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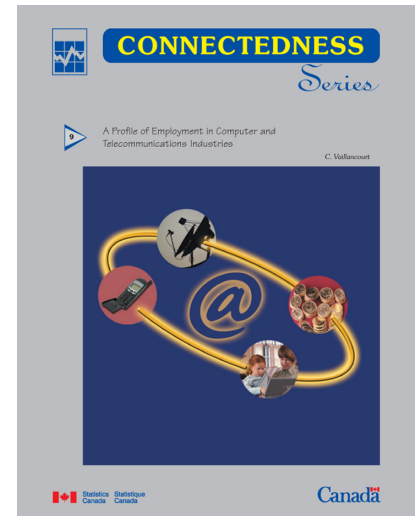
A Profile of Employment in Computer and Telecommunications Industries

by C. Vaillancourt

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Abstract

This paper provides a profile of employment in computer and telecommunications (CT) industries, a group which represents a sizeable sub-set of the information and communications technology (ICT) sector. It analyzes in detail the composition and growth of employment in these industries over the 1990-2002 period, and contrasts them with the rest of the economy.

Employment in the CT group of industries, although small at 3.9% of the total in 2002, experienced unsurpassed growth over the reference period. Yet, it was affected more by the recession of the early 1990s and employment began to fall in 2002, unlike the rest of the economy. By far, the most rapid creation of new jobs came from *computer systems design and related services* industries.

Employment in the CT group is increasingly dominated by university-educated, younger men. Part-time work is less prevalent, while the proportion of self-employed is fast-approaching that of the rest of the economy. By the end of the reference period, the proportion of professional occupations in CT industries outnumbered clerical occupations. Moreover, the gap in average earnings between workers in CT industries and the rest of the economy continued to widen. Despite a generally ageing workforce, average age did not noticeably increase in CT industries until after the year 2000. While traditional labour force characteristics for women are also found in CT industries, there are areas where women in CT industries differ from their counterparts in other industries (proportionately more professional occupations, lower levels of part-time employment and higher average earnings).

A Profile of Employment in Computer and Telecommunications Industries

By C. Vaillancourt

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1. THE ICT SECTOR AND THE LABOUR MARKET

Information and communications technologies (ICTs) represent an important aspect of today's society, as they have widely penetrated the workplace and the home. Not only has their diffusion been growing over the last decade, but so has the production of both ICT goods and services. Statistics Canada's quantification of the ICT sector (2001a, 2001b) provided evidence of its strong performance in the 1990s. Analysis based on key variables, such as Gross Domestic Product (GDP), employment, revenues, international trade, and research and development (R&D) found that the ICT sector registered exceptionally high growth - particularly between 1993 and 1999 - far surpassing that of the Canadian economy in general. In turn, the strong growth of the sector means that it assumes an increasingly important role in the Canadian economy. Thus, analysis of the ICT sector deepens our understanding of the evolution of the Canadian economy overall.

Another important and changing aspect of today's economy is the labour market. During the "jobless recovery" of the first part of the 1990s, Canada's labour market was generally characterized by weak performance, with slow employment creation due to reduced hiring, and lower participation rates due to early retirement (Sunter and Bowlby 1998). The labour market experienced more rapid growth only towards the end of the decade (Picot and Heisz 2000).

The characteristics of employment in the labour market through much of the 1990s were different than those of the 1980s. Net employment growth was mainly concentrated in self-employment or part-time work (Sunter 2001). At the end of the

1990s, there was polarisation in the number of work hours, in a way that both shorter and longer working weeks became more prevalent (Hall 1999). Furthermore, employment and relative earnings improved for women but deteriorated for men - young men in particular. In addition to these structural changes, research has shown that while there was an increase in human capital, the chances of unemployment were higher in the early and mid-1990s for a given level of human capital, and the likelihood of holding a job was lower. As well, there was a decline in labour mobility (Picot and Heisz 2000).

These findings are generally contradictory to the employment record of the ICT sector during this period (Statistics Canada 2001a, 2001b) and contrary to the popular perceptions of the sector's severe skilled-labour shortages and high turnover in the late 1990s. Several questions emerge: Do ICT sector industries diverge from the general workforce in terms of the characteristics of their workers and, if yes, to what extent? Was employment growth in the ICT sector due to the creation of part-time jobs and self-employment? How did women fare in these industries? What about younger workers? These questions, in the context of the ICT sector's increasing importance in the economy, make a detailed profile of employment in these industries critical. It is this gap in research that this paper addresses. Although this can not be done for the precise aggregation of industries that comprise the ICT sector (see Note to Readers), it is done for a grouping of industries that represents a sizeable sub-set of the sector. The general conclusions reached for this sub-set of industries are expected to hold true for the complete set of ICT sector industries.

