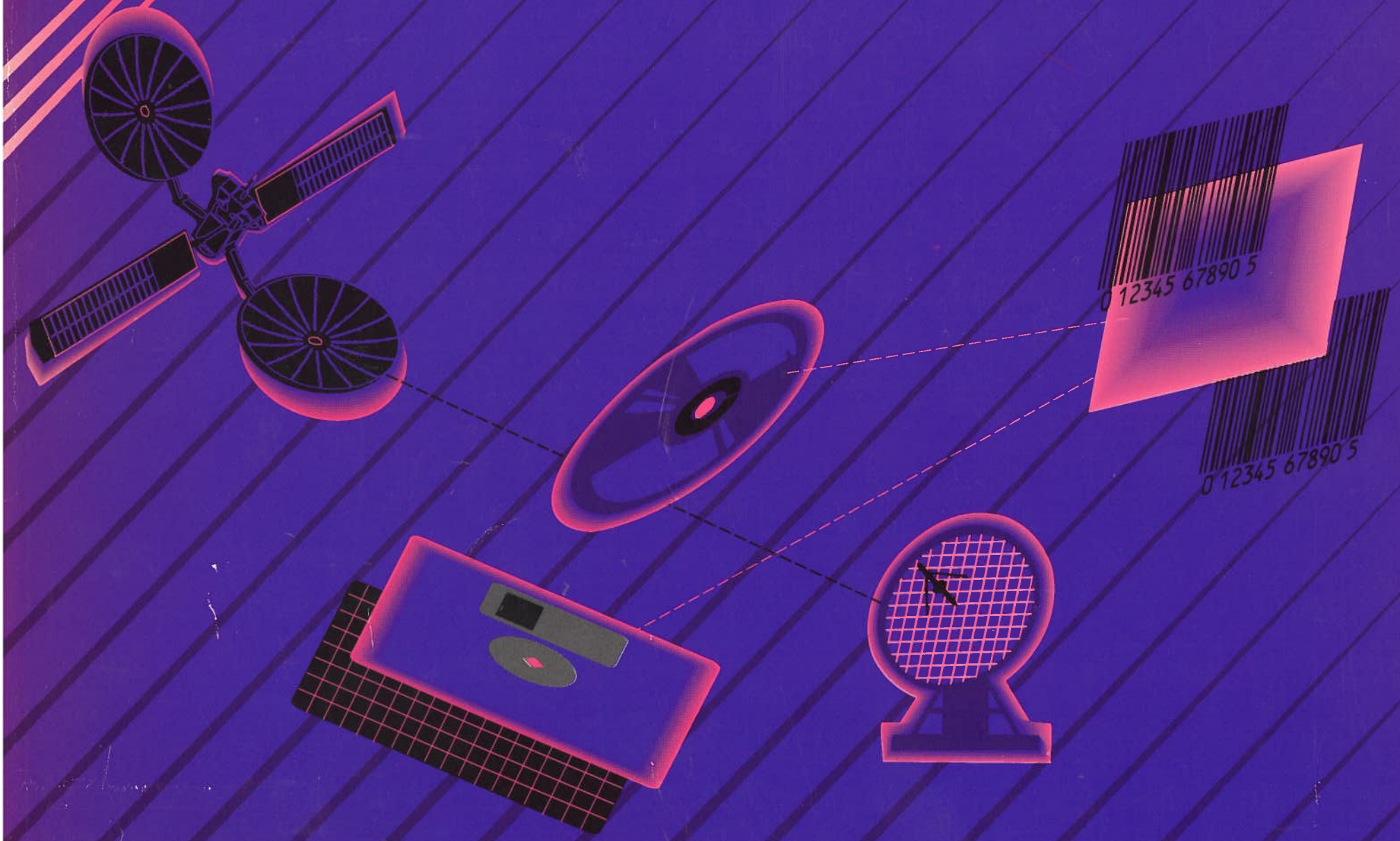
TECHNOLOGIES IN SERVICES



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IN

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1. INTRODUCTION

The ability of Canadian firms to adopt and diffuse technology has a considerable impact on their ability to remain competitive. According to the Economic Council of Canada's 1987 report *Making Technology Work: Innovations and Jobs in Canada*, "Technological change is a crucial means to economic advancement. It is the key to improvements in productivity, global competitiveness, and ultimately, employment. Rapid adoption of new technologies is therefore vitally important to future prosperity."

In 1985, the Economic Council undertook the first extensive assessment of where Canada stands in the use of computer-based technologies. Responses were received from about 1 000 establishments in nearly all industries. In *Making Technology Work*, the Economic Council states that Canada lags behind a number of other Western industrialized nations in the use of new technologies.

As a result of these findings, Statistics Canada carried out another survey in June 1987. Its findings were released in a publication titled *Survey of Manufacturing Technologies*. This was followed up by a similar survey, published in September 1989, on the use and planned use of advanced technologies in manufacturing establishments.

Since World War II, service industries have experienced phenomenal growth. They currently account for around 70% of output and employment in the Canadian economy. In light of their importance, Statistics Canada's Small Business and Special Surveys Division conducted a survey in March 1989, which was released the following September in a publication titled *Diffusion of Technology Survey in the Service Industries*. This survey was sponsored by Communications Canada; Industry, Science and Technology Canada; and Employment and Immigration Canada.

This survey provided up-to-date information on the current and planned use of computer-based technologies and applications within establishments in Canada's service sector. It was intended to help industry appraise its current and projected use of selected technologies. It provides service industries, as well as technology developers, with useful information on the future implementation of widely used and emerging technology applications.

Along with the *Survey of Manufacturing Technologies*, this survey will help the federal government formulate policy and plan programs to promote the diffusion of computer-based technologies. It will also serve Canada in its efforts to encourage other member countries of the Organization for Economic Cooperation and Development (OECD) to conduct studies for international comparisons.

This report highlights the major findings of *Diffusion of Technology Survey in the Service Industries*. It has been prepared by Communications Canada and Industry, Science and Technology Canada. More information, including the full statistical results of the survey, is available from Statistics Canada as well as from the sponsors:

Information Technologies Industry Branch or
Service Industries and Consumer Goods Branch
Industry, Science and Technology Canada
235 Queen Street, Ottawa, Ontario, K1A 0H5
Tel.: (613) 954-3467 or (613) 954-2987

or

Communications Development and Planning Branch
Communications Canada
300 Slater Street, Ottawa, Ontario, K1A 0C8
Tel.: (613) 990-4929

2. SUMMARY OF FINDINGS

2.1 Highlights

- As one would expect, the more established office automation technologies such as personal computers, online terminals and mini-computers have been widely adopted in the service industries.

- Businesses surveyed are now emphasizing relatively new technologies that are more oriented to networking. For example, local area networks (LANs), which allow office machines to communicate over limited distances, are used by 40% of all respondents, and 17% more plan to introduce them within three years. New electronic messaging systems such as facsimile and private electronic mail are popular. Facsimile machines are used by 89% of respondents. Private electronic mail is currently used by 30% of respondents, with 14% planning to introduce it within three years. Electronic data interchange usage is relatively low at 19% but 16% more plan to introduce this technology during the next three years.

- Widely used applications are computerized financial systems (used by 88% of respondents), computerized inventory control (56%) and computerized order entry (50%). Significant growth is expected within the next three years for desktop publishing, human resource management systems, computer-assisted education, expert systems, electronic scanning systems, electronic funds transfer and computer-aided software engineering.

- Establishments in communications, wholesale trade, finance and insurance, and business services are the most likely to have introduced computer-based technologies. Accommodation, food and beverage industries and retail trade industries usually have the lowest incidence of technology use. These industries were also found to be first and last in the Economic Council of Canada's 1986 survey *Working With Technology*.

- Organizations employing over 200 persons made greater use of the technologies than businesses employing fewer than 200. Examples of technologies used significantly more by these large businesses are mainframe computers, local and wide area networks, and human resource management systems.

- In general, foreign owned businesses made greater use of the technologies than Canadian owned businesses. Technologies in which use by American owned businesses is at least 15% greater than use by Canadian owned businesses are desktop publishing, private electronic mail, wide area networks, computerized order entry and computerized inventory control.

- Establishments in the Atlantic and Prairie provinces are generally the slowest to adopt new technology, particularly mainframe computers, desktop publishing, computerized order entry and human resource management systems.

2.2 *Percentage of Establishments Using or Planning to Use Selected Technologies*

	Currently Being Used (%)	Plan to Begin Using in the Next 3 Yrs. (%)
Office Automation		
Personal Computers	89	3
Online Terminals	76	4
Mini-Computers	54	4
Mainframe Computers	41	2
Office Networking		
Facsimile	89	3
Local Area Networks	40	17
Telex	36	0
Electronic Mail - Private	30	14
Wide Area Networks	29	10
External Databases	22	8
Mobile Data Communications	11	5
Electronic Mail - Public	10	9
Voice Mail	6	7
Satellite Data Distribution	3	5
Video Conferencing	2	5
Management Systems		
Computerized Financial Systems	88	4
Human Resource Management	33	16
Computer-Assisted Education	22	11
Expert Systems	12	13
Design Support Systems		
Desktop Publishing	30	15
Computer-Aided Design	14	5
Computer-Aided Engineering	6	4
Computer-Aided Software Eng.	6	8
Inventory/Sales Systems		
Computerized Inventory Control	56	12
Computerized Order Entry	50	9
Point-of-Sale Terminals	22	8
Electronic Data Interchange	19	16
Elec. Scanning Systems	15	14
Automatic Retrieval Systems	10	4
Industry-Specific Systems*		
Computer Reservation	66	10
Property Management	59	4
Automatic Teller Machines	58	9
Transportation Systems	52	11
Electronic Funds Transfer	50	17
In-Room Video	40	8
In-Room Management	26	13
In-Room Check-Out	15	18
Smart Cards	2	16

* For selected industries only

3. METHODOLOGY

The survey of the use and planned use of advanced technologies in service industries was mailed by Statistics Canada in March 1989 and followed up by telephone. The survey covered all service industries, excluding public administration, educational, health and social services. The following Industry Divisions of the 1980 Standard Industrial Classification (SIC) were included:

- Transportation Industries
- Communication Industries
- Wholesale Trade
- Retail Trade
- Finance and Insurance Industries
- Real Estate Operators and Insurance Agent Industries
- Business Services
- Accommodation, Food and Beverage Service Industries

A more detailed list of the industries surveyed is available in Appendix 1.

