in ten in wholesale/retail trade.
- A slight higher share of the 28,435 health scientists with a Master's degree were in goods-producing industries (3%) compared with their Bachelor-trained colleagues; 85% of the health scientists with a Master's degree were in services-producing industries.

[17] Includes health professionals.

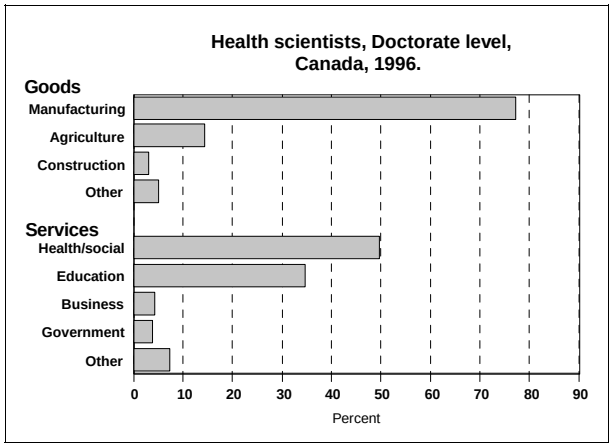
[18] Includes "first professional" degrees.

Health Scientists

- Most of the 850 health scientists with a Master's degree in goods-producing industries were in manufacturing (at least half of them were in chemical products), and one in ten or so were in agriculture.
- At the Master's level of qualification, the dominance of health/social services was less than other levels hitherto examined. Only 61% of the 24,080 health scientists with a Master's degree working in the services sector were in health/professional services, as they were now shared by education services, which attracted a 21% share of them.



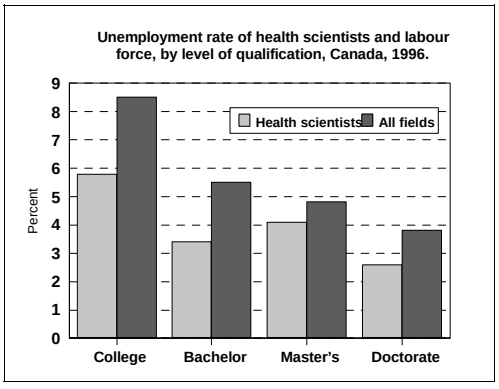
- An even higher share of health scientists with a Doctorate were in goods-producing industries than in other qualifications examined. Four percent of the 12,235 Doctorate-qualified health scientists were in goods-producing industries, and 83% were in services-producing industries.
- Of the some 500 health scientists with a Doctorate working in goods-producing industries, more than three quarters were in manufacturing, and more than one in ten were in agriculture. It was again chemical products which attracted the largest share (67%) of those working in manufacturing.



- As seen among the health scientists with a Master's degree, the 10,100 with a Doctorate working in the services sector were distributed mainly in health/social services and education services: half were reported in health/social services and one third were in education.

Unemployment

- Health scientists enjoyed lower unemployment than their colleagues across Canada's labour force when level of qualification is considered.
- As mentioned, the college-trained health scientists enjoyed lower unemployment than their college colleagues across Canada's labour force in 1996, and considerably so. College-trained health scientists had an unemployment rate of only 5.8% in 1996, compared with the 8.5% reported for all college graduates.



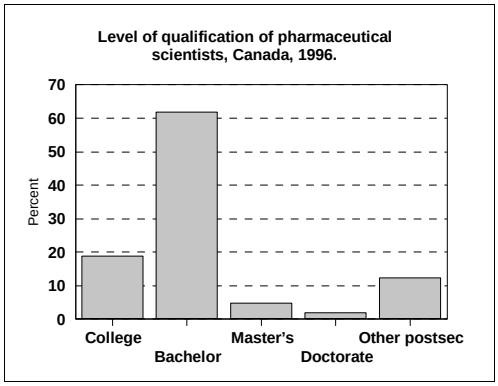
- The gaps between health scientists and the national averages were somewhat narrower at the university level. Health scientists with a Bachelor degree had an unemployment rate of only 3.4% in 1996, compared with 5.5% reported by the entire Bachelor-qualified cohort of Canada's labour force. The unemployment rate of Master's-qualified health scientists was 4.1%, compared with 4.8% for all Master's graduates in Canada's labour force.

- Health scientists with a Doctorate had an unemployment rate of only 2.6% in 1996, compared with the 3.8% national average for Doctorate degree holders.

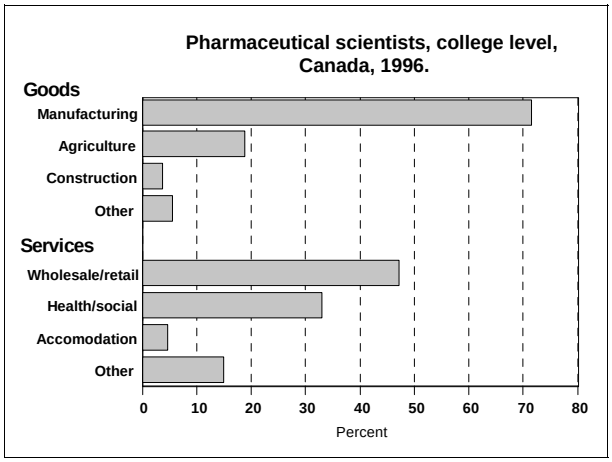
Pharmaceutical Scientists

Industry of employment

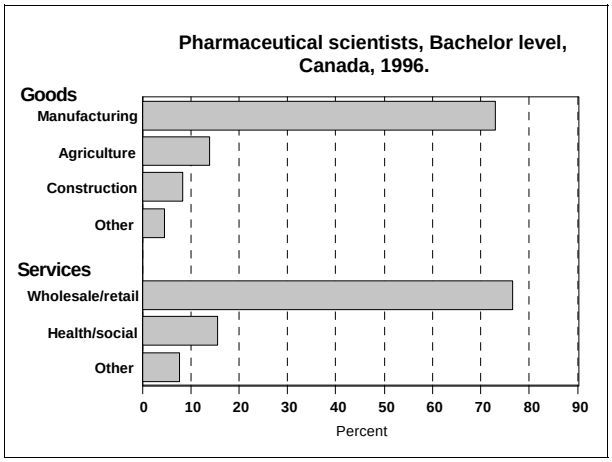
- In 1996, there were 37,860 pharmaceutical scientists[19] (FOS 412-413) in Canada's work force. One in five of the pharmaceutical scientists reported a college credential. Sixty-two percent of them had a Bachelor degree and 7% a graduate level degree (5% had a Master's degree and 2% a Doctorate).



- Only 7% of the 7,165 college-trained pharmaceutical scientists were in goods-producing industries, and 77% were in the services sector.
- Seventy-two percent of the 530 college-trained pharmaceutical scientists in goods-producing industries were in manufacturing, and about one in five were in agriculture/related industries. Of those in manufacturing, the largest share (34%) was in chemical products.



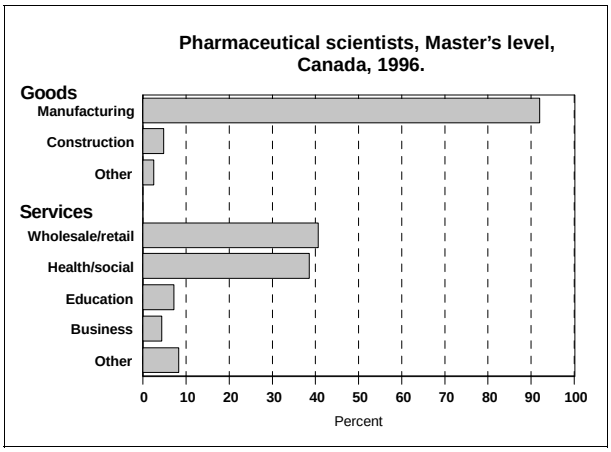
- Almost half of the 5,535 pharmaceutical scientists with a college credential working in the services sector were in wholesale/retail trade. Another one third were in health/social services.
- There were 23,425 pharmaceutical scientists with a Bachelor degree in Canada's work force. Almost none of them (only 2%) were in goods-producing industries, whereas 83% were in services-producing industries.
- Of the 540 or so Bachelor-qualified pharmaceutical scientists working in goods-producing industries, three quarters of them were in manufacturing industries (almost all of which were in chemical products), and about 14% were in agriculture/related industries.

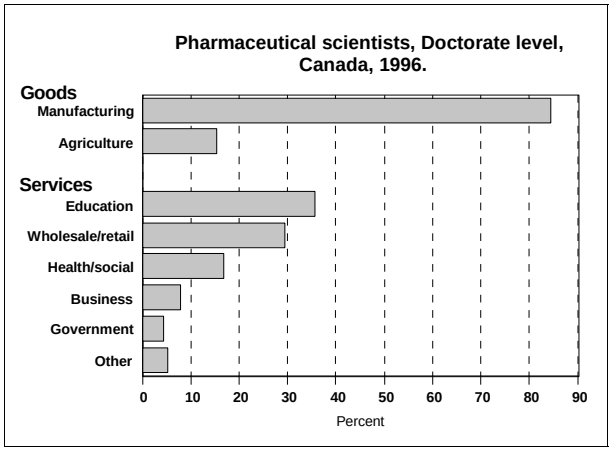


- Nearly four in five of the 19,520 Bachelor-qualified pharmaceutical scientists working in the services sector were in wholesale/retail trade. Almost all of the others were in health/social services.
- One in ten of the 1,870 pharmaceutical scientists with a Master's degree were in goods-producing industries, and three quarter of them were in services-producing industries.
- Almost all of the 195 Master's-equipped pharmaceutical scientists in goods-producing industries were in manufacturing, and almost all of them were in chemical products.
- Wholesale/retail trade and health/social services shared the 1,410 pharmaceutical scientists with a Master's degree working in the services sector, each accounting for some two in five. Only 5% or so were in business services, where they were almost all in engineering/scientific/technical services.

[19] Includes pharmacists.

Pharmaceutical Scientists

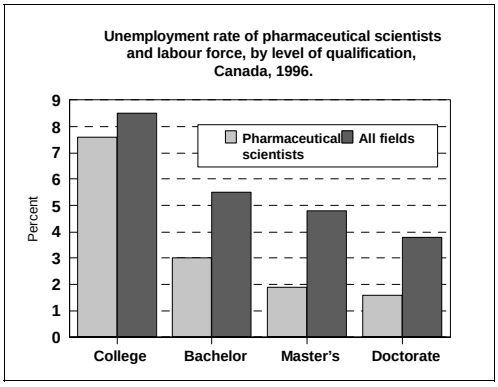




- There were 765 pharmaceutical scientists with a Doctorate. Fewer than one in ten were in goods-producing industries, and close to three quarters were in services-producing industries.
- Almost all (86%) of the 65 or so Doctorate-qualified pharmaceutical scientists reported in goods-producing industries were in manufacturing, with the rest reported in agriculture/related industries. As with their Bachelor- or Master's-qualified colleagues, pharmaceutical scientists with a Doctorate reported in manufacturing were found in chemical products.
- At the Doctorate level, it was education services which accounted for most of the pharmaceutical scientists (36%). Wholesale/retail trade attracted the second largest share of 30%. Fewer than one in ten were in business services, and of those, only one in five were in engineering/scientific/technical services.