NOTE TO READERS

The goal of this paper is to compare the characteristics of employment in the industries of the ICT sector to employment in the rest of the economy. The widely used ICT sector definition - developed by the Organization of Economic Co-operation and Development (OECD) in 1998 - was drafted on the basis of the International Standard Industrial Classification (ISIC, Rev. 3). The concordance drawn with the 1997 North-American Industry Classification System (NAICS) results in the ICT sector being defined at the five-digit NAICS level (see Statistics Canada 2001a and 2001b). However, the Labour Force Survey (LFS), which is the only source of annual data that can provide answers to the questions posed here, provides industry data only at the four-digit NAICS level. Using the industrial aggregate at the four-digit level for the ICT sector would overestimate ICT sector employment due to the inclusion of non-ICT industries. Therefore, the four-digit industries that include non-ICT industries have been dropped. The following computer and telecommunications (CT) industries form the industrial aggregate on which the analysis in this paper has been based:

Manufacturing

- 3333 – Commercial and service industry machinery
- 3341 – Computer and peripheral equipment
- 3342 – Communications equipment
- 3343 – Audio and video equipment
- 3344 – Semiconductor and other electronic components
- 3345 – Navigational, measuring, medical and control instrumentation

Services

- 4173 – Computer and communication equipment and supplies, wholesaler-distributors
- 5112 – Software publishers
- 5133 – Telecommunications
- 5142 – Data processing
- 5415 – Computer systems design and related services
- 8112 – Electronic and precision equipment repair and maintenance

The CT industrial aggregate represents a sizeable part of the ICT sector (the only non-ICT industry included is *Other communications equipment manufacturing* (NAICS 33429), which is considered very small to affect the results). For more discussion on the value of examining this industrial aggregate when using LFS data, see Bowlby and Langlois (2002).

The estimates used in this paper are annual averages from 1990 to 2002, inclusively. Annual averages may hide certain short-term trends, but the overall trends will be evident.

The Labour Force Survey (LFS) is a monthly survey, which provides information on major labour market trends such as employment, unemployment and participation rates. The survey sample consists of approximately 53,000 households or more than 100,000 individuals, and the response rate is usually about 95%. Respondents stay in the sample for six months. They are residents of Canadian provinces, aged 15 years and over. Persons living on Indian reserves, inmates of institutions, territorial residents and full-time members of the Armed Forces are excluded from the sample. These exclusions account for approximately 2% of the Canadian population. Additional information on LFS can be found in Statistics Canada (2002a) and, on its methodology, in Statistics Canada (1998).

2. EMPLOYMENT IN CT INDUSTRIES

In 2002, the ICT sector contributed \$58.7 billion to Canada’s GDP, accounting for 7.1% of business sector GDP. The grouping of CT industries examined here represents a sizeable sub-set of all industries that comprise the ICT sector. In 2002, employment in CT industries accounted for 3.9% of total economy employment, down from 4.2% in 2001.

2.1 Overview

In 1990, the group of CT industries examined here had 359 thousand employees¹, compared with 12.7 million in the rest of the economy. By 2002, these numbers had grown to 596 thousand and 14.8 million, respectively.

Employment levels fluctuated in the 1990s, as a decline during the recessionary period was followed by a strong recovery. The CT industries were more severely affected by this decrease at the beginning of the decade, and were slower to recover to their previous levels. Employment growth in both the CT industries and the rest of the economy began in

1993, but 1990 employment levels were not reached until 1995 for the CT industries, while the industry group representing the rest of the economy recovered one year earlier. Employment in the CT industries peaked in 2001, while growth in all other industries continued into 2002 (Chart 1).

Once employment levels began to recover, CT industries registered phenomenal growth, greatly surpassing growth in the all other industries group. This continued until the end of the decade². Over the course of the 1990-2002 reference period, CT industry employment increased by 66.0% – four times that of the rest of the economy (16.4%). Employment was growing at an average annual rate of 4.3% compared with 1.3% for all other industries. Growth in CT industry employment slowed down in 2000 and 2001, though employment still increased in both industry groups. In 2002 however, there was a marked decrease in CT industry employment, while employment for all other industries accelerated slightly above their 2000 and 2001 rates.

1 -- The number of employees in the grouping of **CT industries** used here differs from the number for the **ICT sector** published elsewhere (Statistics Canada 2001a, 2001b) for several reasons. Not only are the definitions different (see Note to Readers), but so are the data sources used. Each data source is intended for different purposes and is subject to different methodologies. Employment estimates for the ICT sector are based on industry surveys, while the data used here come from the LFS, a household survey. This is the only source of data that can support the type of analysis proposed in this paper and, generally, it reports higher estimates of employees in some of the CT industries compared with industry surveys. For the purposes of this analysis, shares and growth rates rather than absolute levels will be examined.

2 -- Employment growth in CT industries was also accompanied by growth in the number of establishments. Indicatively, between 1993 and 1999, the number of ICT sector establishments more than doubled, growing at an average annual rate of 24% (Statistics Canada 2002b).