The survey's sample was selected from large and medium-sized companies (i.e., more than 20 employees) included in the Statistics Canada *Survey of Employment and Payrolls.* The unit of analysis was establishments operating at a single physical location. The 3 000 companies surveyed were mailed 3 272 questionnaires, because companies operating in more than one service industry were asked to respond separately for each industry. A total of 2 718 responses were received, a response rate of 83%, which is remarkable for a voluntary survey.

The survey questionnaire and definitions of the technologies are included as Appendix 2. Respondents were asked to indicate if they currently use particular technologies, if they plan to use them in the next three years and whether their expectations of these technologies have been met.

3.1 Distribution by Province

The sample distribution by province, shown in the table below, indicates that Ontario and Quebec establishments represent 26% and 20% respectively of the total number of establishments for the SIC codes covered in the survey.

Sample Distribution by Province

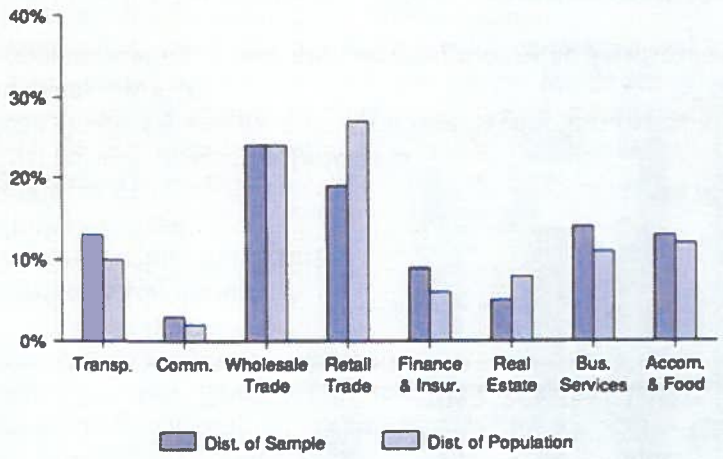
Province	Number of Responding Companies	Percentage of Service Industries*
Newfoundland	39	4.9
Prince Edward Island	13	2.5
Nova Scotia	82	7.3
New Brunswick	72	7.6
Quebec	597	19.6
Ontario	1 114	26.2
Manitoba	150	10.5
Saskatchewan	80	5.3
Alberta	293	12.3
British Columbia	267	11.3
Yukon	8	2.9
Northwest Territories	3	0.9
Canada	**2 718**	**14.2**

* Notes the responding companies as a percentage of the number of establishments from the province for the Standard Industrial Classification codes covered in the survey.

3.2 Distribution by Industry

The distribution of participating establishments by industry reflects the relatively high number of wholesale and retail operations when compared to other industry divisions. The chart below shows that the sample distribution by industry is representative of the overall industrial distribution.

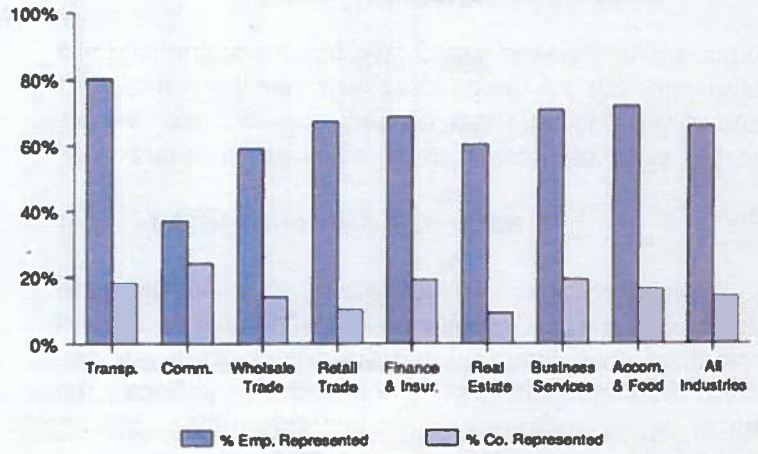
Sample and Population Distribution by Industry Division



3.3 Distribution by Employment

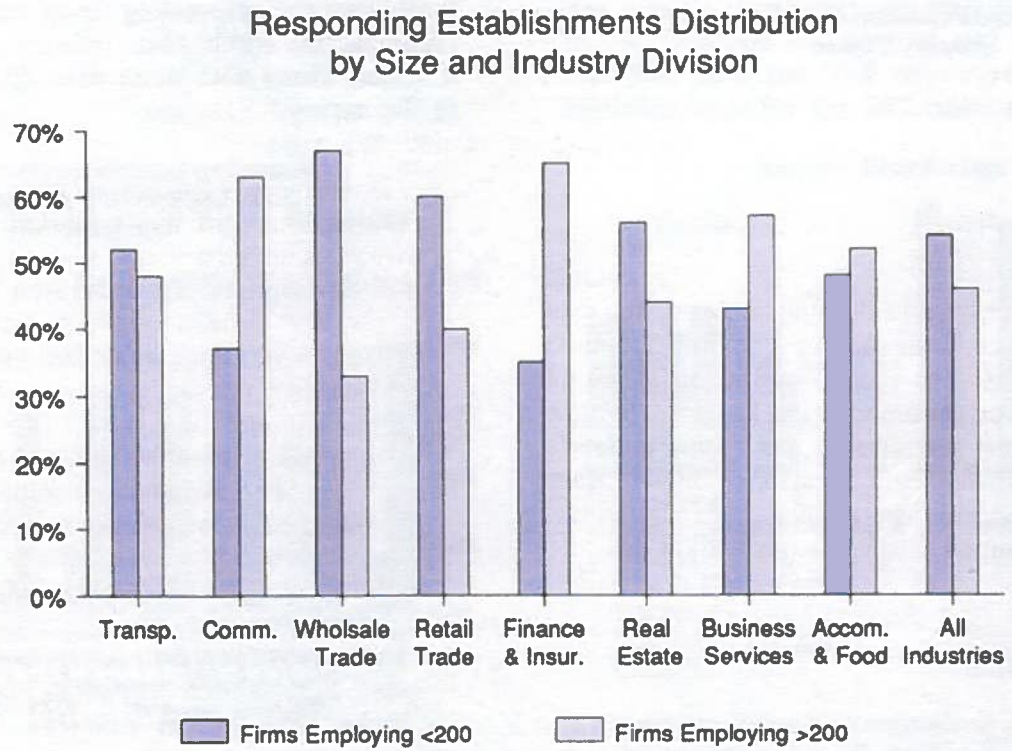
Another indicator of the sample distribution is the percentage of employment represented by responding firms. This percentage ranges from 37% in communications to 80% in transportation. The chart below shows the proportion of responding establishments in terms of the total number of firms within their industry divisions and in terms of employment. The high employment statistics imply that the responding firms tend to be large organizations within their industry division. Please note that only firms with more than 20 employees were included in the survey.

Responding Establishments by Percentage of Companies and Percentage of Employment



3.4 *Distribution by Size*

Overall, 54% of responding establishments have fewer than 200 employees and 46% have more than 200 employees. Industries with a proportionately high number of large firms are communications and finance and insurance. The distribution of respondents by size of firm and industry is shown below.



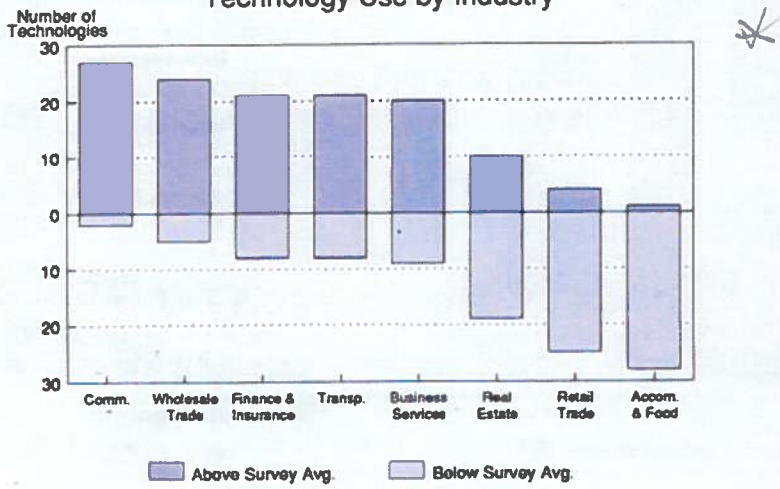
4. TECHNOLOGY USE BY SELECTED CHARACTERISTICS

4.1 Technology Use by Industry

Given the selected list of technologies that were examined and because certain technologies are industry-specific, it is difficult to determine exactly which industries are the leaders in adopting technology. However, establishments in communications, wholesale trade, finance and insurance, transportation, and business services are the most likely to have introduced computer-based technologies. Accommodation, food and beverage service industries and retail trade industries usually have the lowest incidence of technology use. It should be noted that similar results were found in the Economic Council of Canada's 1986 survey *Working with Technology*.

The bar graph below displays industry use of 29 generic technologies (i.e. excluding industry-specific technologies such as automatic teller machines and in-room checkout systems). For each specific industry the use of the 29 technologies has been examined to determine if they are above or below the overall survey average. For example, communications industries use was above the overall survey average for 27 technologies and below average for two technologies.