Unemployment

- Pharmaceutical scientists enjoyed lower unemployment than the national average when level of qualification is considered.
- Pharmaceutical scientists with a college credential had an unemployment rate of 7.6% in 1996, compared with 8.5% for all college graduates in Canada's labour force.
- The unemployment rate of pharmaceutical scientists with a Bachelor degree was almost half that of the national average for Bachelor degree holders: 3.0% versus 5.5%. For those with a Master's degree, the gap was even wider: pharmaceutical scientists had an unemployment rate of only 1.9%, compared with the 4.8% reported by all Master's graduates.

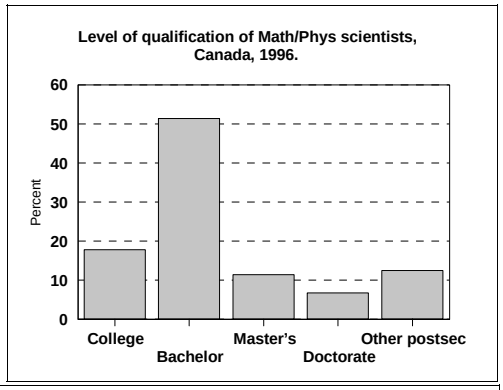


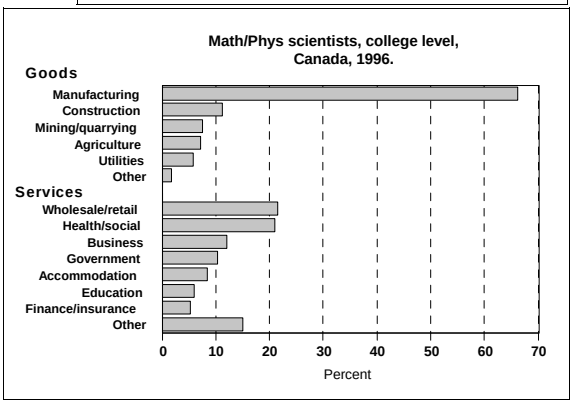
- The unemployment rate of Doctorate-qualified pharmaceutical scientists was less than half the national average for Doctorate graduates in Canada's labour force: 1.6% versus 3.8%.

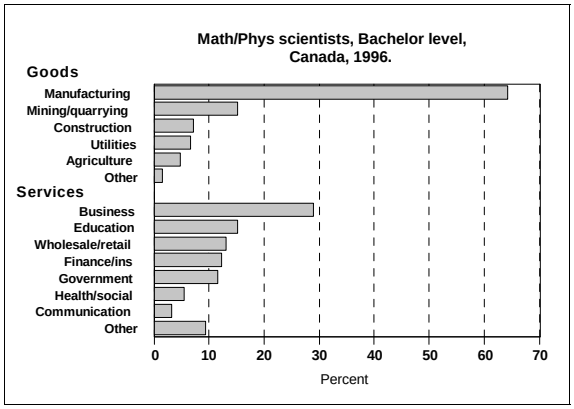
Mathematical and Physical Scientists

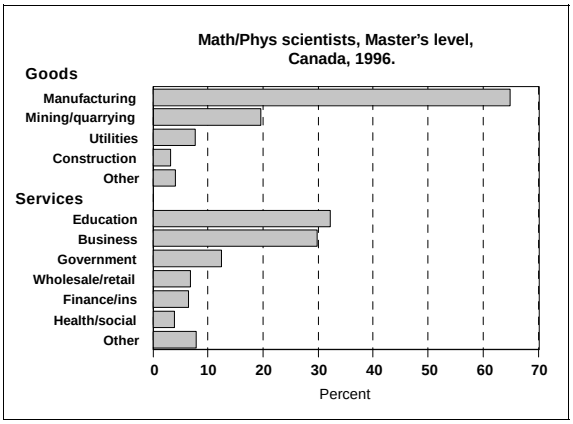
Industry of employment

- Mathematical/physical scientists[20] (FOS 442-480) numbered 306,860 in 1996. Slightly fewer than one in five reported a college credential (18%) and slightly more than half (52%) had a Bachelor degree. Eleven percent of the Math/Phys scientists had a Master's degree and 7% a Doctorate.
- One in five of the 54,490 college-trained Math/Phys scientists were in goods-producing industries and three in five were in the services sector.
- Manufacturing industries utilized two thirds of the 11,960 Math/Phys scientists with college credentials working in goods-producing industries; one in ten were in construction industries. Within manufacturing industries, chemical products accounted for the largest share of 19%; at least one in ten were in primary metal industries, transportation/ equipment industries or food products.
- Wholesale/retail trade and health/social services each accounted for one in five of the 32,935 college-trained Math/Phys scientists in service-producing industries. At least one in ten each were in government or business services (within business services it was engineering/scientific/ technical services which employed half of them, and slightly more than one in ten were in computer services).
- There were 158,175 Math/Phys scientists with a Bachelor degree. Seventeen percent of them were in goods-producing industries and 72% were in services-producing industries.
- Manufacturing industries accounted for 64% of the 26,715 Bachelor-qualified Math/Phys scientists in goods-producing industries. Fifteen percent were in mining/quarrying and about half that share were in construction. Among those reported in manufacturing, chemical products and electrical/electronic products each employed about one in five. Between 7% and 8% were in either transportation/equipment, printing/publishing/allied industries or food products.
- Business services utilized 29% of the 113,075 Bachelor-qualified Math/Phys scientists in the services sector . At least 15% were in education services; between 12% and 13% were in either wholesale/retail trade, finance/insurance industries or government services. As might be expected, more than half of those reported in business services were in computer services and about one fifth were in engineering/scientific/technical services.





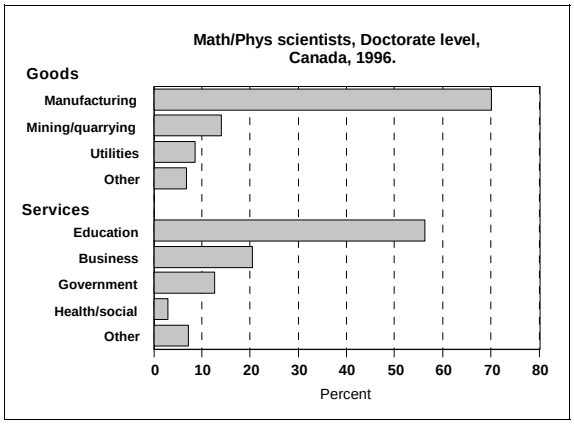




[20] Includes technologists.

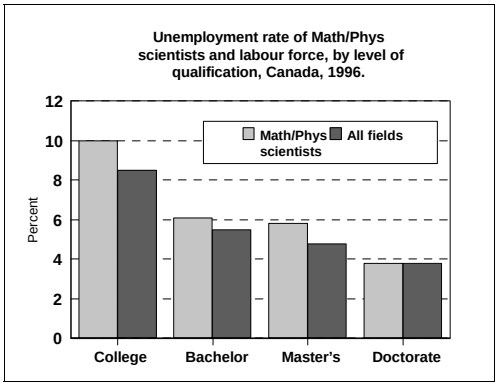
Mathematical and Physical Scientists

- About 15% of the 35,155 Math/Phys scientists with a Master's degree were in goods-producing industries whereas 73% were in service-producing industries.
- Almost the same share of the 5,250 Math/Phys scientists with a Master's degree working in goods-producing industries were in manufacturing industries as their Bachelor-qualified colleagues — 65%. One fifth were reported in mining/quarrying industries. Within manufacturing, they tended to be reported in electrical/electronic products (one third of them) or in chemical products (one quarter of them).
- While education services utilized 32% of the 25,485 Master's-qualified Math/Phys scientists working in the services sector, business services' reliance upon this skill set was not far behind with a 30% share. More than one in ten were in government services. Within business services, again as might be expected, most of the Math/Phys scientists with a Master's degree were in computer services (52%), and about one third were reported in engineering/scientific/technical services.
- Twelve percent of the 20,660 Math/Phys scientists with a Doctorate degree were in goods-producing industries, and 77% were in service-producing industries.
- At this level of qualification, manufacturing industries utilized seven in ten of the 2,430 Doctorate-qualified Math/Phys scientists reported in goods-producing industries. Some 14% were in mining/quarrying industries and just under one in ten were in utilities. Within manufacturing, at this level of qualification it was chemical products which utilized most of the Math/Phys scientists (37%) followed by electrical/electronic products (20%).
- More than half (56%) of the 15,940 Doctorate-qualified Math/Phys scientists in the services sector were in education services. At least one in five were in business services, and at least one in ten were in government services. The trend in business services for Math/Phys scientists with a Doctorate was contrary to that seen among other university graduates; at this level of qualification, it was engineering/scientific/technical services which accounted for most of them (three in five), with about one quarter working in computer services.



Unemployment

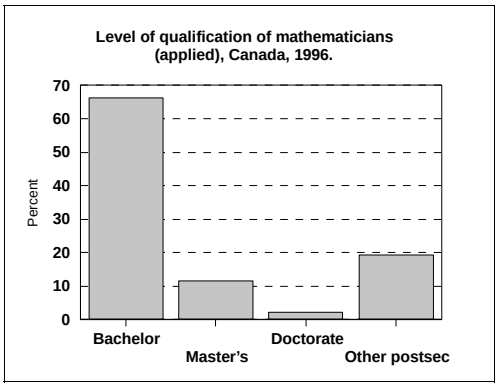
- Math/Phys scientists had unemployment rates above the national average (except for those with a Doctorate) in 1996 when level of qualification is considered.
- The unemployment rate of Math/Phys scientists with a college credential was 10.0% in 1996, compared with 8.5% for all college graduates in Canada's labour force. For Math/Phys scientists with a Bachelor degree, the unemployment rate was 6.1%, whereas for all Bachelor graduates it was only 5.5%. The gap was even wider among those with a Master's degree — for Math/Phys scientists, the unemployment rate was 5.8%, whereas for all Master's degree holders it was only 4.8%.
- It was Math/Phys scientists with a Doctorate degree who proved to be the exception. With an unemployment rate of only 3.8%, they matched the unemployment rate of all Doctorate degree holders in Canada's work force in 1996.



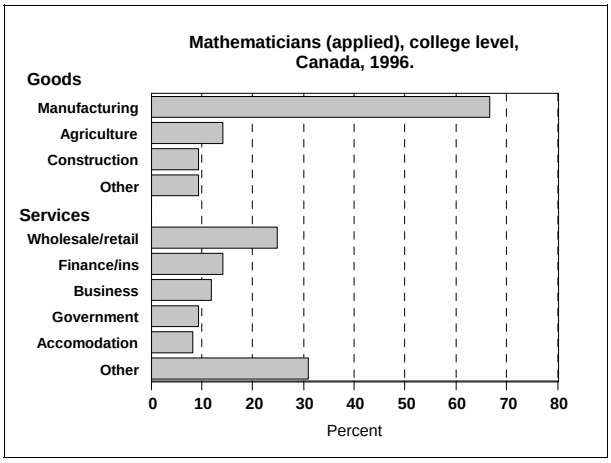
Mathematicians (Applied Mathematics)

Industry of employment

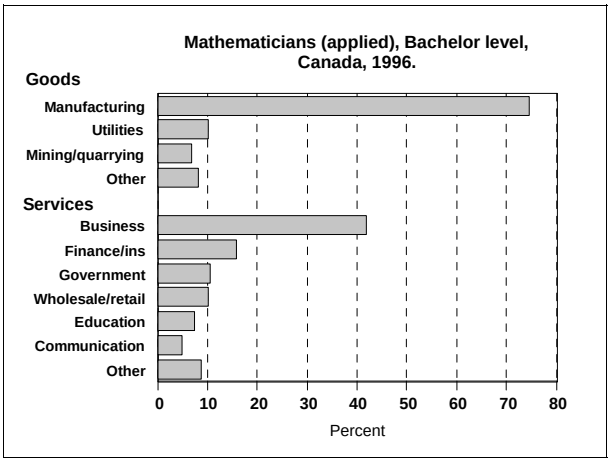
- In 1996, there were 83,455 mathematicians[21] (FOS 442-447) in Canada's work force. Fewer than 1% (only 715) had a college credential. Two thirds of the mathematicians had a Bachelor degree and more than one in ten had a graduate-level degree (11% had a Master's degree and 2% a Doctorate).