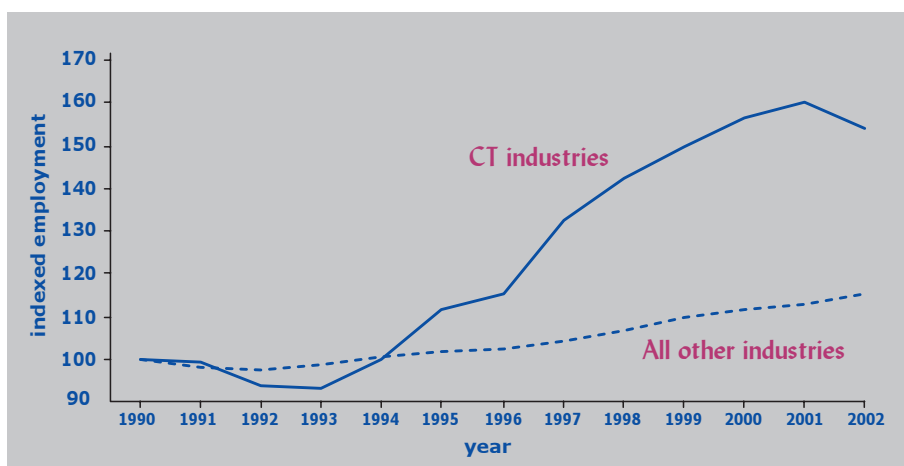


Chart 1.
The CT industries were affected more by recession, and were slower to recover, however they experienced much higher growth once recovery began

Individual industries

Until 1998 the *telecommunications services* industry had the largest share of employment of the group of CT industries examined, but the *computer systems design and related services* industry has since taken, and maintained, this lead (Charts 2 and 3). In 2002, *telecommunications services* accounted for nearly one-quarter of CT industry employment, followed very closely by CT *manufacturing* industries.

The *computer systems design and related services* industry recorded the highest growth in employment among all the CT industries. Over the reference period, employment increased by 335.2%, an annual average rate of 13.0%. *Commercial and service industry machinery manufacturing* registered the largest decrease; since its peak in 1990, employment has dropped by 27.5% (Table 1).

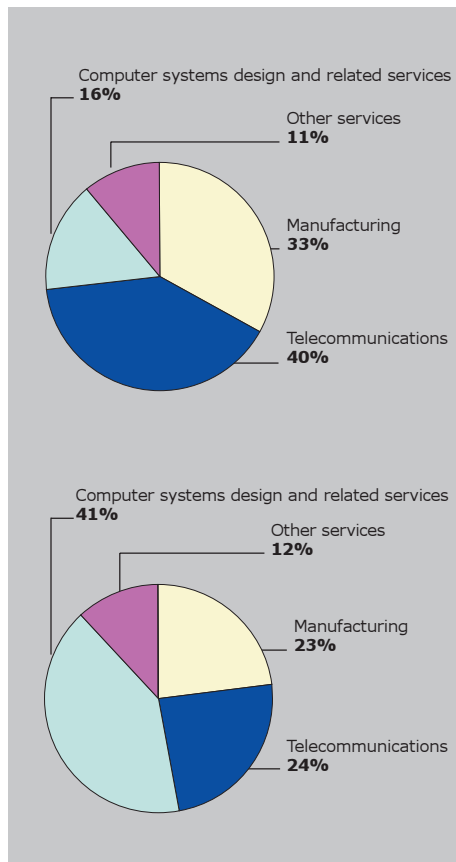


Chart 2.
Employment shares in CT industries, 1990

Chart 3.
Employment shares in CT industries, 2002

Table 1.
Employment growth in CT industries, 1990-2002

	2002/1990			CAGR 2002/1990		
	Male	Female	Total	Male	Female	Total
	%					
All employees in all other industries	11.6	22.5	16.4	0.9	1.7	1.3
All employees in CT industries	74.9	50.8	66.0	4.8	3.5	4.3
Manufacturing						
Commercial and service industry machinery	-45.2	23.3	-27.5	-4.9	1.8	-2.6
Computer and peripheral equipment	-21.5	-19.7	-20.9	-2.0	-1.8	-1.9
Communications, audio and video equipment*	53.4	-16.0	23.7	3.6	-1.4	1.8
Semiconductor and other electronic components	51.5	54.4	52.3	3.5	3.7	3.6
Navigational, measuring, medical and control instruments	116.4	141.2	124.8	6.6	7.6	7.0
Services						
Computer and communication equipment and supplies, wholesale	103.7	123.6	109.5	6.1	6.9	6.4
Software publishers
Telecommunications	-2.8	5.1	0.6	-0.2	0.4	0.0
Data processing	-45.3	5.3	-23.1	-4.9	0.4	-2.2
Computer systems design and related services	349.2	303.1	335.2	13.3	12.3	13.0
Electronic and precision equipment repair and maintenance	49.5	68.8	53.7	3.4	4.5	3.6

CAGR compound annual growth rate

.. not available

* combines NAICS industries 3342 and 3343

2.2 Socio-demographic characteristics

Clearly, there was considerable industry variation within the overall movements of the CT industries. Contrary to the trend of the early 1990s, and in addition to the *computer systems design and related services* industry, two other CT services industries proved quite resilient, never dropping below their 1990 levels of employment: *computer and communication equipment and supplies, wholesale, and; electronic precision equipment repair and maintenance*. On the other hand, in contrast to the rapid employment growth after the recovery, the *computer and peripheral equipment* industry and the *commercial and service industry machinery* manufacturing did not recover to their 1990 levels of employment. In contrast to the general decline in CT employment levels in 2002, two CT industries registered growth in that year: *navigational, medical and control instruments* manufacturing and *electronic and precision equipment repair and maintenance*.

CT industries are male-dominated

Most CT industries employ a greater proportion of male workers than female. This may be explained by the fact that there are no health occupations in the CT industries - one of the occupations in which women traditionally work (Statistics Canada 2000). However, there are some exceptions to the male-dominated CT industries, such as *data processing services*, where three-quarters of the employees were female in 2000, and women comprised at least half of its workforce for much of the reference period.