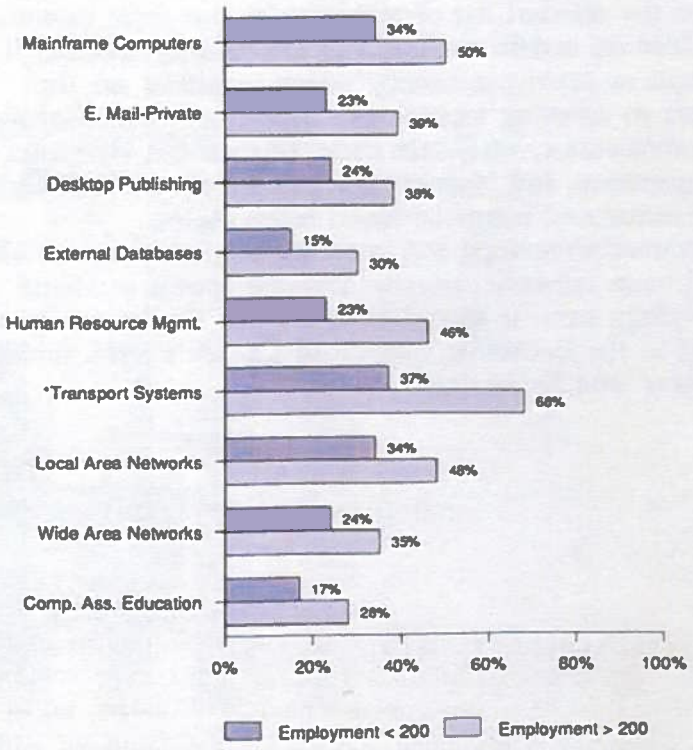
Technology Use by Industry



4.2 *Technology Use by Company Size*

As might be expected, large organizations, those employing over 200, make greater use of technologies than businesses employing fewer than 200. Technologies for which use by large businesses is at least 10% higher than use by small businesses are included in the adjacent bar graph. Many of the examples — such as mainframe computers, local and wide area networks and human resource management systems — are indicative of an establishment with a large number of employees.

Comparison of Technology Use
by Company Size



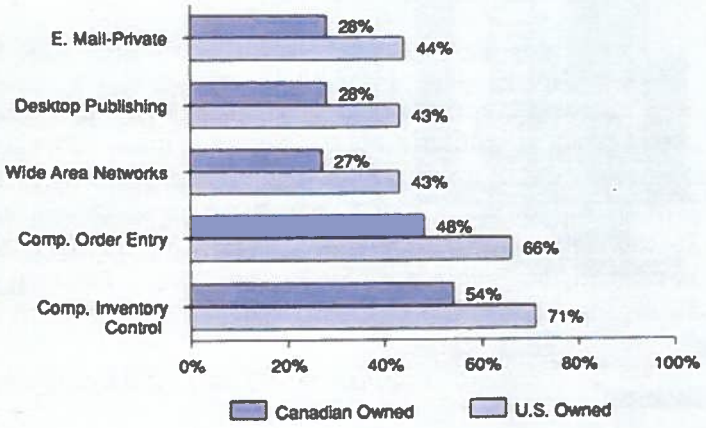
* Transportation industry only

4.3 Technology Use by Country of Ownership

In general, foreign owned businesses make greater use of technologies than Canadian owned businesses. Perhaps foreign owned businesses adopt technologies used by their parent companies, which are larger and more advanced in some cases than Canadian owned companies.

Technologies in which use by U.S. owned businesses is at least 15% greater than use by Canadian owned businesses are desktop publishing, private electronic mail, wide area networks, computerized order entry and computerized inventory control.

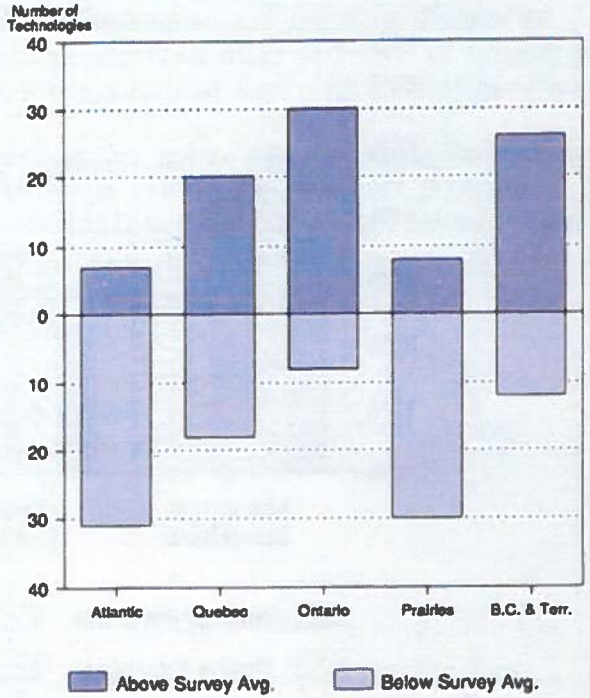
Technological Use by Country of Ownership - All Industries



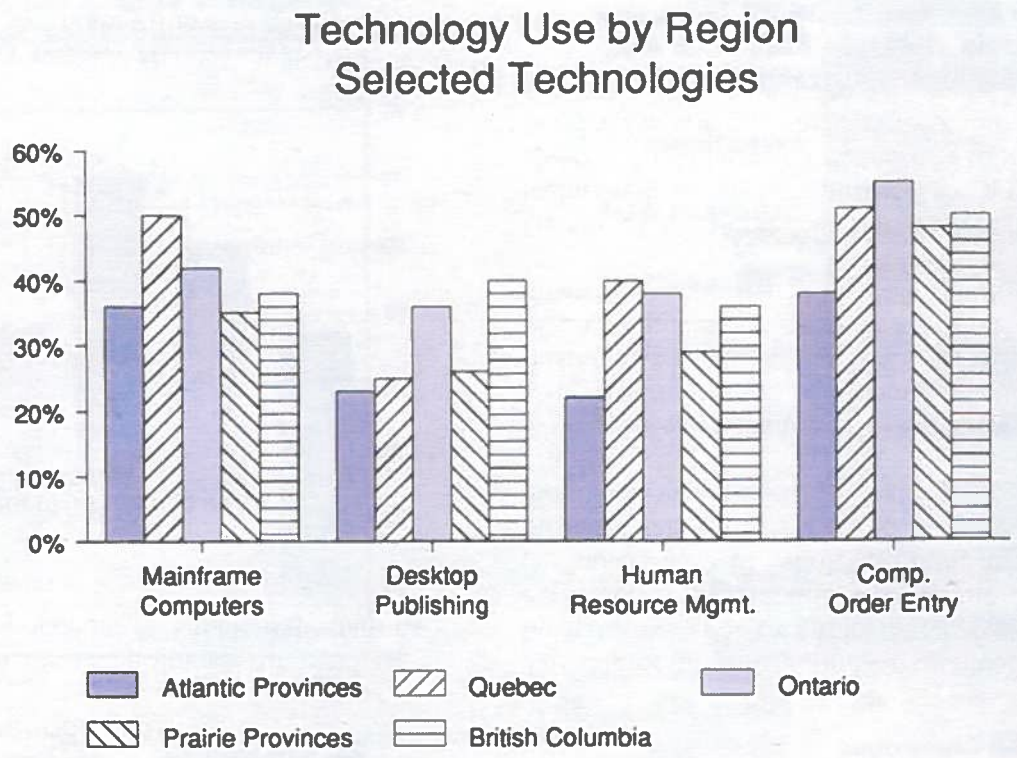
4.4 Technology Use by Region

Respondents from the Atlantic and Prairie provinces are generally the slowest to adopt new technology. The bar graph below displays regional use of the survey technologies. For each region, the graph indicates the number of technologies that are used more and less than the overall survey average.

Technology Use by Region

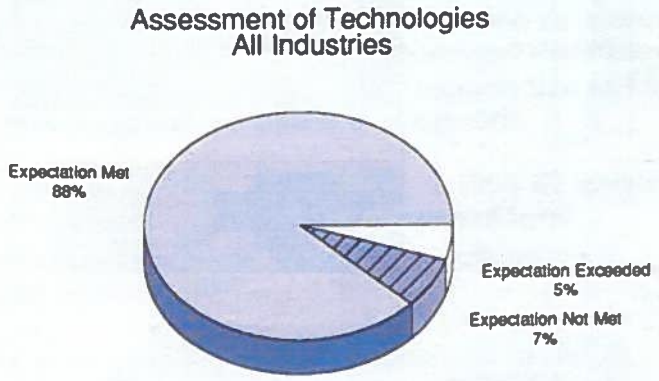


Technologies for which the difference in use between regions is at least 15% are mainframe computers, desktop publishing, computerized order entry and human resource management systems. The leading region varies by the specific technology being discussed. For example, Quebec leads in mainframe computers and human resource management systems, British Columbia in desktop publishing and Ontario in computerized order entry.



4.5 *Satisfaction with Technologies*

Overall user satisfaction with the technologies surveyed is very high. Over 90% of respondents feel their expectations have been met or exceeded.



No more than 15% of all respondents indicate that their expectations of any specific technology have not been met. Technologies in which 10% or more of the overall respondents feel their expectations have not been met are electronic mail (both public and private), voice mail, telex, electronic data interchange, satellite data distribution, computer-aided software engineering, and in-room check-out systems.

The degree of satisfaction or dissatisfaction of course varies by industry. For example, 14% of all survey respondents expressed dissatisfaction with public electronic mail. In particular, 22% of wholesale trade respondents and 21% of business service users feel their expectations have not been met.

With respect to computer-aided software engineering, the largest current users, the communications and finance and insurance industries, are the most dissatisfied. About 22% of communications users and 18% of finance and insurance businesses state that their expectations have not been met.

Details of the degree of satisfaction for specific technologies and all industries are provided in the Statistics Canada publication *Diffusion of Technology Survey in the Service Industries*, which is available from the sponsors of this report listed on page 1.