- Some 15% of the 715 college-trained mathematicians were in goods-producing industries, and 60% or so were in service-producing industries.
- Two thirds of the 105 or so mathematicians with college training working in goods-producing industries were in manufacturing.
- Of the 420 college-trained mathematicians working in the services sector, most of them (25%) were in wholesale/retail trade, and at least one in ten each were in finance/insurance industries or business services.



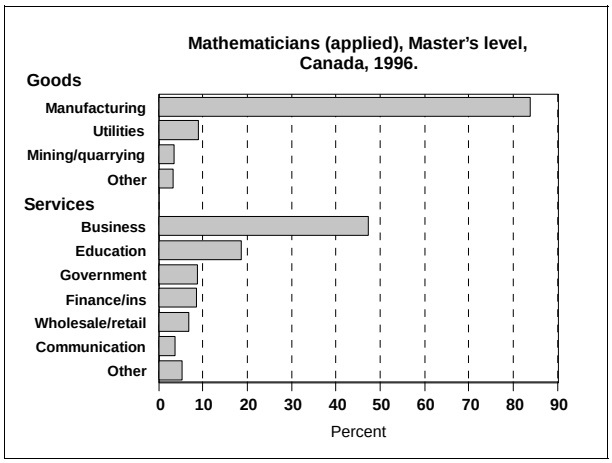
- Twelve percent of the 55,245 mathematicians with a Bachelor degree were in goods-producing industries and 82% were in service-producing industries.
- Three quarters of the 6,830 Bachelor-equipped mathematicians working in goods-producing industries were in manufacturing, and about one in ten were in utilities. Electrical/electronic industries utilized more than one third of those working in manufacturing, with some one in ten reported in printing/publish- ing/allied industries or transportation equipment.



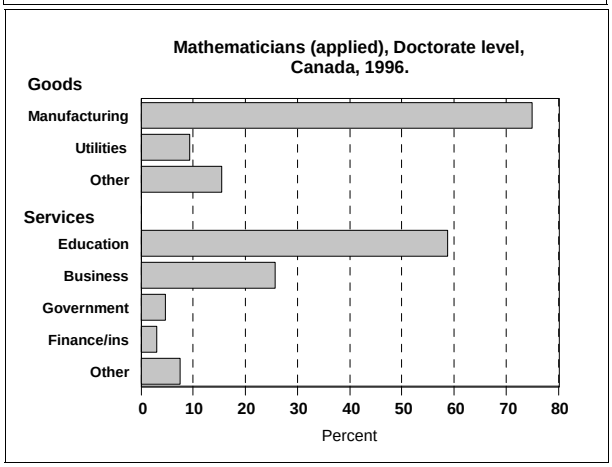
- As could be predicted, at least two in five of the 45,075 Bachelor-trained mathematicians working in the services sector were in business services. The second largest share was in finance/insurance industries. At least one in ten each were in government services and wholesale/retail trade, and only 7% or so were in education services. Business services include computer services and it was clearly computer services driving the attraction of business services — three quarters of the mathematicians with a Bachelor degree working in business services were in computer services; fewer than one in ten were in engineering/scientific/technical services.
- There were 9,560 mathematicians with a Master's degree in Canada's work force in 1996, and their distribution between goods- and services-producing industries was about the same as that of their Bachelor-qualified colleagues: 13% of them were in goods-producing industries and 79% were in services industries.
- Among the 1,210 Master's-qualified mathematicians working in goods-producing industries, more than four in

[21] Includes graduates of "applied" mathematics; for general mathematics, refer to mathematicians (FOS 464).

five were in manufacturing, and one in ten or so were in utilities. At this level of qualification, it was electrical/electronic industries which accounted for most of the mathematicians reported in manufacturing — 64%.



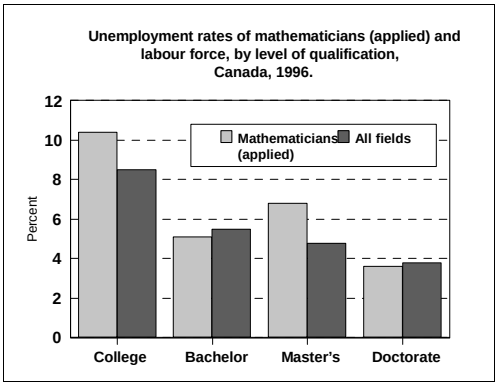
- At the Master's level, the dominance of business services as employers was evident. Forty-eight percent of the 7,590 mathematicians with a Master's degree working in the services sector were in business services. One in five were in education services, and between 7% and 9% were in either government services, finance/insurance industries or wholesale/ retail trade. Four in five of those reported in business services were in computer services, and only 7% or so were in engineering/scientific/technical services.



- At the Doctorate level of qualification, the share of the 1,915 mathematicians in goods-producing industries had fallen to only some 8%, whereas 86% were reported in services-producing industries.
- True to the trend, manufacturing industries accounted for almost all (three quarters) of the 160 Doctorate-qualified mathematicians working in goods-producing industries, with about one in ten in utilities. And of those in manufacturing, almost all of them were in electrical/electronic products.
- Unlike the other degree levels, among the 1,650 Doctorate-qualified mathematicians working in services-producing industries, it was education services which accounted for the largest share — 59%. Business services ranked second with a 26% share. For the first time, the share of mathematicians within business services in computer services fell below three quarters (66%), whereas there were 16% reported in engineering/ scientific/technical services.

Unemployment

- There weren't many mathematicians with college credentials, but they suffered higher than average unemployment in 1996: for mathematicians with college training the unemployment rate was 10.4%, whereas for all college graduates in Canada's labour force it was a lower 8.5%.

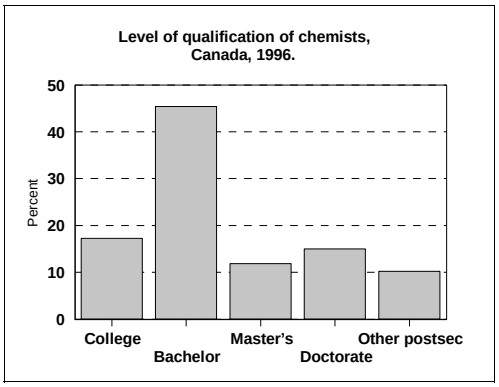


- Mathematicians with a Bachelor degree enjoyed slightly lower unemployment than all Bachelor graduates in Canada's labour force: 5.1% versus 5.5%. In contrast, those with a Master's degree reported higher unemployment than the national average: for mathematicians with a Master's degree, the unemployment rate was 6.8%, but for all Master's graduates it was only 4.8%. Mathematicians with a Doctorate had an unemployment rate slightly lower than the national average in 1996: for mathematicians it was 3.6%, compared with 3.8% for all Doctorate graduates.

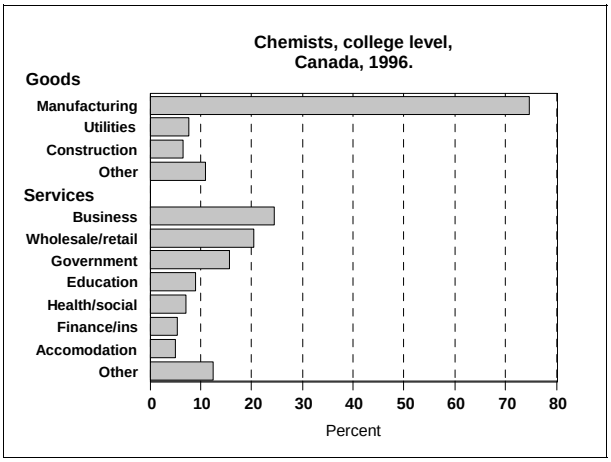
Chemists

Industry of employment

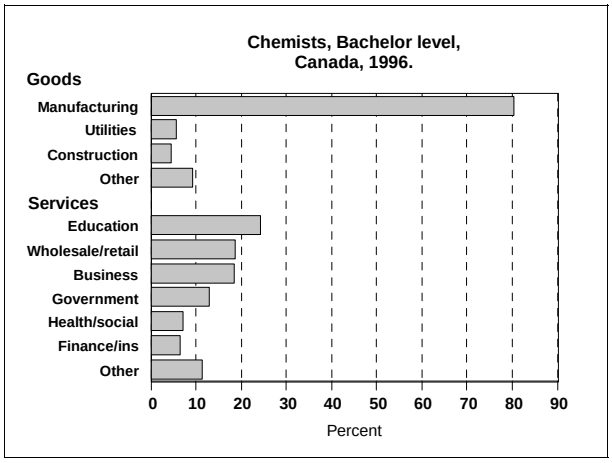
- There were 45,920 chemists (FOS 448-454) in Canada's work force in 1996. Seventeen percent reported a college credential as their highest qualification. Forty-five percent of them had a Bachelor degree. This was another field in S&T where the number of Master's degree holders were outnumbered by those with a Doctorate: 12% had a Master's degree and 15% had a Doctorate.



- More than one third (37%) of the 8,000 college-trained chemists were in goods-producing industries, and fewer than half (45%) were in services-producing industries.
- Three quarters of the 2,970 college-trained chemists working in goods-producing industries were in manufacturing. More than four in ten of those in manufacturing were in chemical products, and at least one in ten were in primary metal industries.
- Of the 3,630 chemists with a college credential working in services-producing industries, the largest share was in business services (24%), followed by wholesale/retail trade with a 21% share. More than one in ten were government services and close to one in ten were in education services. Within business ser- vices, seven in ten of them were in engineering/ scientific/technical services, with only 8% or so in computer services.



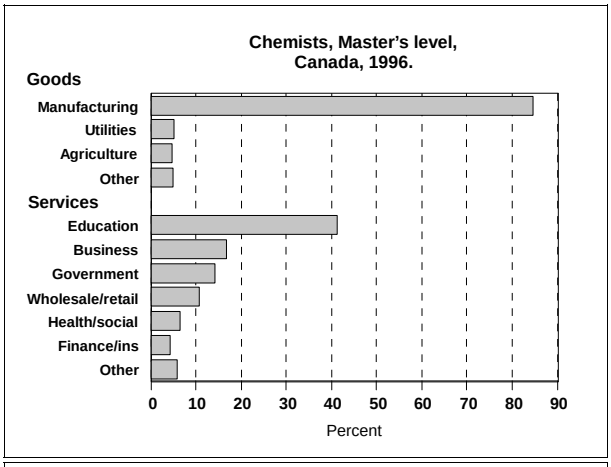
- Twenty-six percent of the 20,835 chemists with a Bachelor degree were in goods-producing industries, and 56% were in services-producing industries.
- Four in five of the 5,490 Bachelor-equipped chemists working in goods-producing industries were in manufacturing. Close to half of those in manufacturing as might be expected were in chemical products, and just under one in ten were in food products.
- One quarter of the 11,695 chemists with a Bachelor degree in the services sector were in education services. One in five each were in either wholesale/ retail trade or business services, with some one in ten in government services. Of those reported in business services, it was engineering/scientific/technical services which utilized just under half of them, with close to one in five in computer services.