While the proportion of females working in all other industries slowly but steadily increased over the 1990-2002 period, the proportion of females in CT industries decreased during this time (Chart 4). Therefore, the important labour market trend of growing female employment is not present in the CT industry group.

Contrary to the growth in all other industries, employment growth for women in CT industries was not as significant as it was for men. Between 1990 and 2002, employment growth in all other industries was nearly twice as high for women than for men. In CT industries, though, employment growth for women was only two-thirds that of men's - but still substantial at nearly 51% (Table 1).

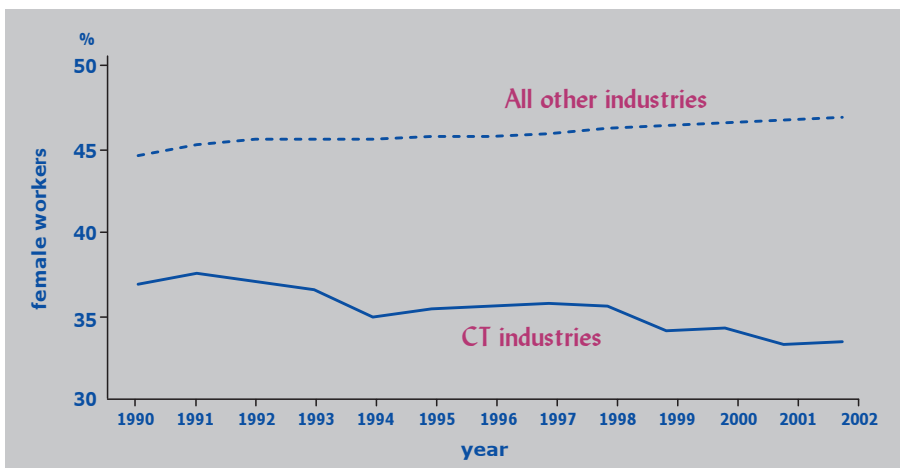


Chart 4.
Female workers are losing ground in CT industries, but are gaining elsewhere

Workers in CT industries more educated, with post-secondary graduates leading employment growth

The proportion of university graduates in the CT industries is greater than in the rest of the economy, for all years examined. This is true for both males and females. In addition, a more rapid employment growth for workers with university degrees in CT industries translates into an increasing gap between the proportions of university graduates in the two industry groups. University graduates accounted for 22.8% of the CT industry workforce in 1990 and 37.8% in 2002. In all other industries, these proportions ranged from 14.2% in 1990 to 19.6% in 2002. Thus, in 2002, the proportion of university graduates in the all other industries group still did not reach the proportion found in the CT industries twelve years earlier.

There are proportionally more males with university degrees employed in CT industries than females (41.6% vs. 30.2% in 2002). While this was also the case in the rest of the economy until 1994, the proportions had equalised by 1995. Afterwards, proportionally more women with university degrees have been

employed in the economy at large, and the gap between the proportions of males and females has been widening.

In both the CT industry group and the rest of the economy, the greatest increase in employment occurred for employees with a university degree or certificate, but it was far more important in CT industries (175.3% compared to 61.3% in the rest of the economy). The growth in employment for university graduates was twice as important for females (86.5%) than for males (43.0%) working in the rest of the economy. However, for CT industries the difference in employment growth by sex at this level of education was less important (200.0% for females, 167.3% for males) (Table 2).

Workers with a post-secondary certificate (non-university) also made important gains in employment and, again, their growth was more important in CT (90.9%) than in other industries (49.8%). At this level of education, female workers again fared better than males. This was particularly true in CT industries, where female employment growth was significantly greater than that of males (127.7% vs. 77.5%).

Table 2.
Employment growth by education level, 1990-2002

	2002/1990			CAGR 2002/1990		
	Male	Female	Total	Male	Female	Total
	%					
All employees						
CT industries	74.8	50.8	66.0	4.8	3.5	4.3
All other industries	11.6	22.5	16.4	0.9	1.7	1.3
Less than high school						
CT industries	-37.3	-43.0	-40.1	-3.8	-4.6	-4.2
All other industries	-31.6	-30.2	-31.1	-3.1	-3.0	-3.1
Graduated high school						
CT industries	-3.3	-7.2	-5.4	-0.3	-0.6	-0.5
All other industries	11.8	5.6	8.8	0.9	0.5	0.7
Non-university post-secondary certificate						
CT industries	77.5	127.7	90.9	4.9	7.1	5.5
All other industries	45.2	54.9	49.8	3.2	3.7	3.4
University degree or certificate						
CT industries	167.3	200.0	175.3	8.5	9.6	8.8
All other industries	43.0	86.5	61.3	3.0	5.3	4.1

CAGR compound annual growth rate

High school graduates in CT industries did not fare well: while they made some gains in the all other industries group, this was not the case for CT industries. This difference underlines the importance of a more highly-skilled workforce in the CT industries and was even more pronounced when employment levels began to decrease: from 1990 to 2001, employment levels for males with high school education in the CT industries had generally increased. However, when CT industry employment dropped in 2002, so too did employment for male high school graduates. This suggests that when CT employment decreased, it was the less skilled workers who were among the first to leave.