5. TECHNOLOGY USE BY INDUSTRY

5.1 Office Automation

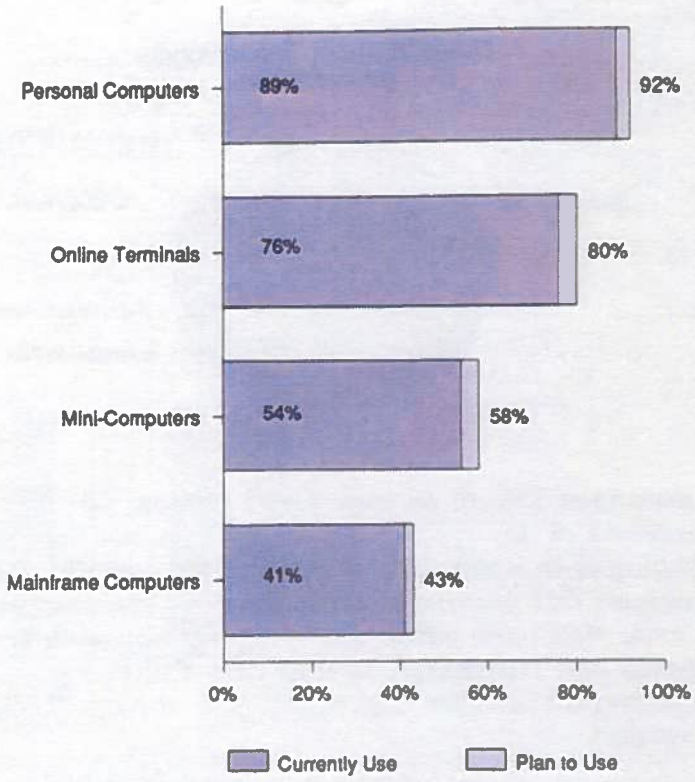
As one might expect, the most widely used office automation technology is the personal computer (PC).

Use of online terminals is currently at 76% and is projected to grow to 80% in three years. Use ranges from 93% for finance and insurance industries to 53% for accommodation, food and beverage industries.

Mini-computers are currently used by 54% of respondents, and use is projected to grow to 58% in three years. Communications industries are the highest users at 67% while accommodation, food and beverage industries are the lowest at 40%.

Mainframe computers are used by 41% of all respondents. Use is greatest in finance and insurance (67%), communications (49%), transportation (46%) and wholesale trade (45%).

Use of Office Automation Equipment
All Industries



5.1.1 Personal Computers

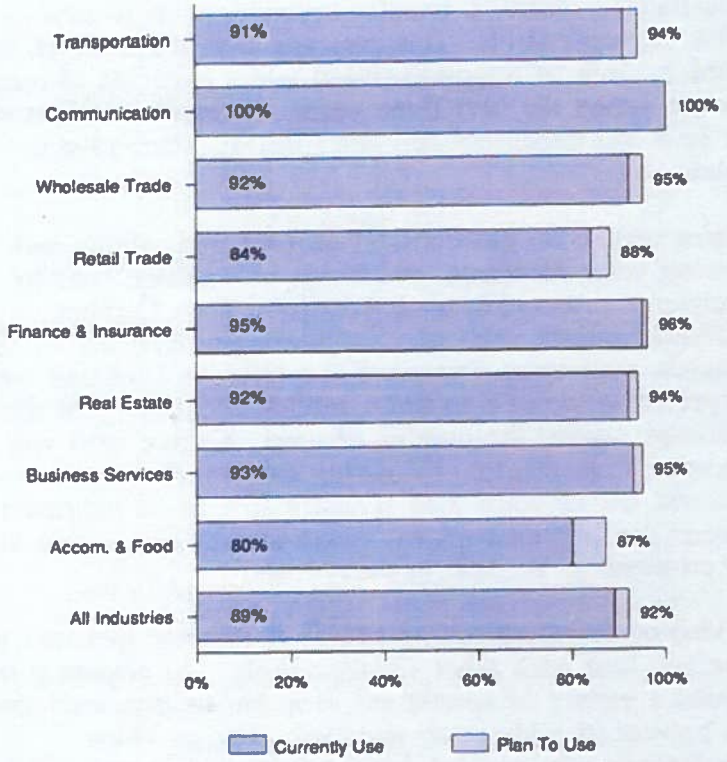
Use of personal computers (PCs) is 89% overall and is projected to reach 92% within three years. Increased processing power and the growing number of software applications are among the reasons for the continuing expansion in the number of users. Furthermore, the networking capabilities of the PC are now being developed. This trend is supported by the survey findings, which show that 45% of respondents who own PCs indicate that at least some of their machines are linked to a network.

Working With Technology, the report on a 1986 Economic Council of Canada survey, says that 65% of 946 establishments surveyed introduced office automation technologies between 1980 and 1985.

While our survey predicts only a 3% increase in the number of PC users over the next three years, 57% of users indicate that they intend to increase their current use over that time.

Use of personal computers ranges from 100% for communications industries to 80% for accommodation, food and beverage industries. While the lowest use of PCs is in accommodation, food and beverage industries and retail trade industries, they report the highest projected growth rate over the next three years.

Use of Personal Computers Across Industry Divisions



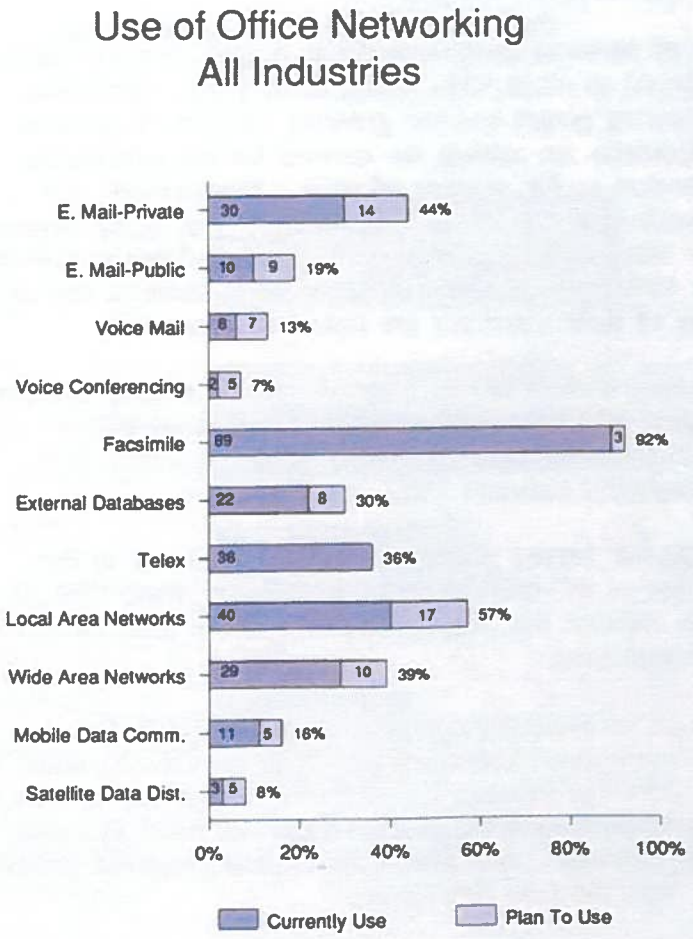
5.2 *Office Networking*

Many of the establishments surveyed indicate an interest in networking technologies, which facilitate communication within or between establishments.

Facsimile is clearly a popular technology. It is used by 89% of respondents. This contrasts with telex, which is used by 36% of respondents and is not expected to increase in use during the next three years. Facsimile services seem to be a less expensive and more flexible alternative to telex.

Voice mail is an electronic system for transmitting and storing voice messages, which can be accessed later by recipients. According to International Data Corporation Canada Limited, sales of voice messaging systems within Canada were approximately $20 million in 1988 and are expected to increase to $62.1 million by 1991. The survey findings suggest the number of users of voice mail will increase from 6% to 13% during the next three years. Current use of voice mail is under 10% in all industries except for communications, where current use is 18% and is projected to be 31% in three years.

Video conferencing allows parties at separate locations to see and hear each other simultaneously. At present it has found a variety of specialized uses, but its high cost seems to prevent its widespread adoption. Use of video conferencing is only 2% but is projected to grow to 7% within three years. Communications industries show the highest use (13%), with all other industries below 5%. Projected increases in use are greatest in communications (17%), finance and insurance (9%), and business services (8%).



Mobile data communications is the transmission of voice and data information from a base station to a mobile unit via radio. At present this service can only be provided through terrestrial transmitters. In 1990 Telesat Canada Mobile will provide for the broadcast of data services via satellite, and in 1993 capacity for voice communication will be added. The introduction of satellite-based mobile data communications may generate growth in the use of this technology far beyond what is suggested by the survey results. The survey predicts an increase in mobile data communications use in the next three years from 11% to 16%. The dominant users are communications and transportation industries, with 32% and 21% use respectively.

Satellite data distribution sends data via satellites and is particularly useful for widely distributed data communication requirements. The introduction of very small aperture terminals (VSATs) has considerably reduced the cost of installing a satellite data distribution system. Use of satellite data distribution is reported by 3% of respondents, with projected use of 8% within three years. Use is greatest among communications industries (15%); all other industries are below 5%.

The more popular office networking technologies are discussed in more detail in the following sections.

5.2.1 Electronic Mail

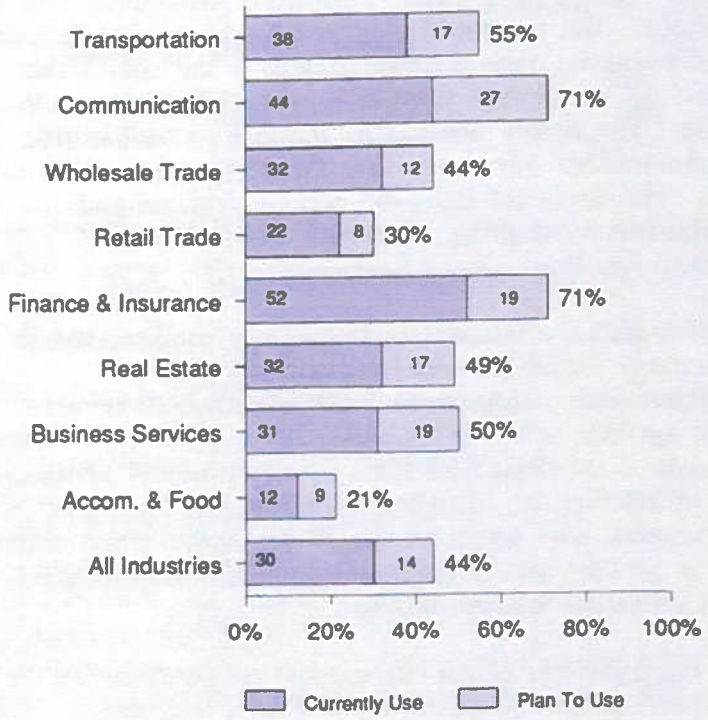
Electronic mail is the electronic transmission and storage of text messages, which may be retrieved by recipients at a later date. Users of electronic mail have the option of purchasing a privately owned system or subscribing to a public electronic mail service. *Data Communications* magazine estimates current worldwide use of private electronic mail exceeds that of public electronic mail, with 12.8 million and 2.4 million users respectively.