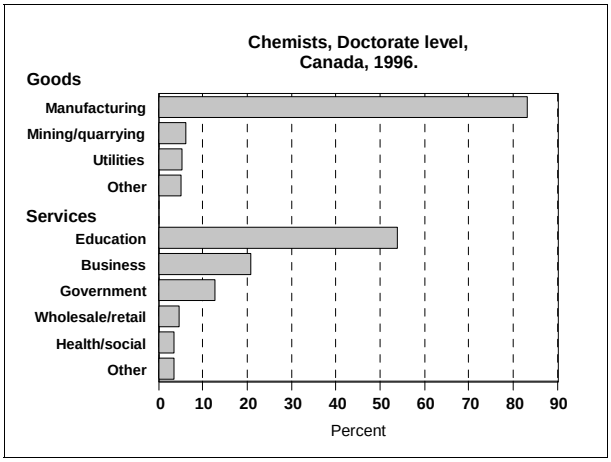


- There were 5,510 chemists with a Master's degree. One in five were in goods-producing industries and at least three in five were in services-producing industries.
- More than four in five of the 1,220 Master's-qualified chemists working in goods-producing industries were in manufacturing, in which more than half were employed in chemical products industries.
- Four in ten of the 3,400 chemists with a Master's degree working in the services sector were in education

services. The second largest share of 17% were reported in business services, with 14% in government services. About one in ten were in wholesale/retail trade. Three in five of those reported in business services were in engineering/scientific/technical services, and one in five were in computer services.

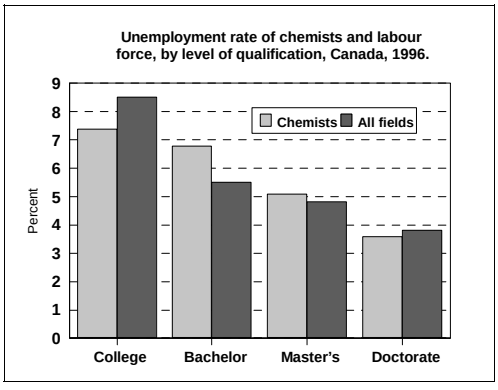
- Sixteen percent of the 6,910 chemists with a Doctorate were in goods-producing industries and 72% were in services-producing industries.
- Following the trend, almost all of the 1,135 Doctorate-qualified chemists reported in goods-producing industries were in manufacturing, and most of them (58%) were in chemical products.
- More than half of the 4,975 chemists with a Doctorate degree working in the services sector were in education services. One in five were in business services and 13% were in government services. At this level of qualification, it was engineering/scientific/ technical services which accounted for three quarters of the chemists working in business services, with about one in ten in computer services.





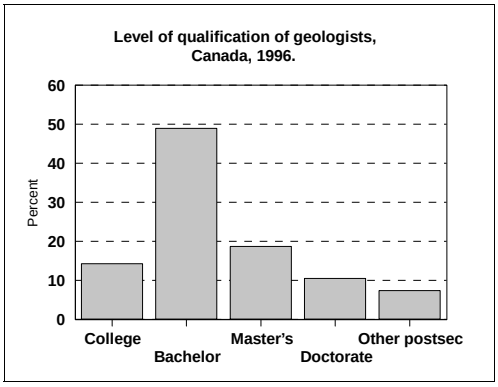
Unemployment

- It was chemists with college credentials who enjoyed lower than average unemployment rates . In 1996, the unemployment rate of chemists with a college credential was 7.4%, more than one percentage point lower than the 8.5% reported by all college graduates in Canada's labour force.
- Chemists with a Bachelor degree did not fare as well. In 1996, chemists with a Bachelor degree had an unemployment rate of 6.8%, which was more than one percentage point higher than the 5.5% reported by all Bachelor graduates in Canada's labour force. For chemists with a Master's degree, the unemployment rate was 5.1%, compared with 4.8% for the total Master's-qualified labour force.
- Chemists with a Doctorate degree enjoyed lower unemployment than the national average, albeit by a slight margin. In 1996, the unemployment rate for chemists was 3.6%, compared with 3.8% for all Doctorate graduates in Canada's labour force.

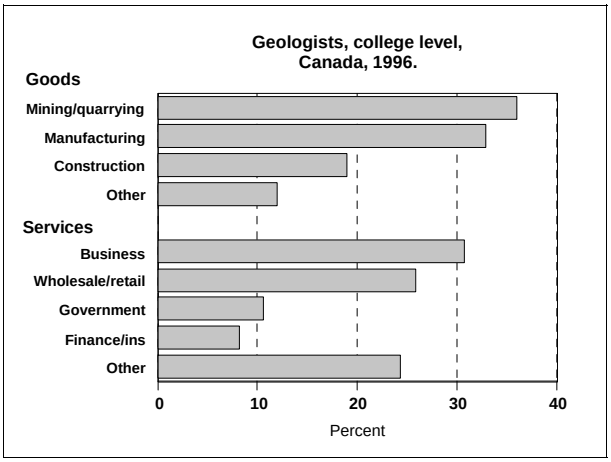


Geologists

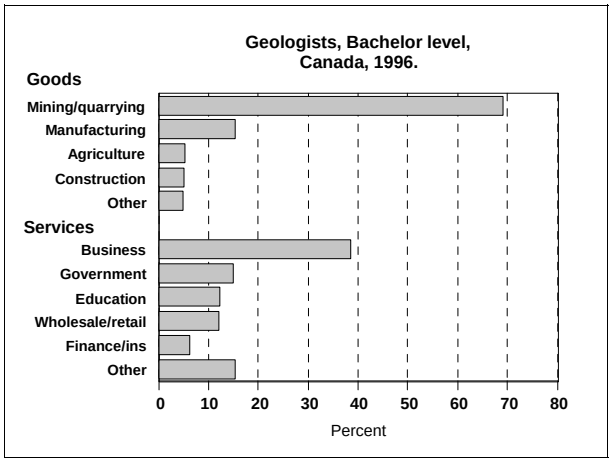
Industry of employment



- In 1996, there were 25,190 geologists (FOS 455-462) in Canada's work force. Fourteen percent of them reported a college credential as their highest qualification. Almost half (49%) of the geologists had a Bachelor degree, and almost one third had a graduate level degree (19% reported a Master's degree and 11% a Doctorate).
- Thirty percent of the 3,615 geologists with a college certificate were in goods-producing industries and 57% in services-producing industries.
- The largest share (36%) of the 1,080 college-trained geologists working in goods-producing industries not surprisingly were reported in mining/quarrying, with the second largest share of 33% being in manufacturing industries. Close to one in five were in construc- tion.



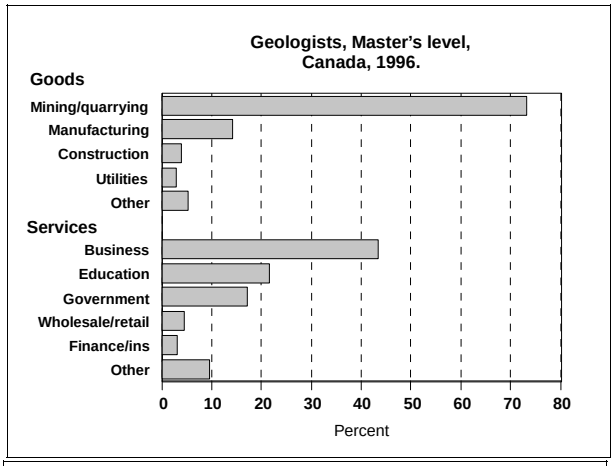
- Within the services sector, the largest share (31%) of the 2,065 college-trained geologists were in business services, with the second largest share of 26% in wholesale/retail trade. Slightly more than one in ten were in government services, and slightly fewer than one in ten were in finance/insurance industries. About two thirds of those working in business services were in engineering/scientific/technical services.
- A large share of the 12,370 Bachelor-equipped geologists were in goods-producing industries (32%), while 56% of them were in services-producing industries.

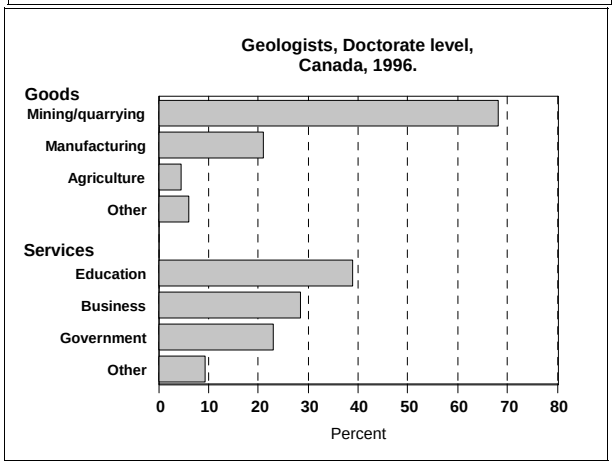


- As expected, it was mining/quarrying industries which utilized most of the 3,960 geologists with a Bachelor degree working in goods-producing industries — 69%. Around 15% or so were in manufacturing, and they were spread across a range of industries: from 8% to 11% were reported in printing/publishing/allied industries, electrical/electronic products, refined petroleum/ oil/gas products, transportation equipment, fabricated metal products or chemical products.
- It was business services which accounted for the largest share (39%) of the 6,955 geologists with a Bachelor degree working in the services sector. Between 12% and 15% each were in government services, education services or wholesale/retail trade. Three quarters of those working in business services were in engineering/scientific/ technical services, and about one in ten were in computer services.
- Just under one quarter of the 4,700 geologists with a Master's degree were in goods-producing industries, and just under two thirds were in services-producing industries.
- Again, it was mining/quarrying which utilized most of the 1,120 Master's-qualified geologists reported in goods-producing industries — 73%. Around 14% were reported in manufacturing (most of them in primary metal products).

Geologists

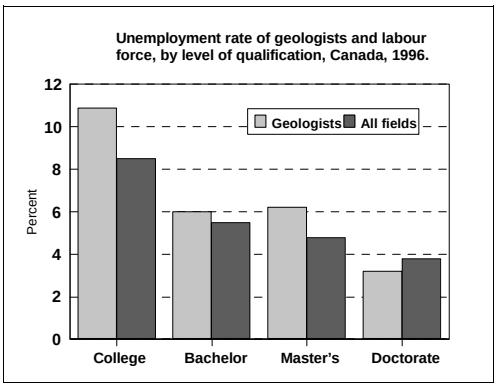
- An even larger share of the 3,030 Master's-qualified geologists in the services sector were in business services than their Bachelor-qualified colleagues: business services accounted for a 44% share of the geologists with a Master's degree working in the services sector. More than one in five were in education services, and slightly fewer than one in five were in government services. Almost all of those in business services were in engineering/scientific/technical services.
- Only a small percentage of the 2,650 geologists with a Doctorate (12%) were in goods-producing industries and three quarters were in goods-producing industries.
- True to the trend, it was mining/quarrying which accounted for most of the Doctorate-qualified geologists in goods-producing industries (almost seven in ten of them), while one in five were in manufacturing. Of those in manufacturing, it was refined petroleum/oil/gas products which employed the largest share.
- At the Doctorate level of qualification, education services utilized most of the 1,980 geologists (39%). Twenty-eight percent were in business services and 23% were in government services. Eight in ten of those working in business services were in engineering/scientific/technical services, and one in ten or so were in computer services.