Workers with less than high school education registered negative growth in employment in both industry groups. This points to the fact that the workforce has become increasingly educated, another characteristic of labour force up-skilling during the 1990s (Table 2).

CT workers are younger

The average age of workers increased steadily over the 1990-2002 period, indicative of an ageing workforce. In the all other industries group, workers were on average two years older in 2002 (37.9) than in 1990 (35.6). The average age of workers in CT industries, though, remained relatively stable, at least until 2000. As a result, from 1994 to 2000, an increasing gap in the average age between the two

industry groups has emerged, with CT workers always being younger (Chart 5). The largest age gap (1.7 years) occurred in 2000, when the average age of workers in CT industries was at its lowest (35.8). In the last two years, however, this gap has been closing rapidly, as average age in CT industries increases. This is likely due to the decrease in CT industry employment in the last year of the reference period, whereby younger employees may have been subjected to the "last in – first out" principle.

Beginning in 1994, both males and females in CT industries are younger than their counterparts in other industries. In all other industries, men are always older, but this gap in age between the two sexes decreases with time. Within CT industries, the average age of female workers rivals that of men's, so that men are sometimes older, but not always.

This is consistent with earlier findings concerning the relatively higher proportion of university graduates working in CT industries. In conjunction with the growth in CT industry employment throughout much of the reference period – especially for men – a good number of employees were likely to be young graduates in their first jobs. This is in contrast to lower employment for younger men in the economy at large.

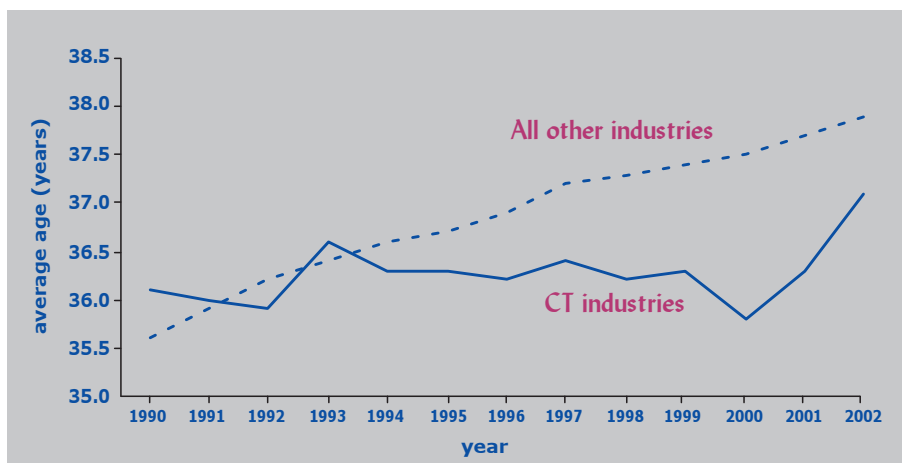


Chart 5. Workers in CT industries are ageing, but still younger than the rest of the economy

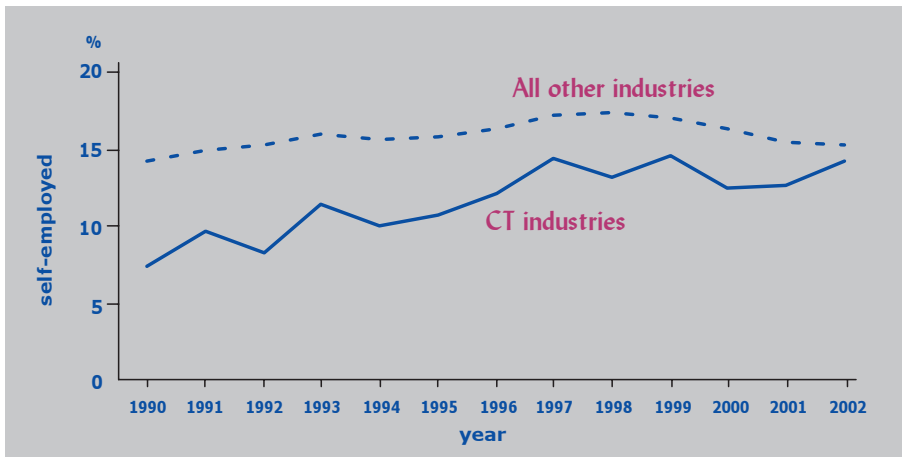


Chart 6.
Self-employment in CT industries has increased, approaching that of the economy at large

2.3 Employment characteristics

CT self-employment and its growth highly concentrated

The proportion of self-employment in CT industries is lower than in the rest of the economy, but the gap has been closing in recent years (Chart 6). At its peak, in 1998, the proportion of self-employment in all other industries was 17.3% of total employment. For the CT industry group, this proportion peaked at 14.6% one year later – nearly doubling in relative importance from its share of 7.4% in 1990. As overall employment growth slowed down, the proportion of self-employment declined in both groups. This trend was reversed in 2002 for the CT industry group, when self-employment reached a high of 84 thousand (14.1% of total employment). This increase in self-employment may have been prompted by job loss in the CT industry group that same year.