The results of the survey indicate similar patterns of use, with 30% using private electronic mail but only 10% using public electronic mail.

The introduction of international standards for the operation of electronic messaging systems will greatly increase the potential for linking different electronic mail services along with their usefulness and popularity.

Use of private electronic mail is expected to increase to 44% within the next three years, and use of public electronic mail is expected to almost double to 19%.

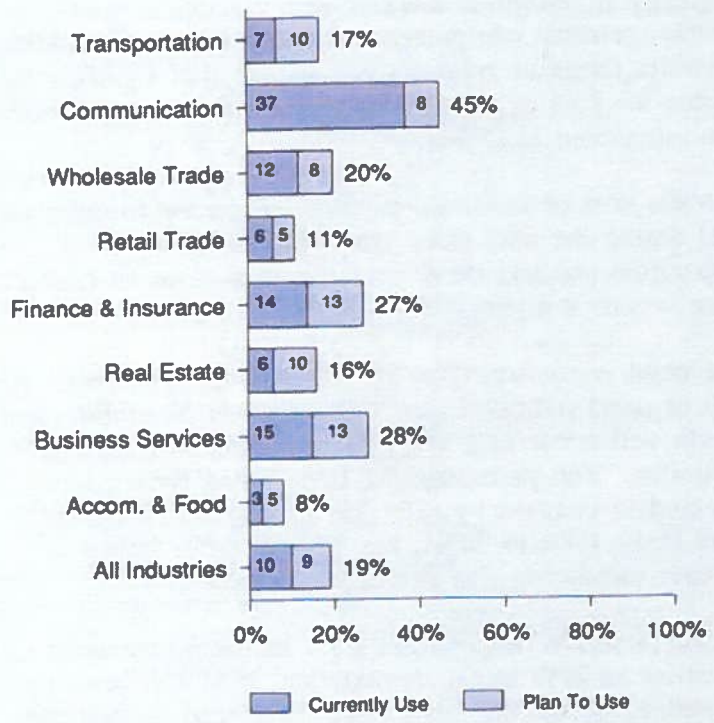
Use of Private Electronic Mail
Across Industry Divisions



Use of private electronic mail is greatest within finance and insurance industries (52%). Accommodation, food and beverage industries report the lowest use (12%). Communications industries showed the greatest planned increase in use during the next three years, at 27%.

Communications industries are the highest user of public electronic mail, at 37%. However, these industries expect only a modest increase in use, to 45%, over the next three years. The finance and insurance and business services industries expect the largest relative increases in use during this time period, from 14% and 15% respectively to 27% and 28%.

Use of Public Electronic Mail Across Industry Divisions



5.2.2 Facsimile

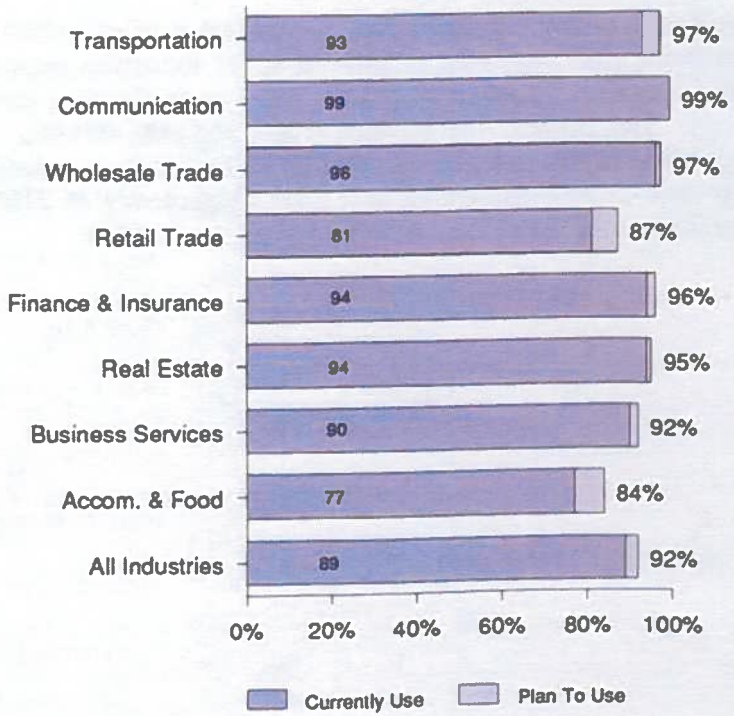
Facsimile is a system of transmitting and receiving documents through telecommunications links. Future developments in the facsimile market will involve the integration of facsimile devices with electronic mail systems, personal computers and photocopiers. In addition a satellite facsimile transmission service that significantly reduces the cost of long distance transmission has recently been introduced in Canada.

With the cost of facsimile machines expected to decrease to $500 during the next three years, Evans Research Corporation predicts these machines will soon be on each office worker's desk.

This trend is confirmed by the results of this survey. As 89% of users indicated they currently use facsimile, most growth will occur as current users purchase additional facsimiles. The percentage of firms using facsimile is expected to increase by only 3% during the next three years (from 89% to 92%), but 38% of users intend to increase use during this same time period.

Use of facsimile ranges from 99% in communications industries to 77% in accommodation, food and beverage industries. While the latter have the lowest current use, they report the highest projected increase over the next three years.

Use of Facsimile
Across Industry Divisions

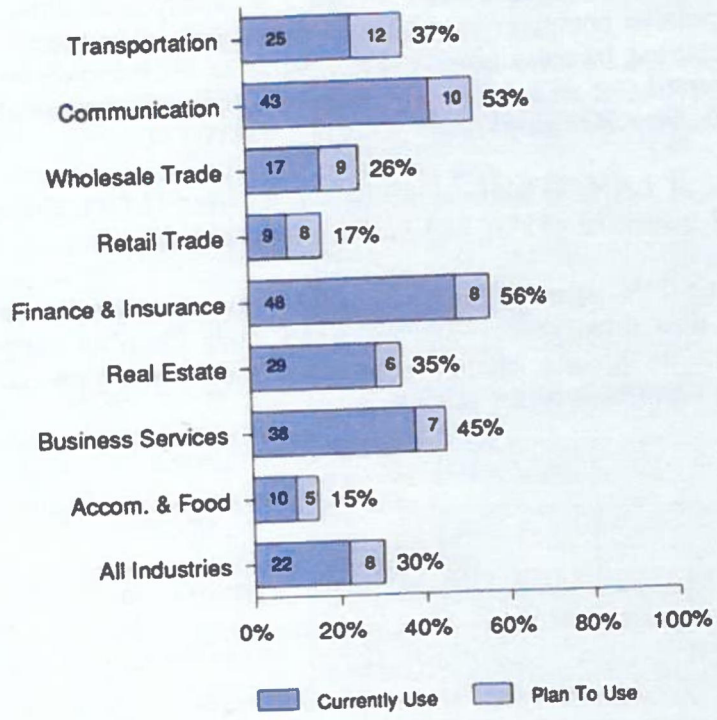


5.2.3 External Databases

External databases are commercial databases that may be accessed by many different companies for a fee. They provide comprehensive collections of information, usually designed to appeal to a specific target group. Users may access them on a selective basis, according to their needs. By spreading the cost of information-gathering over many subscribers, external databases keep individual user costs down. Furthermore, as the information is organized in an electronic format, it may be updated and distributed more easily than printed text.

Overall use of external databases is 22%, with the highest levels in finance and insurance (48%), communications (43%) and business services (38%); they are lowest in retail trade (9%) and accommodation, food and beverage (10%). Use of external databases is expected to grow from 22% to 30% within the next three years.

Use of External Databases
Across Industry Divisions



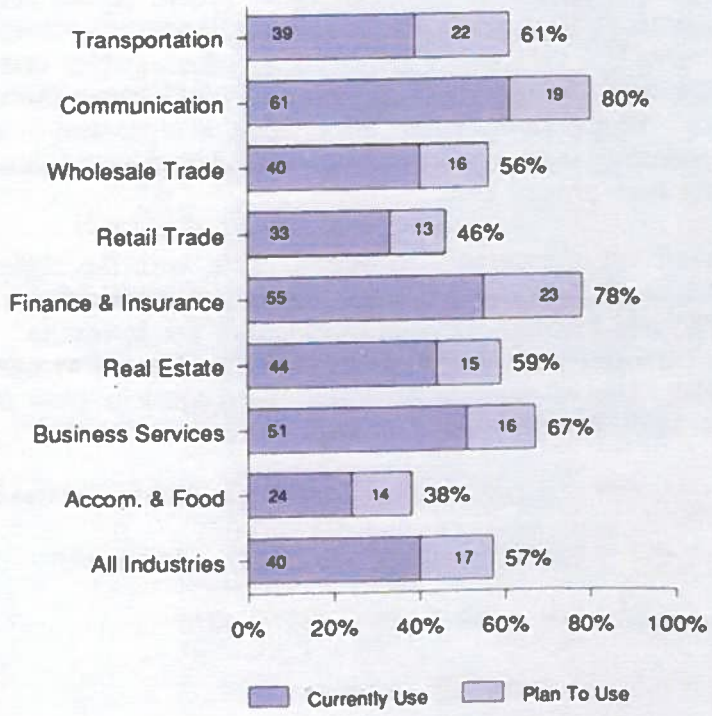
5.2.4 Local Area Networks

A local area network (LAN) allows office machines such as computers and word processors to communicate over limited distances (e.g., inter-office). LAN systems facilitate electronic communications within a company and allow expensive computer resources to be shared. They are becoming increasingly prevalent; 40% of all respondents reported use of LANs. Furthermore, 56% of respondents with over 200 employees possess a LAN.