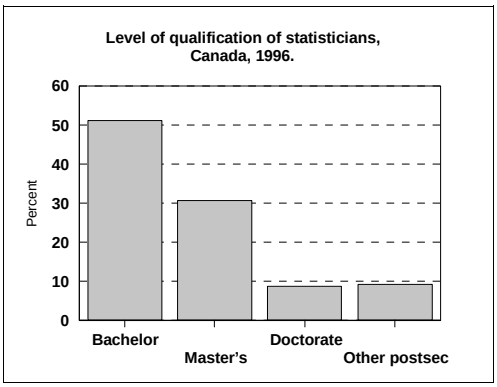
Unemployment

- With the exception of those with a Doctorate, geologists suffered higher unemployment than their counterparts in Canada's labour force in 1996 when level of qualification is considered.
- College-trained geologists had an unemployment rate of 10.9% in 1996, compared with the 8.5% reported for all college graduates in Canada's labour force.
- The gap was narrower for those with a Bachelor degree: for geologists the unemployment rate was 6.0%, slightly above the 5.5% reported for all Bachelor graduates.
- Then among those with a Master's degree, the gap widened. In 1996, the unemployment rate for geologists with a Master's degree was 6.2% compared with the 4.8% reported for all Master's graduates in Canada's labour force.
- Geologists with a Doctorate degree were the only cohort to enjoy lower than national average unemployment in 1996. For geologists the unemployment rate was only 3.2%, compared with 3.8% reported for all Doctorate graduates in Canada's labour force.

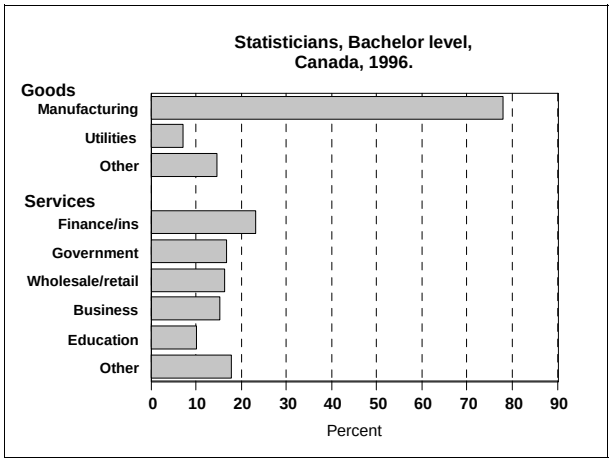


Statisticians

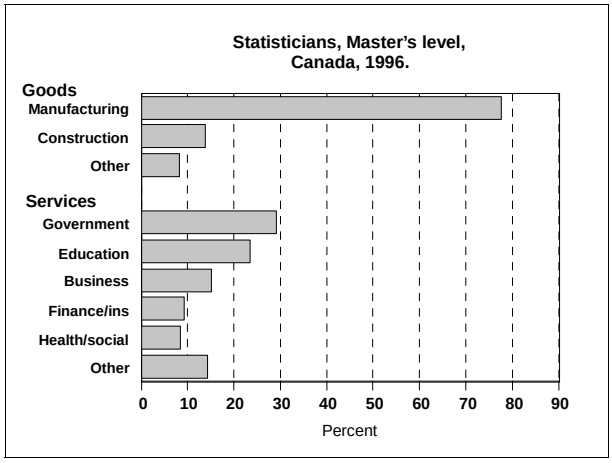
Industry of employment



- There were close to 5,000 (4,895) statisticians (FOS 463) in Canada's work force in 1996. No one reported a college credential. At least half of the statisticians had a Bachelor degree, and four in five had a graduate level degree (31% reported a Master's degree and 9% a Doctorate).
- Fewer than one in ten (8%) of the 2,505 Bachelor-qualified statisticians were in goods-producing industries and three quarters were in services-producing industries.
- Of the 200 or so statisticians with a Bachelor degree working in goods-producing industries, most of them (78%) were in manufacturing industries. The largest share (19%) were in electrical/electronic products, with some reported in chemical products, transportation equipment or printing/publishing/allied products.



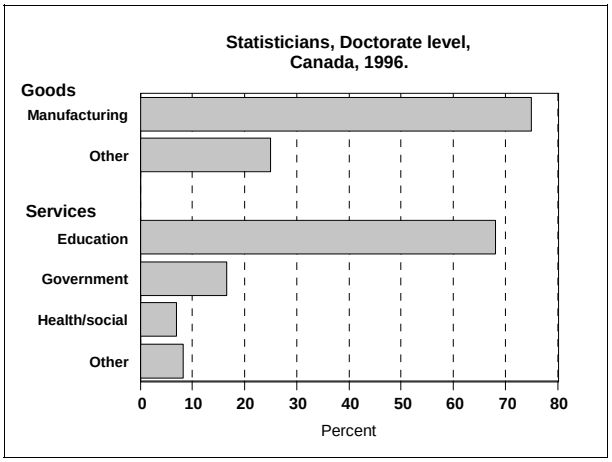
- As might be expected, it was finance/insurance industries which accounted for the largest share (23%) of the 1,895 Bachelor-qualified mathematicians working in the services sector. Government services, business services and wholesale/retail trade each accounted for between 15% and 17% of them. At least one third of those reported in business services were in computer services, with fewer than one in ten in engineering/ scientific/technical services.
- There were 1,505 statisticians with a Master's degree. Slightly more than one in ten were in goods-producing industries and close to eight in ten were in services-producing industries.
- There were only about 200 statisticians working in goods-producing industries, almost all of which were in manufacturing. It appears that they tended to be in chemical products or transportation equipment industries.
- Of the 1,185 Master's-qualified statisticians working in services-producing industries, unlike their Bachelor-qualified colleagues, most of the statisticians with a Master's degree were in government services (29%). The second largest share of 24% were in education services, and about 15% were in business services. Of those in business services, more than one third were in computer services and about one in five were in engineering/scientific/technical services.



- Four hundred and thirty of the mathematicians had a Doctorate. Only one in ten or so were in goods-producing industries, and following the trend seen at other levels they were for the most part in manufacturing (and usually in chemical products).
- Eight-four percent were reported in services-producing industries. Education services accounted for 68% of the

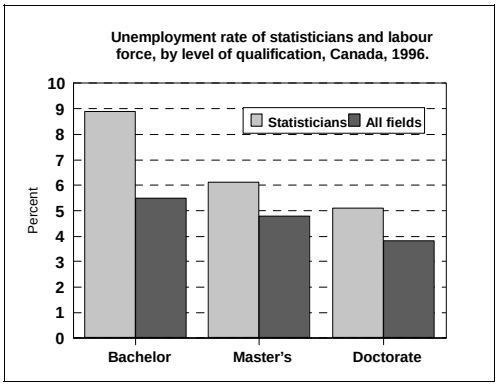
Statisticians

360 mathematicians with a Doctorate working in the services sector. Seventeen percent were each in either business services and finance/insurance industries.



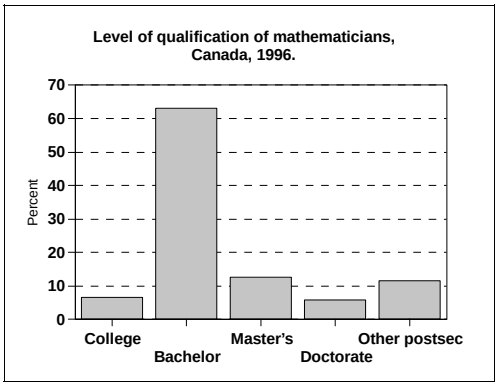
Unemployment

- All mathematicians suffered higher unemployment than the national average for those holding comparable degrees in other disciplines.
- The widest gap was among those with a Bachelor degree: statisticians reported an unemployment rate of 8.9% in 1996, compared with only 5.5% for all Bachelor graduates in Canada's labour force.
- Statisticians with a Master's degree had an unemployment rate of 6.1%, compared with a Master's graduate national average of only 4.8%. Likewise, among those with a Doctorate, for statisticians the unemployment rate of 5.1% was considerably higher than the 3.8% reported for all Doctorate graduates in Canada's labour force.

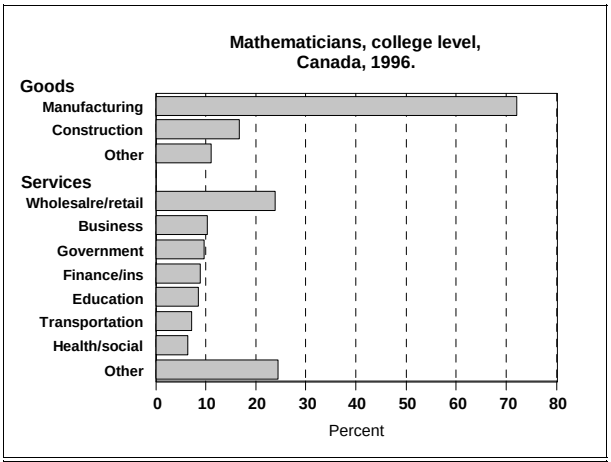


Mathematicians

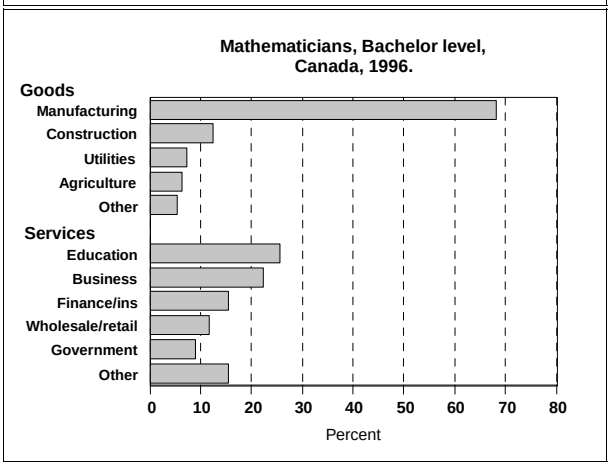
Industry of employment



- In 1996, there were 39,815 mathematicians (FOS 464) in the work force. Only 7% of them reported a college credential. Sixty-three percent had a Bachelor degree, 13% a Master's degree and 6% a Doctorate.
- Slightly fewer than one in five of the 2,615 mathematicians with a college credential were in goods-producing industries, and three in five were in services-producing industries.
- Close to three quarters of the 450 or so college-trained mathematicians were in manufacturing and about one fifth were in utilities.
- The largest share of the 1,605 college-trained mathematicians working in the services sector were in wholesale/retail trade — 24%. Around one in ten each were either in finance/insurance industries, business services or government services. At least one quarter of those in business services were in computer services.