Self-employment in both CT and all other industries grew at a much greater rate than that of employees (Charts 7 and 8). Between 1990 and 2002, growth in self-employment for CT industries (216.9%) was nearly four times greater than growth in employees (53.9%), while for all other industries it was one-and-a-half times greater (24.5% vs. 15.1%). This accounted for the closing gap in self-employment between CT and all other industries.

While growth in employees was steady in CT industries from 1993 to 2001, it remained fairly flat in all other industries from 1994 to 1997, with growth only occurring in the later part of the decade – when self-employment began to decrease.

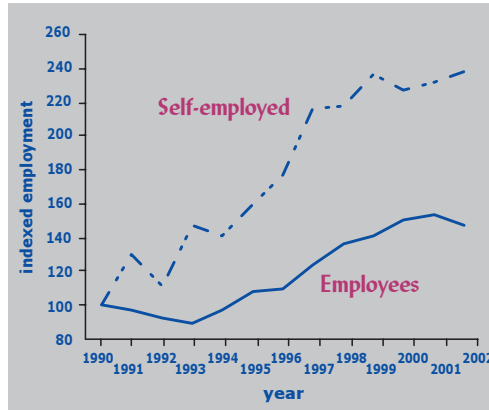


Chart 7.
Employment in CT industries, 1990-2002



Chart 8.
Employment in all other industries, 1990-2002

Most of the self-employment in the CT industry group is heavily concentrated in the *computer systems design and related services* industry. In 2002, self-employment in this industry accounted for 79.9% of all CT self-employment. Growth in self-employment was also heavily concentrated in the same industry, more than tripling over the 1990-2002 period (an annual average of 13.3%).

That is not to say, however, that self-employment growth in this industry was more important than growth in employees, which grew as rapidly over the same period (annual average of 13.0%). Thus, employment growth in CT industries was not mainly due to self-employment, as was the case in the labour force at large for much of the 1990s (Sunter 2001).

Males are more likely to be self-employed than females in both CT and all other industries, but male self-employment is relatively more important in CT industries. It ranged from a low of 77.7% in 1991 to a high of 86.0% in 1994, whereas males accounted for about two-thirds of self-employment in all other industries throughout the 1990-2002 period.

Part-time jobs not prominent in CT industries

The differences between CT industries and the rest of the economy are remarkable with respect to part-time employment. While the proportion of part-time jobs is quite high in all other industries as a group (about 20%), the vast majority of CT jobs are full-time (the proportion of part-time jobs was 5.4% at its highest, in 1996).

Different patterns are also found in the growth performance of the two industrial aggregates (Table 3). In CT industries, growth in part-time work was somewhat higher than growth in full-time work (80.2% and 52.9%, respectively) over the 1990-2002 period. In the group of all other industries, however, it was nearly double (25.1% vs. 13.0%). Thus, although part-time employment in CT industries grew and contributed to overall growth, it has not been as significant as for the rest of the economy in terms of overall employment growth.

There are proportionately more female part-time workers than male in both CT and all other industries. Their share in CT industries is lower, though, and has been variable over the reference period, while the proportion of part-time females in all other industries has remained fairly stable at about 70% (Chart 9).

Table 3.
Employment growth, 1990-2002

	2002/1990			CAGR 2002/1990		
	Male	Female	Total	Male	Female	Total
	%					
All employees						
CT industries	74.8	50.8	66.0	4.8	3.5	4.3
All other industries	11.6	22.5	16.4	0.9	1.7	1.3
Full-time						
CT industries	59.3	55.0	52.9	4.0	4.1	3.6
All other industries	8.4	16.8	13.0	0.7	1.4	1.0
Part-time						
CT industries	126.5	47.1	80.2	7.0	3.6	5.0
All other industries	29.3	18.8	25.1	2.2	1.6	1.9

CAGR compound annual growth rate

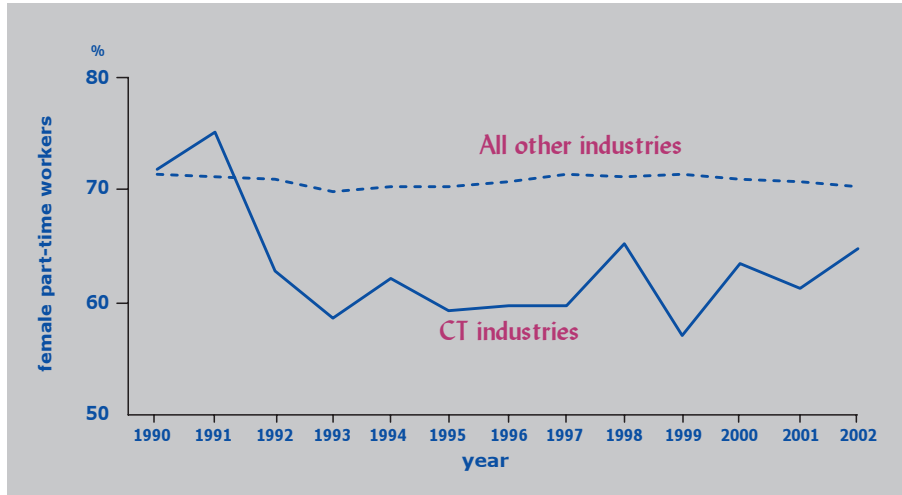


Chart 9.
The proportion of female part-time workers is lower in CT industries

In CT industries, both full- and part-time employment growth was more important for men than women. In the all other industries group, full-time employment growth was more important for women than for men (Table 3).