Use of LANs is highest in communications (61%), finance and insurance (55%) and business services (51%).

Some 17% of respondents plan to begin using LANs within the next three years. The industries most likely to adopt them are finance and insurance (23%), transportation (22%) and communications (19%).

Use of Local Area Networks
Across Industry Divisions

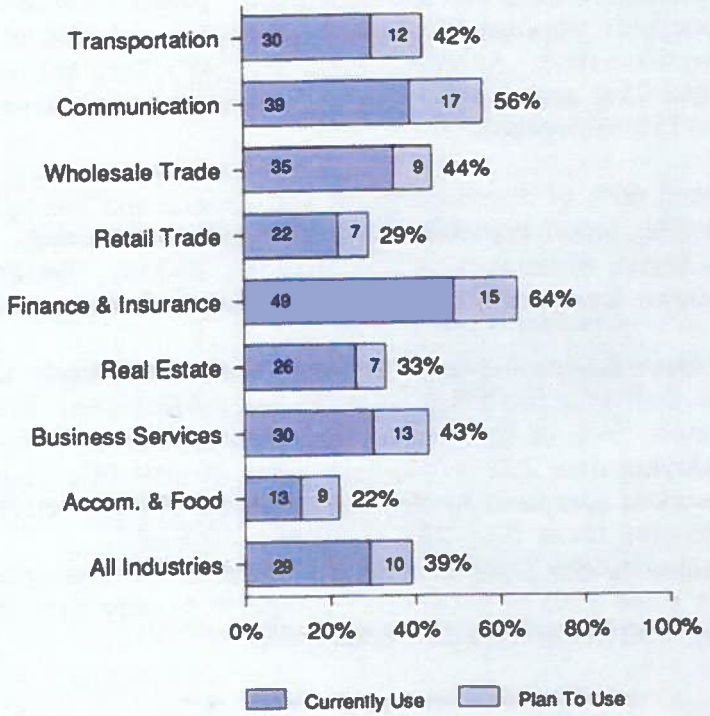


5.2.5 Wide Area Networks

Wide area networks (WANs) allow computers and other electronic machines to communicate over long distances (e.g., inter-city or inter-country). Overall use of WANs is 29%, with the highest levels in finance and insurance industries (49%) and communications industries (39%).

In the next three years, 10% of respondents plan to begin using WANs, with the communications (17%) and finance and insurance (15%) industries leading the way.

Use of Wide Area Networks
Across Industry Divisions

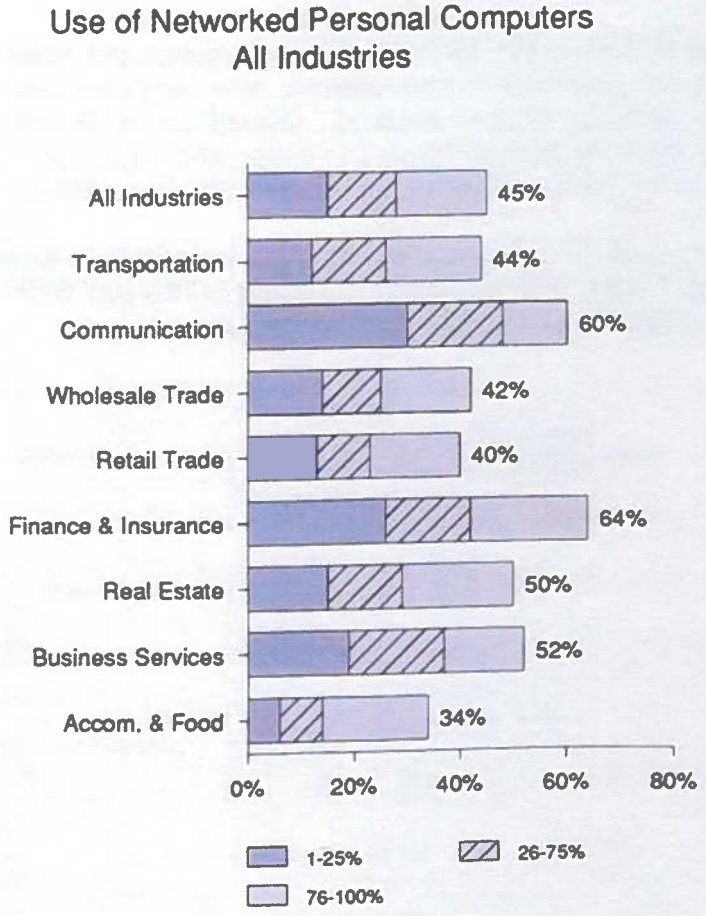


5.2.6 Networking of Personal Computers

Respondents were asked to indicate what percentage of their personal computers are networked. Overall, 45% of respondents who own personal computers indicate that at least some of their PCs are networked. About 15% of respondents who use PCs have between 1% and 25% of these networked. Another 12% of PC users have between 26 and 75% networked. Finally, 17% of PC users have over 75% networked.

Around 60% of communications and finance and insurance industries report that some of their PCs are networked. The degree of networking (i.e., 1- 25%, 26-75%, 76-100%) is shown for specific industries in the adjacent bar graph.

Businesses that employ more than 200 are more likely to have their PCs networked than are small businesses. For example, 68% of finance and insurance businesses employing over 200 people have some of their PCs networked compared to 49% for businesses in that sector employing fewer than 200. Similarly, 70% of communications companies with more than 200 employees have some level of networking compared to only 41% for those with fewer than 200 employees.



5.3 *Management Systems*

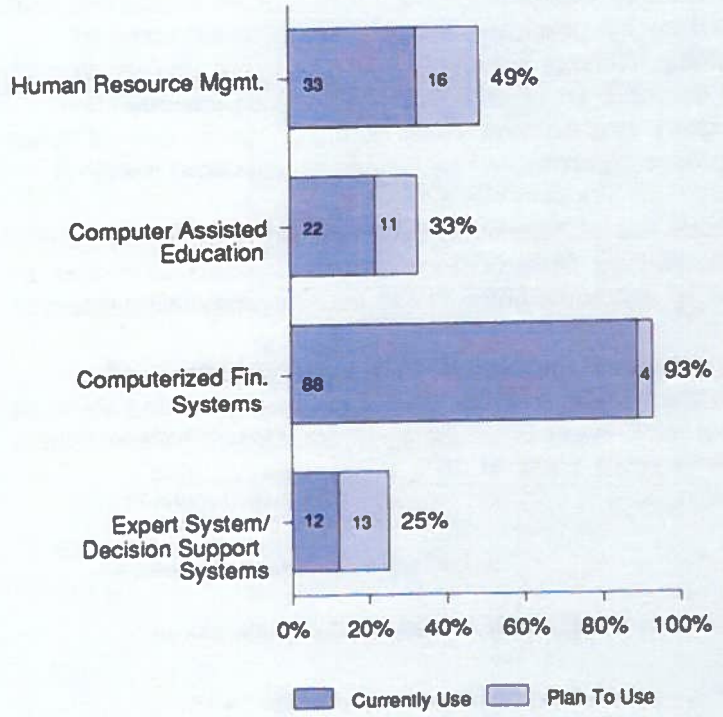
Computerized financial systems are clearly the dominant management system technology, with 88% of respondents reporting use, followed by human resource management systems (33%) and computer assisted education (22%).

Most companies are using some form of computerized financial system to maintain finances (e.g., accounting or payroll).

Decision support expert systems are software programs used to replicate expert knowledge in many domains, from financial planning to market forecasting. These business tools apply a system of decision rules to analyze large bodies of information with greater speed and comprehensiveness than would be possible if performed manually. In addition they are able to combine diverse areas of expertise in their analysis.

Arthur D. Little Decision Resources predicts that worldwide use of expert systems will grow at a rate of 40% annually. However, this survey indicates that use of expert systems will grow from a current level of 12% to 25% within the next three years. The highest growth rate is expected in finance and insurance industries in the next three years, from 11% to 40%.

Use of Management Systems
All Industries



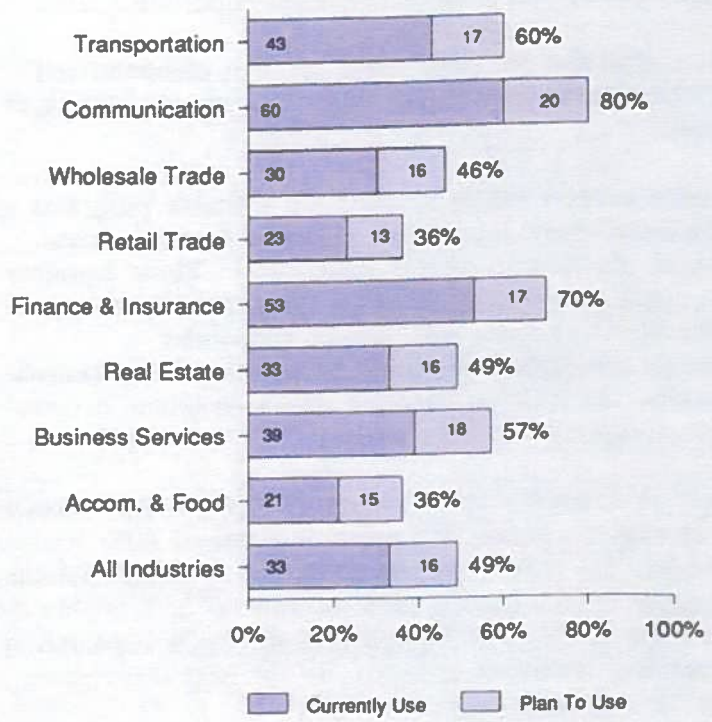
5.3.1 Human Resource Management Systems

A human resource management system (HRMS) maintains personnel management information such as personal employee data and data on career planning, absenteeism, and training and skills. An HRMS helps companies make decisions by providing a fast and accurate means of entering, storing, retrieving and analyzing this information. For example an HRMS may be used to construct a company organization chart or make predictions of future employee turnover.