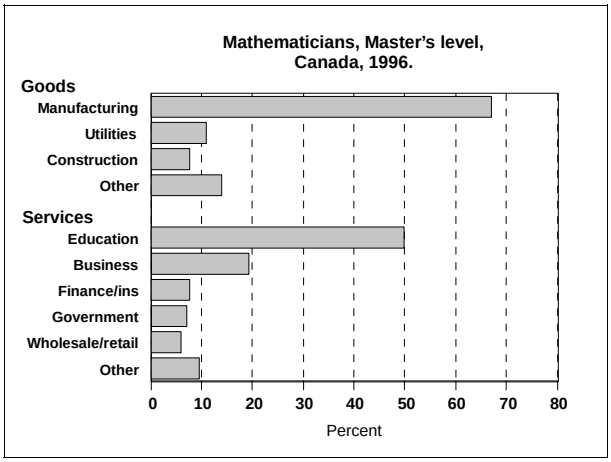
- One in ten of the 25,170 mathematicians with a Bachelor degree were in goods-producing industries and three quarters were in services-producing industries.
- More than two thirds of the 2,890 Bachelor-qualified mathematicians working in goods-producing industries were in manufacturing, with at least one in ten reported in construction. Of those in manufacturing industries, about one in five were employed in electrical/electronic products, and at least one in ten were in either printing/publishing/allied industries, food products or transportation equipment.
- Education services accounted for the largest share (26%) of the 18,935 Bachelor-equipped mathematicians working in the services sector. Business services utilized more than one in five of them. Sixteen percent were working in finance/insurance industries, and at least one in ten were in wholesale/retail trade. More than half of those in business services were in computer services.

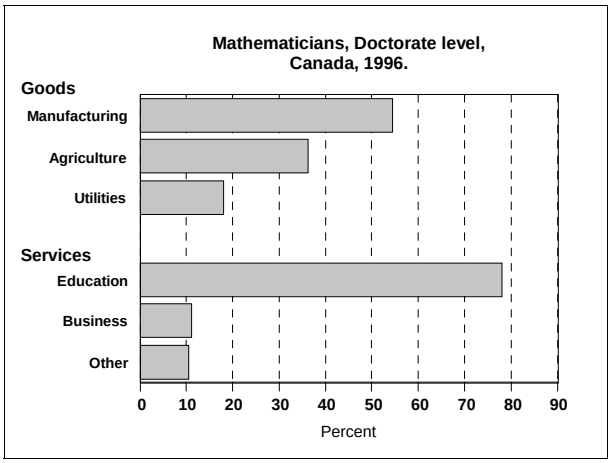


- Only 6% of the 5,060 mathematicians with a Master's degree were in goods-producing industries, whereas 80% were in services-producing industries.
- Two thirds of the 300 or so Master's-qualified mathematicians working in goods-producing industries were in manufacturing, and most of them were in electrical/electronic products.
- Half of the 4,025 mathematicians with a Master's degree working in the services sector were in education services. One in five were in business services. It was computer services which utilized most of those in business services (62%), while more than one in ten were in engineering/scientific/technical services.

Mathematicians

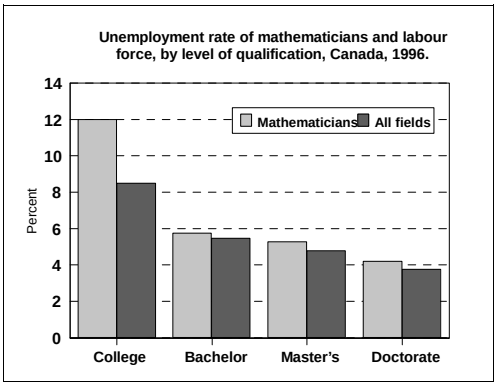
- Hardly any of the 2,345 mathematicians with a Doctorate were in goods-producing industries — only 2% or so (which numbered only some 55). Services-producing industries accounted for 87% of them.
- More than three quarters of the 2,040 mathematicians with a Doctorate working in the services sector were in education services. About one in ten were in business services. Within business services, it was computer services which utilized 62% of them while about 15% were in engineering/scientific/technical services.





Unemployment

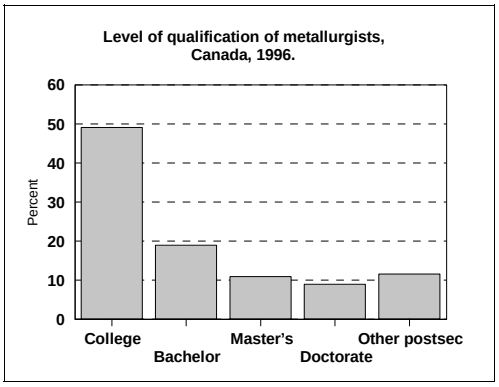
- There weren't many mathematicians with college credentials as their highest qualification, but they suffered considerably higher unemployment than their colleagues across the economy. In 1996, the unemployment rate for mathematicians with a college credential was 12.0%, compared with 8.5% reported by all college graduates in Canada's labour force.
- Although the mathematicians with a university degree also reported higher than average unemployment rates, the gaps were much narrow. Among those with a Bachelor degree, mathematicians had an unemployment rate of 5.8%, marginally higher than the 5.5% reported by all Bachelor graduates in the labour force.
- At 5.3%, the unemployment rate of mathematicians with a Master's degree was half a percentage point above the 4.8% registered by all Master's graduates in 1996. This was about the same as for Doctorate degree holders: for mathematicians, the unemployment rate was 4.2%, compared with the 3.8% reported for all Doctorate degree holder in Canada's labour force.



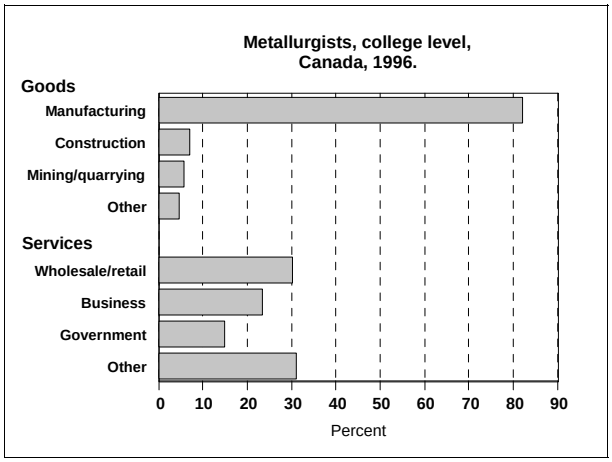
Metallurgists

Industry of employment

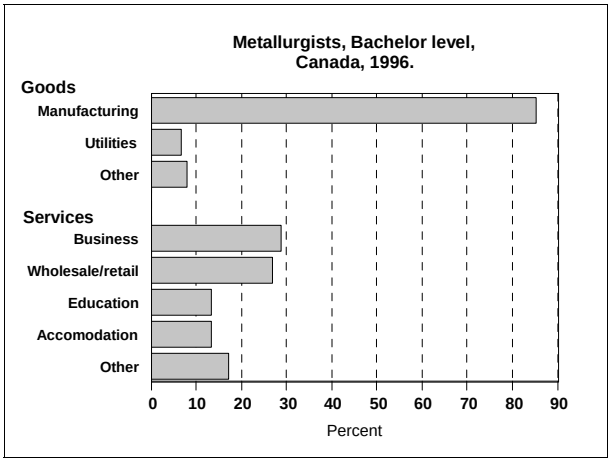
- Canada's work force had 4,410 metallurgists[22] (FOS 465) in 1996. Close to half (49%) reported a college certificate as their highest credential. Nineteen percent had a Bachelor degree, the same percentage as those with a graduate level degree (10% had a Master's degree and 9% a Doctorate).



- Almost half (48%) of the 2,175 college-trained metallurgists were in goods-producing industries, and more than one third (37%) were in services-producing industries.
- More than eight in ten of the 1,045 college-trained metallurgists in goods-producing industries were in manufacturing. As might be expected, those in manufacturing industries were typically in primary metal industries, fabricated metal industries or transportation equipment industries.



- It was wholesale/retail industries which accounted for the largest share (30%) of the 805 college-trained metallurgists working in the services sector. Twenty-four percent were reported in business services, and 15% in government services. It was engineering/ scientific/technical services which accounted for most of those working in business services.
- There were 840 metallurgists with a Bachelor degree. Again, it was goods-producing industries which accounted for most of the metallurgists (45%), with 31% in services-producing industries.

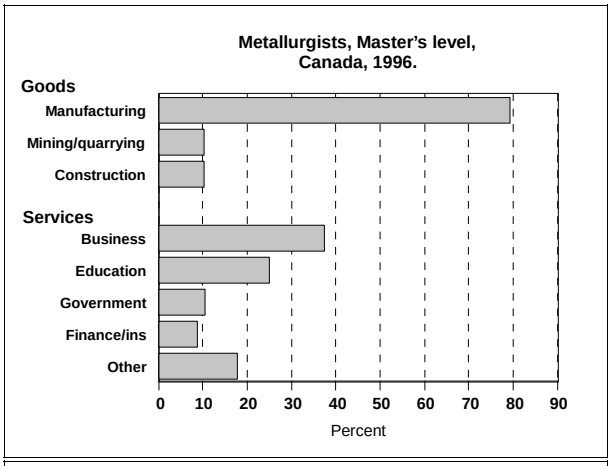


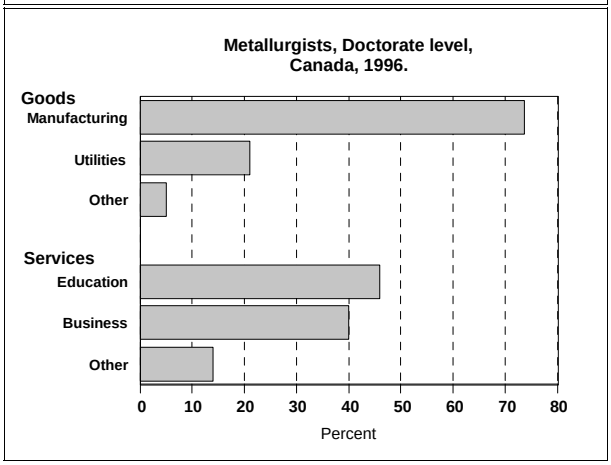
- Almost all of the 375 Bachelor-trained metallurgists working in goods-producing industries were in manufacturing, with primary metal products accounting for most of them, with some in fabricated metal products and transportation equipment.
- It was business services which accounted for the largest share (29%) of the 260 Bachelor-equipped metallurgists working in the services sector, seconded by wholesale/retail trade with a 27% share. At least one in ten each were in education services or accommodation. More than two thirds of those reported in business services were in engineering/scientific/technical services.
- There were 475 metallurgists who reported a Master's degree. At this level of qualification, goods-producing industries attracted a smaller share than did services-producing industries: 31% versus 59%.
- Of the 145 Master's-qualified metallurgists working in goods-producing industries, almost all of them were in manufacturing (most in fabricated metal products), with some in construction and mining/quarrying.

[22] Includes material scientists.

Metallurgists

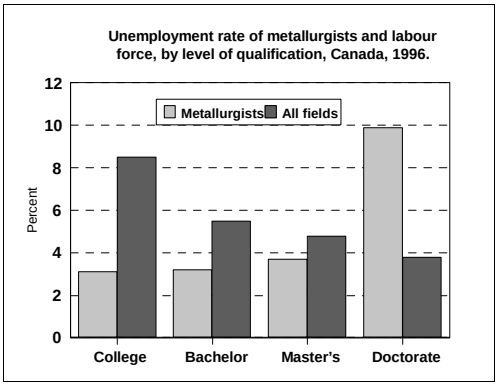
- Business services utilized most (38%) of the 280 metallurgists with a Master's degree working in the services sector, followed by education services with a 25% share. Some one in ten were in government services. Again, it was engineering/scientific/technical services which accounted for most those working in business services.
- One quarter of the 400 Doctorate-qualified metallurgists were in goods-producing industries, and 63% were in services-producing industries.
- At the Doctorate level of qualification, of the 95 metallurgists in goods-producing industries, it was manufacturing which accounted for 74%. Utilities ranked second with about a one in five share. Although the numbers are small, it appears that another change was evident at this level of qualification — most of the metallurgists in manufacturing were in electrical/ electronic products rather than in metal products.
- Almost half (46%) of the 250 metallurgists with a Doctorate working in the services sector were in education services. Forty percent were in business services. Of those in business services, the dominance of engineering/scientific/technical services was clear as at least eight in ten of those in business services were in these activities.