Employees in CT industries work, on average, longer hours than their counterparts in the rest of the economy. This is partly due to the larger proportion of full-time jobs in the CT industry group. The movement in average weekly hours worked over the 1990-2002 period follows a similar

pattern in both industry groups (Chart 10). As with age, the greatest gap between the two occurred in 2000 (4.3 hours).

Both men and women in CT industries work longer hours than their counterparts in the rest of the economy as a whole, but men work more hours than women in both. Men in the group of all other industries work a greater average number of hours than do the women in the CT industry group. These results partly reflect the proportions of full- and part-time work for men and women.

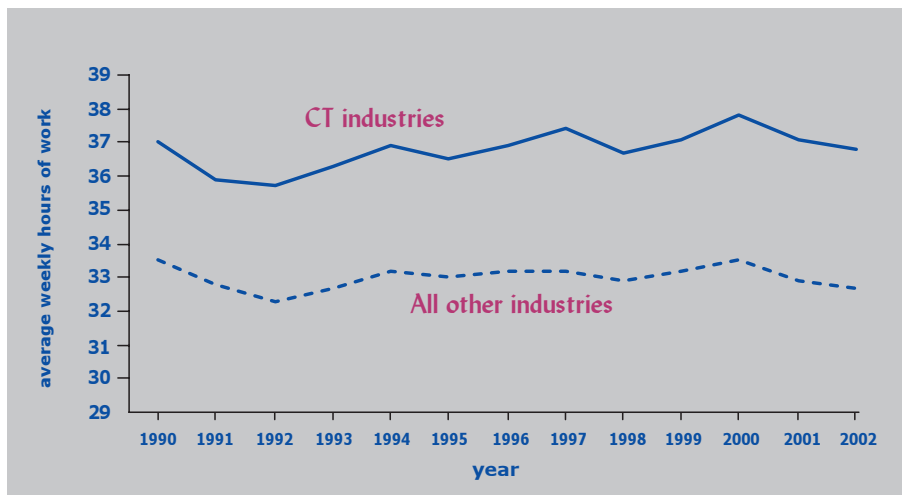


Chart 10.
Workers in CT industries put in longer hours

Occupations and their growth

The shift in employment from clerical to professional occupations in the natural sciences between 1990 and 2002 was the principal characteristic of the CT industry group. While in 1990 clerical occupations were slightly ahead of professional and accounted for almost one-in-five employees, their relative significance was greatly reduced by 2002 (11.9%). This was due to the phenomenal growth of professional occupations (228.2% or 10.4% average annual), which represented 36.9% of all CT industry occupations in 2002 and outnumbered clerical occupations by a factor of three. The share of other occupational groups, such as technical occupations and wholesale and technical sales specialists also increased somewhat at the expense of clerical occupations (Table 4).

Men accounted for the largest proportion of workers in professional

occupations, each year. Moreover, professional occupations likely require more education, which is in keeping with the growth in more highly educated workers in the CT industries. In 2002, the proportion of men in professional occupations had increased to 43.4%, up from 24.2% in 1990. Women also made substantial gains. While their most important occupations were clerical in 1990 (38.0%), by 2002 clerical and professional occupations for women were more evenly balanced (25.0% and 24.0%, respectively).

Throughout the reference period, the most important occupations in the all other industries group were also clerical. However, they accounted for a much lower proportion, ranging from 8.5% of all occupations in 1998 to 9.6% in 1990. Clerical occupations are the most important for women in all other industries, ranging from 15.1% in 1990 to 13.9% in 2002.

Occupations in CT industries can be numerous and are constantly evolving. While data for very specific occupations do not exist, some insights can be obtained through higher occupational aggregates.

Table 4.
Relative importance of occupations in the CT industries

Occupations	1990	2002
	%	
Professional Occupations in Natural and Applied Sciences <i>(electrical and electronics engineers, industrial and manufacturing engineers, computer engineers, computer programmers, systems analysts)</i>	18.7	36.9
Clerical Occupations <i>(computer operators, data entry clerks, telephone operators, administrative clerks)</i>	19.0	11.9
Technical Occupations related to Natural and Applied Sciences <i>(industrial instrument technicians and mechanics, electronic service technicians, electrical and electronic engineering technologists and technicians, industrial engineering and manufacturing technologists and technicians)</i>	9.2	12.0
Specialist Managers <i>(sales, marketing and advertising managers, financial managers, facility operation and maintenance managers, information systems and data processing managers)</i>	7.0	6.7
Assemblers in Manufacturing <i>(electronics assemblers, fabricators, inspectors and testers, assemblers and inspectors, electrical appliance, apparatus and equipment manufacturing, machine operators and inspectors, electrical apparatus manufacturing)</i>	6.9	4.8
Wholesale and Technical Sales Specialists <i>(sales representatives, wholesale trade, retail and wholesale buyers, technical sales specialists, wholesale trade)</i>	4.9	7.8
Stationary Engineers, Power Station Operators and Electrical Trades and Telecommunications <i>(telecommunications line and cable workers, industrial electricians, telecommunications installation and repair workers, cable television service and maintenance technicians)</i>	8.9	4.0
Other Managers, N.E.C. <i>(telecommunications carriers managers, manufacturing managers)</i>	4.5	3.3
All other occupations	21.0	12.6

Earnings greater in CT industries, but women still earn less

Average earnings show that workers in CT industries earn more than workers in the rest of the economy. In addition, while earnings increased in nominal terms for both groups over recent years, they increased more in CT industries. Thus, the difference in average earnings between the two industry groups has widened (Chart 11). Earnings are certainly related to occupation, which is in turn related to qualifications and skills, including education. Other analyses on earnings show that for university educated men and women, wages rose in the latter part of the 1990s (Heisz, Jackson and Picot 2002).