Overall use of human resource management systems is 33%, ranging from 60% in communications industries to 21% in accommodation, food and beverage industries.

The projected increase in new users is high in all industries. The number of respondents planning to begin using such systems in the next three years ranges from 13% in retail trade to 20% in communications.

Use of Human Resource Management Systems Across Industry Divisions

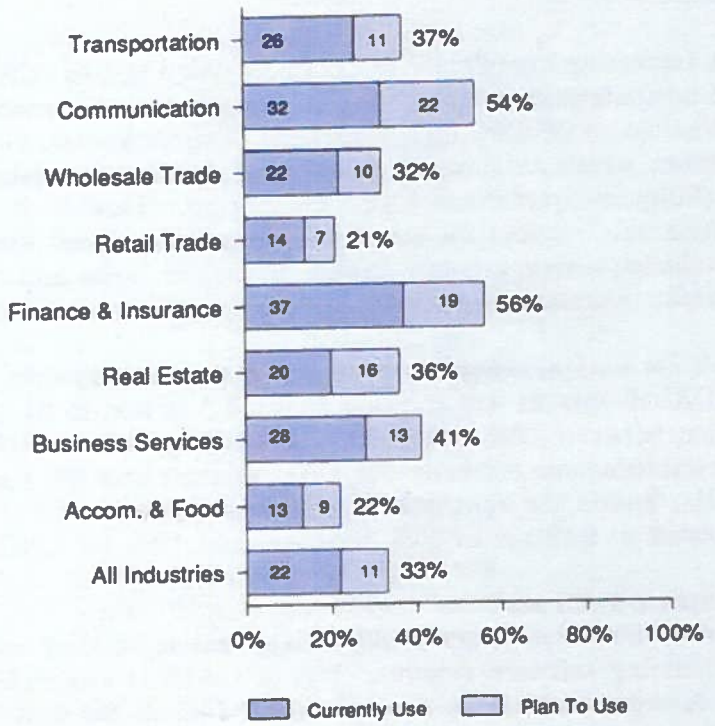


5.3.2 Computer-Assisted Education

Computer-assisted education systems use computers to augment or supplement more conventional instruction systems. For example an interactive video system uses a video disk player and a computer to teach a user via live pictures, graphics and individualized text feedback. Such systems allow for instruction to be provided on a flexible and individual basis.

Overall use of computer-assisted education is 22%, with finance and insurance industries (37%) and communications industries (32%) leading the way. Both these industries have high projected increases of use, with 22% of respondents within communications industries planning to begin using computer-assisted education within the next three years, followed by 19% in finance and insurance industries.

Use of Computer-Assisted Education Systems Across Industry Divisions



5.4 Design Support Systems

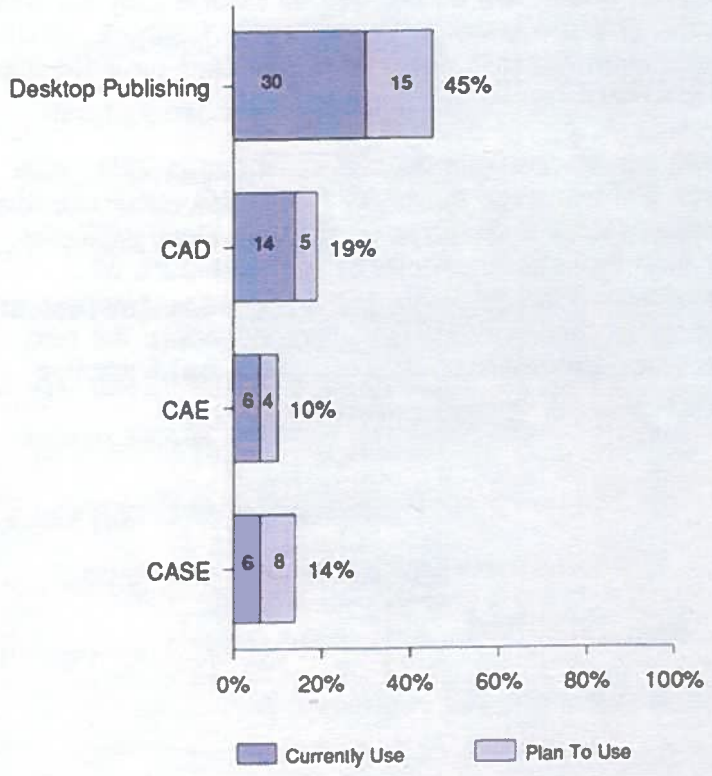
Desktop publishing is the dominant design technology in use (30%) and has the highest projected increase, with 15% of respondents planning to begin using it in the next three years.

The increasing complexity of computer-aided design (CAD) and computer-aided engineering (CAE) software has made it possible to develop fully integrated design/manufacturing systems, which can use computer-based drawings to test the reliability and performance of a component. This considerably reduces the time and expense associated with introducing a new product, lowers production costs and shortens manufacturing runs.

High Technology magazine estimates that the worldwide CAD/CAE market will increase from $8.5 billion to $13.5 billion between 1988 and 1990. This survey indicates 14% of establishments currently use CAD systems and 6% use CAE. Within the next three years, these figures are expected to increase to 19% for CAD and 10% for CAE.

Computer-aided software engineering (CASE) is a combination of techniques and tools aimed at building and maintaining software systems. Use of CASE is low (6%) but is expected to more than double to 14% in the next three years.

Use of Design Support Systems
All Industries



5.4.1 Desktop Publishing

Desktop publishing uses a personal computer/laser printer system to produce high-quality graphics and text from a desktop. Desktop publishing can be used to produce everything from internal memos to corporate reports and advertisements.

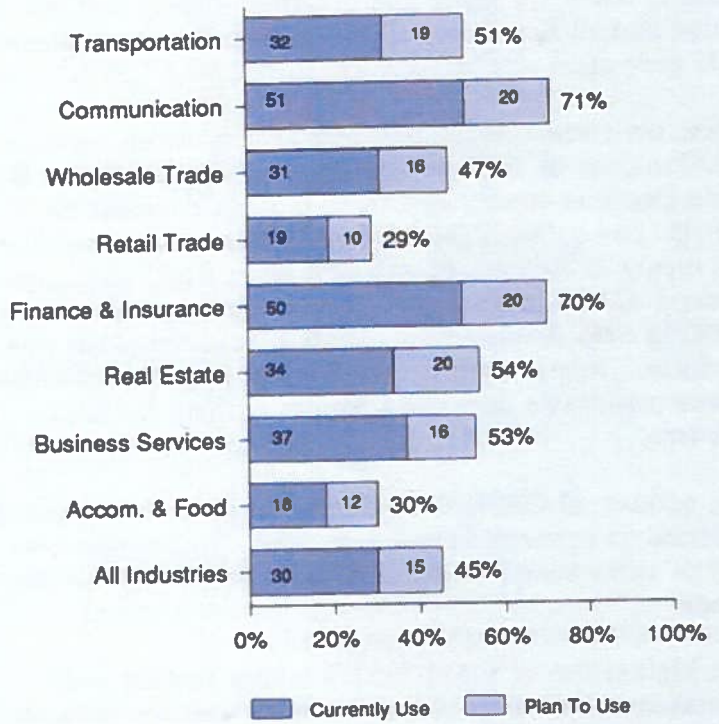
The appeal of desktop publishing systems is increasing as low-end systems become less expensive and high-end systems expand their capabilities. Evans Research estimates that the Canadian desktop publishing market will expand from $40 million in 1985 to $560 million in 1990.

This survey forecasts an increase in the number of users during the next three years from 30% to 45% and a 53% increase in use among current users.

Communications and finance and insurance industries are the dominant users of desktop publishing systems, reporting 51% and 50% use respectively. In addition, these industries report the highest planned increase in use during the next three years, by 20% in each case.

The lowest use of desktop publishing is in accommodation, food and beverage industries (18%) and retail trade industries (19%). These industries also have the lowest projected increase in new users over the next three years (12% and 10% respectively).

Use of Desktop Publishing
Across Industry Divisions



5.4.2 Computer-Aided Software Engineering

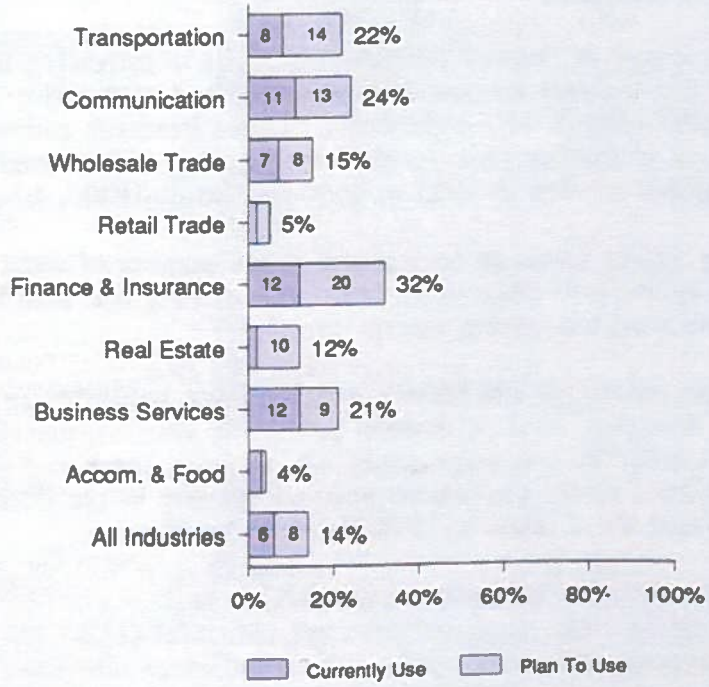
Computer-Aided Software Engineering (CASE) is a combination of techniques and tools used in the development and maintenance of software systems. CASE products allow for faster and improved coding and testing during system development, with features such as automatic code generation and information engineering.