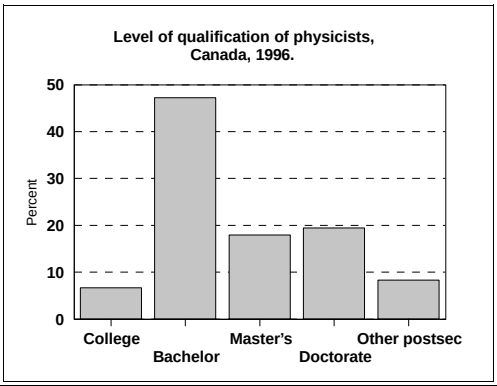
Unemployment

- With the exception of those with a Doctorate, metallurgists enjoyed lower unemployment than their counterparts in the economy when level of qualification is considered.
- In 1996, the unemployment rate of metallurgists with a college credential was only 3.1%, compared with 8.5% reported by all college graduates in Canada's labour force.
- The gaps for Bachelor- and Master's-trained metallurgists was narrower. For metallurgists with a Bachelor degree, the unemployment rate was only 3.2%, compared with 5.5% for all Bachelor graduates. At the Master's level, for metallurgists the unemployment rate was only 3.7%, compared with the 4.8% for all Master's graduates.
- However, in 1996 it was metallurgists with a Doctorate whose unemployment was rather dismal compared with other Doctorate graduates and metallurgists with other qualifications. Ringing in at 9.9%, the unemployment rate of metallurgists with a Doctorate was more than twice as high as the 3.8% reported by all Doctorate graduates in Canada's labour force.

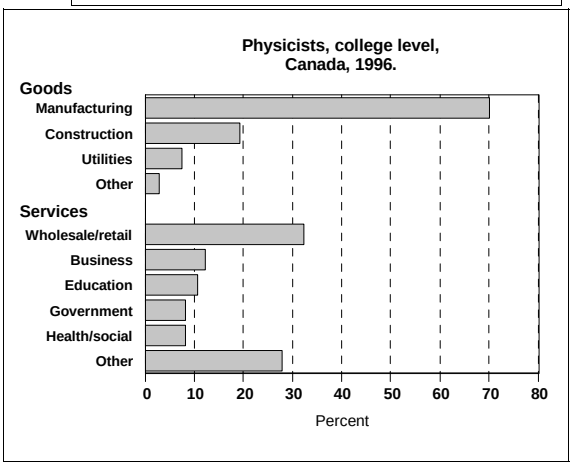


Physicists

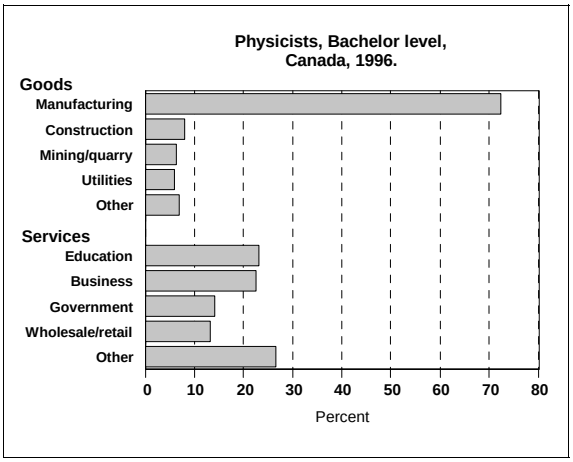
Industry of employment



- In 1996, there were 24,590 physicists (FOS 471-478) in Canada's work force. Fewer than one in ten (7%) reported a college credential. Whereas 47% had a Bachelor degree, 37% had a graduate level degree (18% had a Master's degree and 19% a Doctorate).
- Only 20% of the 1,655 college-trained physicists were in goods-producing industries, and 62% were in services-producing industries.
- Seven in ten of the 335 physicists with a college credential were in manufacturing. Two in five were in construction and slightly fewer than one in ten were in utilities. Those in manufacturing tended to be in transportation equipment industries or printing/publishing/allied industries.



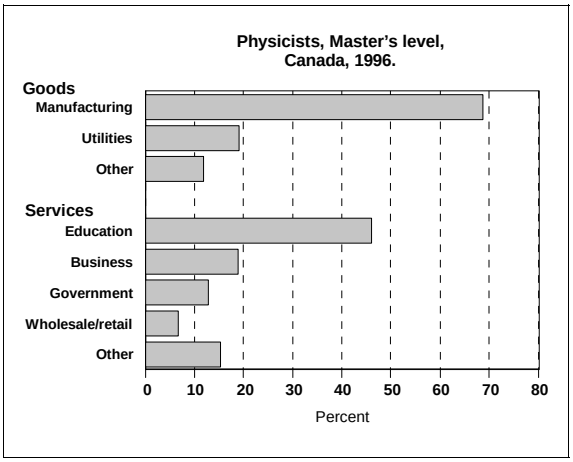
- Wholesale/retail trade accounted for 32% of the 1,020 college-trained physicists working in the services sector. At least one in ten each were in business services or education services, with slightly fewer than one in ten each in government services or health/social services. Within business services, they were split between computer services and engineering/scientific/technical services.
- Physicists in Canada's work force with a Bachelor degree numbered 11,625 in 1996. Seventeen percent of them were in goods-producing industries and 68% were in services-producing industries.

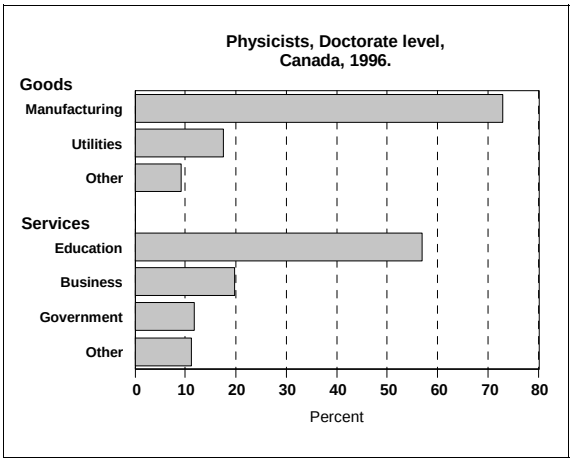


- Almost three quarters (73%) of the 2,040 Bachelor-qualified physicists working in goods-producing industries were in manufacturing. About one third of those in manufacturing industries were in electrical/electronic products, while at least one in ten were in transportation equipment, chemical products or food products.
- Business services and education services each utilized 23% of the 7,895 physicists with a Bachelor degree working in the services sector. Between 13% and 14% each were in either wholesale/retail trade or government services. Close to half of those working in business services were in computer services, with one quarter or so in engineering/scientific/technical services.
- Of the 4,430 physicists with a Master's degree, 14% were reported in goods-producing industries and 71% were in services-producing industries.
- Manufacturing industries also accounted for most of the 625 Master's-qualified physicists working in goods-producing industries — 69%. About one in five were in utilities. Within manufacturing, it was electrical/electronic products which employed most of them (at least four in ten), whereas about one in ten were in transportation equipment industries.
- There were 3,155 physicists with a Master's degree working in services-producing industries, and almost half of

them were in education services. The second largest share (one fifth) were in business services and a few more than one in ten were in government services. At this level of qualification, almost as many were in computer services as in engineering/scientific/ technical services — around four in ten were in each area.

- At least one out of every ten of the 4,790 physicists with a Doctorate were in goods-producing industries, and almost eight out of every ten were in services-producing industries.
- Of the 540 Doctorate-qualified physicists working in goods-producing industries, close to three quarters were in manufacturing (most in electrical/electronic products), and almost one fifth were working in utilities industries.
- It was education services which employed most of the 3,705 physicists working in the services sector — 57%. The next largest share of 20% was made up of those working in business services and 12% were in government services. Physicists with a Doctorate working in business services tended to be in engineering/scientific/ technical services (three in five), while computer services accounted for slightly more than one quarter.





Unemployment

- With the exception of those with a Doctorate, physicists suffered somewhat higher unemployment than their colleagues across the economy when level of qualification is considered.
- The widest gap between physicists and the national average was among those with a college credential. Physicists with a college credential had an unemployment rate of 11.8% in 1996, compared with 8.5% for all college graduates in Canada's labour force.
- The higher the qualification, the narrower the gap. For physicists with a Bachelor degree, the unemployment rate was 7.1%, compared with a Master's graduates' national average of 5.5%. For physicists with a Master's degree, it was 5.7%, compared with 4.8% for all Master's graduates in Canada's labour force.
- It was physicists with a Doctorate who enjoyed marginally lower unemployment than Doctorate graduates overall: for physicists the unemployment rate was 3.5%, compared with a Canadian average of 3.8%.

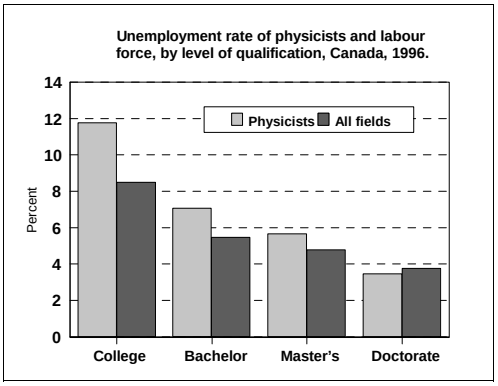


Table 1. Gross domestic product at factor cost, 1980 SIC (estimates are in millions of 1992 constant dollars) and the S&T knowledge work force, Canada, 1996.