Thus, the widening gap in earnings may be explained by the increasing level of professional vis-à-vis clerical occupations, in conjunction with the greater proportion of university graduates working in CT industries.

As in the rest of the economy, though, earnings for women lag behind men's. However, women earn higher average salaries in CT industries (approximately the same as men in all other industries - see Chart 11). A large part of this is likely explained by the different occupations that women hold in CT industries, and by the fact that women in CT industries are more educated than their counterparts in the rest of the economy.

Beginning in January 1997, information on the usual wages or salary of employees at their main job is collected by the LFS. Respondents are asked to report their wage/salary before taxes and other deductions, and include tips, commissions and bonuses. Weekly wages/salaries are calculated in conjunction with usual paid work hours per week (Statistics Canada 2002a).

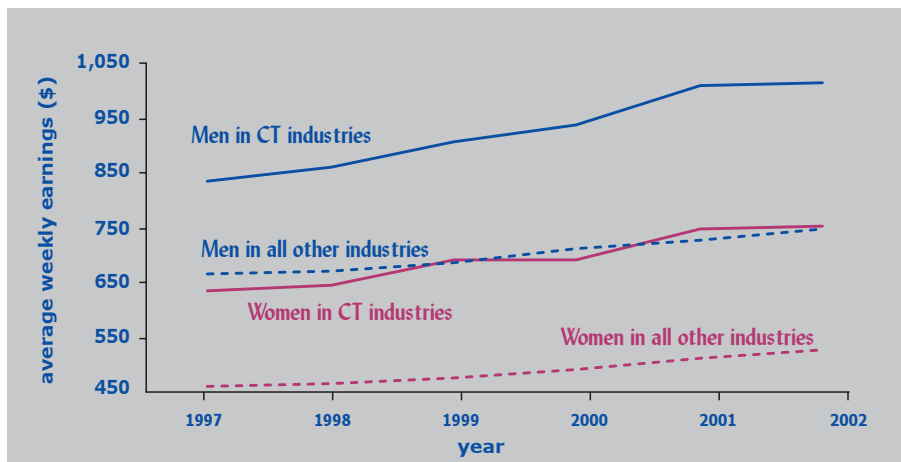


Chart 11.
Women's earnings lag men's in CT industries, but are higher than all other industries

3. SUMMARY REMARKS AND FUTURE WORK

This paper painted a profile of employment in a group of CT industries, which represents a sizeable sub-set of the ICT sector. It examined in detail the composition of employment in these industries and analysed its growth performance over the past decade. Throughout, it contrasted the characteristics and the evolution of employment in this group of CT industries with the rest of the economy.

Even in a labour market where change is the rule rather than the exception, CT industries, although a small group, distinguished themselves with unsurpassed employment growth. Yet, they were more profoundly affected by the recession of the early 1990s, and their

employment levels began to fall in 2002, contrary to the rest of the labour force. While certain CT industries did not falter in spite of the jolts of the economy, some never recovered to their 1990 levels of employment. By far, the most rapid creation of new jobs came from the rise to prominence of the *computer systems design and related* industries.

Self-employment (heavily concentrated in *computer systems design and related services* industries), and part-time work are less important in CT industries than in the rest of the economy. Thus, unlike the economy at large, the overall growth in employment cannot be attributed to these factors - even though growth in self- and part-time employment outpaced growth in the number of employees and full-time employment.

CT industries are very much a male-dominated world, with higher growth in employment for men. While traditional labour force characteristics for women are also found in CT industries (proportionately more women in part-time jobs and clerical occupations, proportionally lower self-employment and average earnings), there are areas where women in CT industries differ from their counterparts in other industries (proportionately more professional occupations, lower levels of part-time employment and higher average earnings).

Despite a generally ageing workforce, average age did not noticeably increase in CT industries until after the year 2000. CT industries also experienced proportionately higher employment growth for university-educated workers. The shares of university graduates in CT industries are always much higher than the rest of the economy, attesting to a highly-skilled workforce.

While the differences between CT industries and the rest of the economy can be revealed by the analysis of the annual employment data used in this study, they cannot be explained by the same data. The huge growth in jobs in CT industries, in conjunction with the findings related to the age and the increasing levels of education of its workforce may perhaps mean that more recent graduates are finding their first jobs in these industries. It may well be, though, that the fast-growing demand for workers, at least until 2002, was met by inter-sectoral flows, from non-CT to CT industries. Moreover, we know little with respect to the intra-sectoral mobility of employees, that is, their movement from one CT industry to another, or even from one firm to another within the same CT industry. Addressing these issues would require detailed analysis of employment dynamics through the use of longitudinal microdata.

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