	GDP		S&T knowledge workers	
	Millions (1992 constant dollars)	% of GDP	Number	% of S&T know-ledge workers
All industries	**665,277**	**100.0**	**5,005,905**	**100.00**
Goods-producing industries [011-449, 491-499]	**220,528**	**33.1**	**1,188,445**	**23.7**
Agriculture/related industries [010-023]	12,277	1.9	103,325	2.1
Fishing/trapping industries [031-033]	851	0.1	10,825	0.2
Logging/forestry [041-051]	4,304	0.7	29,355	0.6
Mining/quarrying/oil wells [061-092]	27,002	4.1	68,575	1.4
Manufacturing [101-399]	114,942	17.3	599,720	12.0
Construction [401-449]	36,412	5.5	305,785	6.1
Utilities (other) [491-499]	24,740	3.7	70,850	1.4
Services-producing industries [451-484, 501-999]	**444,749**	**66.8**	**3,044,105**	**60.8**
Transportation/storage industries [451-479]	28,253	4.3	162,345	3.2
Communication industries [481-484]	23,238	3.5	77,925	1.6
Wholesale/retail trade [501-692]	36,234	5.5	551,970	11.0
Finance/insurance industries [701-761]	34,329	5.2	154,360	3.1
Business service industries [771-779]	35,750	5.4	383,165	7.7
Government service industries [811-841]	41,637	6.3	336,005	6.7
Education service industries [851-859]	40,465	6.1	248,945	5.0
Health/social service industries [861-869]	48,171	7.2	785,940	15.7
Accomodation/food/beverage industries [911-922]	17,599	2.6	141,215	2.8
Other service industries not elsewhere classified	139,073	20.9	202,200	4.0
Not reported (not reported + not in labour force)	Not applicable		773,355	15.5

Annex

Technical Notes

1. Level of qualification (credential)

College diploma/certificate
University diploma/certificate below Bachelor degree
Bachelor degree, including first professional degree
University diploma/certificate above Bachelor degree
Master's degree
Doctorate (earned)

2. Field (discipline) of expertise (specialization) coding structure

Social sciences [125-187]
Agriculture and biological sciences [221-266]
- Agricultural science and technology [221-238]
- Biochemistry [239]
- Biology [240-244]
- Biophysics [245]
- Household science and related fields [249-254]

Engineering and applied science [267-301]
- Architecture and architectural engineering [267-269]
- Aerospace and aeronautical engineering [270]
- Biological engineering (includes biomedical and clinical) [272]
- Chemical engineering [273]
- Civil engineering [274]
- Design and systems engineering [275]
- Electrical and electronic engineering [276]
- Industrial engineering [279]
- Mechanical engineering [280-282]
- Mining, metallurgical and petroleum engineering [283-286]
- Forestry [294-298]
- Landscape architecture [299-301]

Engineering and applied science technologies and trades [302-369]
- Chemical technologies [304-307]
- Electronic and electrical technologies [322-327]
- Civil and general engineering technologies [333-339]
- Industrial engineering technologies [340-348]
- Mechanical engineering technologies [349-358]
- Primary industry and resource processing technologies [359-362]
- Transportation technologies [363-368]

Health [370-441]
- Pharmaceutical sciences and pharmacy [412-413]

Mathematics and physical sciences [442-480]
- Applied mathematics [442-447]
- Chemistry [448-454]
- Geology and related fields [455-462]
- Mathematical statistics [463]
- Mathematics [464]
- Metallurgy and materials science 465]
- Physics [471-478]

Source: Statistics Canada, Culture, Tourism and the Centre for Education Statistics and, Census Dictionary of Terms.

4. **Industry classification list (1980 Standard Industrial Classification)**
   - Goods-producing industries [011-449, 491-499]
     - Agriculture and related industries [010-023]
     - Fishing and trapping industries [031-033]
     - Forestry and logging industries [041-051]
     - Mining (including milling), quarrying and oil well industries [061-092]
     - Manufacturing industries [101-399]
       - Food industry [101-109]
       - Beverage industry [111-114]
       - Tobacco industry [121,122]
       - Rubber products industry [151-159]
       - Plastic products industry [161-169]
       - Leather and allied products industry [171]
       - Primary textile industry [181-183]
       - Textile products industry [191-199]
       - Clothing industry [243-249]
       - Wood industry [251-259]
       - Furniture and fixtures industry [261-269]
       - Paper and allied products industry [271-279]
       - Printing, publishing and allied industries [281-284]
       - Primary metal industry [292-299]
       - Fabricated metal products (excluding machinery and transportation equipment) [301-309]
       - Machinery (except electrical machinery) industry [311-319]
       - Transportation equipment industry [321-329]
       - Electrical and electronic products industry [331-339[
       - Non-metallic mineral products industry [351-359]
       - Refined petroleum and coal products industry [361-369]
       - Chemical and chemical products industry [371-379]
       - Other manufacturing industries [391-399]
     - Construction industries [401-499]
     - Utilities (other) industries [491-499]
   - Service producing industries [451-484,501-999]
     - Transportation and storage industries [451-479]
     - Communication industries [481-484]
     - Wholesale and retail trade industries [501-692]
     - Finance and insurance industries [701-761]
     - Business service industries [771-779]
       - Computer and related service industries [772]
       - Engineering and other scientific, architect and technical services [775]
     - Government service industries [811-841]
     - Educational service industries [851-859]
     - Health and social service industries [861-869]
     - Accommodation, food and beverage industries [911-922]

5. **Unemployment rate** refers to the unemployed labour force expressed as a percentage of the total labour force (in the reference week). The reference week refers to the week prior to Census survey (June 1996).

6. **Data Source(s)**

   S&T knowledge worker data are based on special tabulations of 1996 Census, Statistics Canada.

   GDP data are based on special tabulations provided by the Science and Technology Redesign Project of Statistics Canada.

How to Order Catalogued Publications

These and other Statistics Canada publications may be purchased from local authorized agents and other community bookstores, through the local Statistics Canada offices, or by mail order to:

Statistics Canada
Operations and Integration Division
Circulation Management
120 Parkdale Avenue
Ottawa, Ontario
K1A 0T6
1(613)951-7277

National toll free order line: 1-800-267-6677
Fax number: 1-(613)951-1584
Toronto Credit Card only (416)973-8018

CATALOGUED PUBLICATIONS

Statistical Publication

88-202-XPB Industrial Research and Development, 1997 Intentions (with 1996 preliminary estimates and 1995 actual expenditures)

88-204-XPB Federal Scientific Activities, 1997-98 (annual)

88-001-XPB Science Statistics (monthly)

Volume 21

No. 1 Scientific and Technological (S&T) Activities of Provincial Governments, 1987-88 to 1995-96

No. 2 The Effect of Country of Control on Industrial Research and Development (R&D) Performance in Canada, 1993

No. 3 The Provincial Research Organizations, 1995

No. 4 Federal Government Expenditures on Scientific Activities, 1997-98

No. 5 Industrial Research and Development, 1993 to 1997

No. 6 Software Research and Development (R&D) in Canadian Industry, 1995

No. 7 Distribution of Federal Expenditures on Science and Technology, by Province and Territories, 1995-96

No. 8 Total Spending on Research and Development in Canada, 1986 to 1997[e], and Provinces, 1986 to 1995

No. 9 Estimation of Research and Development Expenditures in the Higher Education Sector, 1995-1996

No. 10 Research and Development (R&D) Personnel in Canada, 1986 to 1995

No. 11 Biotechnology Research and Development (R&D) in Canadian Industry, 1995

No. 12 Research and Development (R&D) Expenditures for Environmental Protection in Canadian Industry, 1995

No. 13 Research and Development (R&D) Expenditures of Private Non-Profit (PNP) Organizations, 1996

Volume 22

No. 1 The Provincial Research Organizations, 1996

No. 2 Federal Government Expenditures on Scientific Activities, 1998-99

No. 3 Federal Government Personnel Engaged in Scientific and Technological (S&T) Activities, 1989-90 to 1998-99[e]

No. 4 Biotechnology Scientific Activities in Selected Federal Government Departments, and Agencies, 1997-98

No. 5 Total Spending on Research and Development in Canada, 1987 to 1998[e], and Provinces, 1987 to 1996

No. 6 Distribution of Federal Expenditures on Science and Technology, by Province and Territories, 1996-97

No. 7 Estimation of Research and Development Expenditures in the Higher Education Sector, 1996-1997

No. 8 Research and Development (R&D) Expenditures of Private Non-Profit (PNP) Organizations, 1997

WORKING PAPERS - 1997

These working papers are available from the Science and Technology Section of Statistics Canada, please contact:

Science and Technology Section
Science and Technology Redesign Project
Statistics Canada
Ottawa, Ontario
K1A 0T6

Tel: (613) 951-6347

ST-97-01 A Compendium of Science and Technology Statistics, February 1997
Price: $75.00

ST-97-02 Provincial Distribution of Federal Expenditures and Personnel on Science and Technology, 1994-95, February 1997
Price: $75.00

ST-97-03 Scientific and Technological Activities of Provincial Governments, 1989-90 to 1995-96, March 1997
Price: $75.00

ST-97-04 Federal Government Expenditures and Personnel on Activities in the Natural and Social Sciences, 1987-88 to 1996-97^{e}, March 1997
Price: $75.00

ST-97-05 Transfers of Funds for Research and Development in Canadian Industry, 1993 March 1997
Price: $75.00

ST-97-06 Estimation of Research and Development Expenditures in the Higher Education Sector, 1995-96, August 1997
Price: $75.00

ST-97-07 Estimates of Canadian Research and Development Expenditures (GERD), Canada, 1986 to 1997, and by Province, 1986 to 1995, August 1997
Price: $75.00

ST-97-08 Federal Government Expenditures and Personnel on Activities in the Natural and Social Sciences, 1988-89 to 1997-98^{e}, July 1997
Price: $75.00

ST-97-09 R&D Tax Treatment in Canada: A Provincial Comparison, September 1997
Price: $75.00

ST-97-10 Provincial Distribution of Federal Expenditures and Personnel on Science and Technology, 1987-88 to 1995-96, October 1997
Price: $75.00

ST-97-11 Commercialization of Intellectual property in the Higher Education Sector: A Feasibility Study, October 1997
Price: $75.00

ST-97-12 Business Demographics as Indicators of Innovation Activity, October 1997
Price: $75.00

ST-97-13 Methodology for Estimation of Higher Education R&D Personnel, November 1997
Price: $75.00

ST-97-14 Estimates of Research and Development Personnel in Canada 1979-1995 November 1997
Price: $75.00

WORKING PAPERS - 1998

ST-98-01 A Compendium of Science and Technology Statistics, February 1998

ST-98-02 Exports and Related Employment in Canadian Industries, February 1998

ST-98-03 Job Creation, Job Destruction and Job Reallocation in the Canadian Economy, February 1998

ST-98-04 A Dynamic Analysis of the Flows of Canadian Science and Technology Graduates into the Labour Market, February 1998

ST-98-05 Biotechnology Use by Canadian Industry – 1996, March 1998

ST-98-06 An Overview of Statistical Indicators of Regional Innovation in Canada: A Provincial Comparison, March 1998

ST-98-07 Federal Government Payments to Industry 1992-93, 1994-95 and 1995-96, September 1998

ST-98-08 Bibliometric Analysis of Scientific and Technological Research: A User's Guide to the Methodology, September 1998

ST-98-09 Federal Government Expenditures and Personnel on Activities in the Natural and Social Sciences, 1989-90 to 1998-99[e], September 1998

ST-98-10 Knowledge Flows in Canada as Measured by Bibliometrics, October 1998

ST-98-11 Estimates of Canadian Research and Development Expenditures (GERD), Canada, 1987 to 1998[e], and by Province 1987 to 1996, October 1998

ST-98-12 Estimation of Research and Development Expenditures in the Higher Education Sector, 1996-97, November 1998

WORKING PAPERS - 1999

ST-99-01 Survey of Intellectual Property Commercialization in the Higher Education Sector, 1998, February 1999

RESEARCH PAPERS – 1996-1999

No. 1 The State of Science and Technology Indicators in the OECD Countries, by Benoit Godin, August 1996

No. 2 Knowledge as a Capacity for Action, by Nico Stehr, June 1996

No. 3 Linking Outcomes for Workers to Changes in Workplace Practices: An Experimental Canadian Workplace and Employee Survey, by Garnett Picot and Ted Wannell, June 1996

No. 4 Are the Costs and Benefits of Health Research Measurable?, by M.B. Wilk, February 1997

No. 5 Technology and Economic Growth: A Survey, by Petr Hanel and Jorge Niosi, April 1998

No. 6 Diffusion of Biotechnologies in Canada, by Anthony Arundel, February 1999