While the current market for CASE is relatively small ($250 million in 1987 worldwide according to Arthur D. Little Decision Resources), there is great potential for growth. As software development costs spiral upward and the supply of new applications becomes backlogged against demand, CASE technologies provide the possibility of reducing both development costs and lead times for new products. This is especially useful for large corporations whose mainframe computers require custom designed software.

The number of CASE users during the next three years is expected to increase from 6% to 14%. In addition over half of users intend to increase their use during this time period.

The highest use of CASE occurs within finance and insurance industries (12%) and communications industries (11%), which are also the highest users of mainframe computers. In addition, the use of CASE is four times as high among companies that employ over 200 people (12%) than among companies that employ under 200 (3%).

Use of Computer-Aided Engineering Software (CASE) Across Industry Divisions



5.5 *Inventory/Sales Systems*

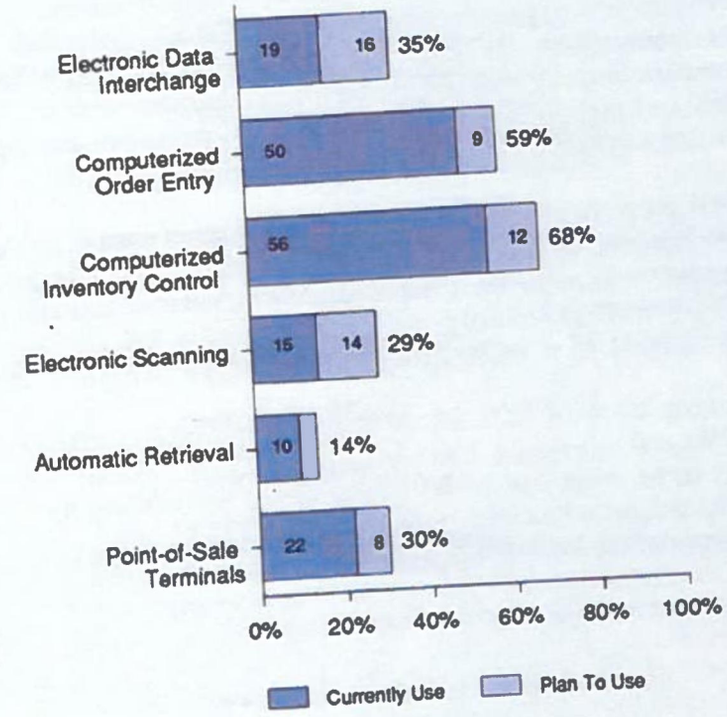
The dominant technologies used in inventory/sales systems are computerized inventory control (56%) and computerized order entry (50%).

While overall use of electronic data interchange (EDI) is relatively low (19%), its projected increase in use is high, with 16% of respondents planning to adopt it during the next three years.

Electronic scanning systems automatically record information on a product as a scanning device is passed over special markings (bar codes) on the product. In retail trade, for example, scanning improves price accuracy at point of sale, checkout productivity and unit inventory accuracy. Improved market information is another benefit. Use of electronic scanning systems is highest in communications (24%), retail trade (22%) and transportation (17%). During the next three years new users are expected to increase by 14%, with the highest increases occurring within communications (22%), wholesale trade (19%) and transportation (16%).

Point-of-sale terminals are devices generally used in retail establishments to record sales information automatically into a computer. The retail trade industry (47%) and the accommodation, food and beverage industry (43%) are by far the major users. In retailing, features can include merchandise and customer sales data capture, inventory control systems, and the ability to look up the price of a particular item.

Use of Inventory/Sales Systems
All Industries



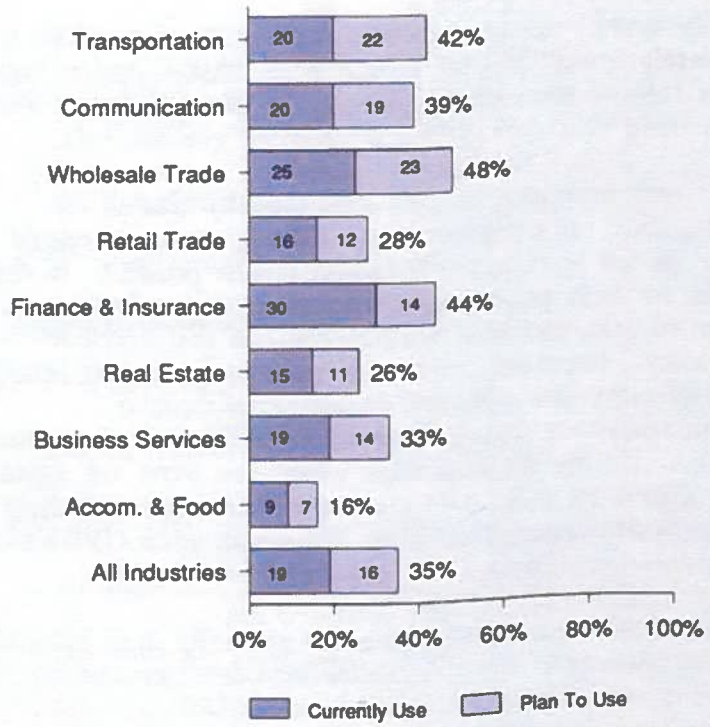
5.5.1 Electronic Data Interchange

Electronic Data Interchange (EDI) involves the electronic transfer of structured business transaction information, generally between suppliers and customers. EDI attempts to replace paper transactions such as purchase orders, invoices and payment orders with computer-to-computer communications. It offers the potential not only to reduce purchasing costs, but also to improve customer service, cash and inventory management and to strengthen trading relationships.

Until recently growth in EDI has been concentrated in the development of privately operated systems, linking large organizations with their suppliers on a closed network. The development of industry-wide EDI standards has allowed the creation of a multi-customer/multi-supplier environment.

Leading users of EDI are finance and insurance industries (30%) and wholesale trade industries (25%). Within the next three years use of EDI is expected to increase by 16%, led by wholesale trade industries (23%) and transportation industries (22%).

Use of Electronic Data Interchange
Across Industry Divisions

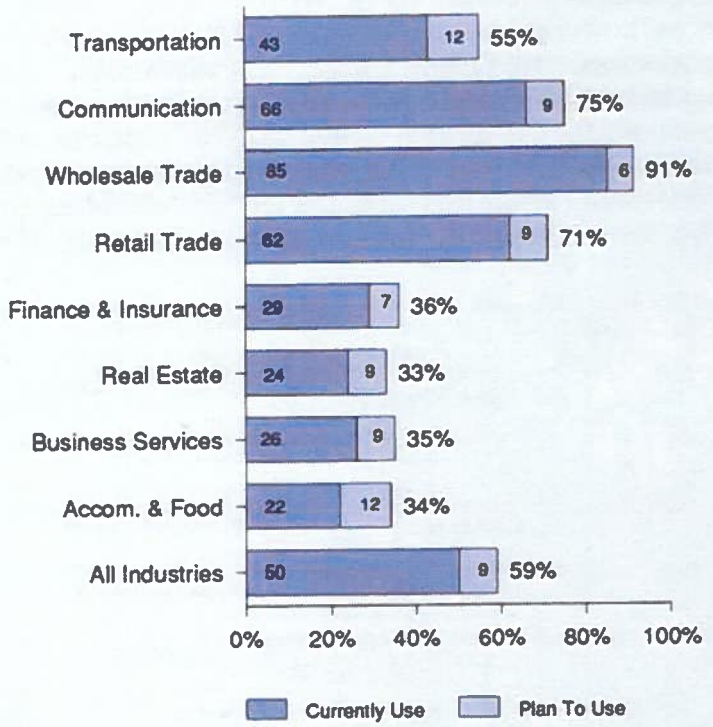


5.5.2 Computerized Order Entry

Computerized order entry includes systems that computerize the order process. Overall use of computerized order entry is 50%, with the following industries leading: wholesale trade (85%), communications (66%) and retail trade (62%).

Use of computerized order entry within wholesale trade industries is projected to be 91% within three years.

Use of Computerized Order Entry
Across Industry Divisions

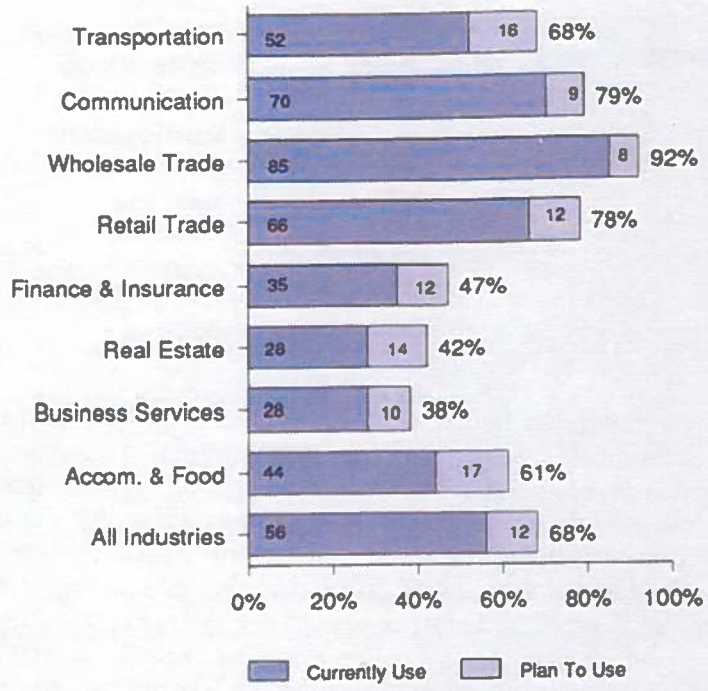


5.5.3 Computerized Inventory Control

Computerized inventory control is used by 56% of respondents. The following industries are the major users: wholesale trade (85%), communications (70%) and retail trade (66%).

It is predicted that 12% of respondents will adopt computerized inventory control in the next three years, increasing total use to 68%. New usage is expected to be highest in the following industries: accommodation, food and beverage (17%), transportation (16%) and real estate (14%).

Use of Computerized Inventory Control
Across Industry Divisions



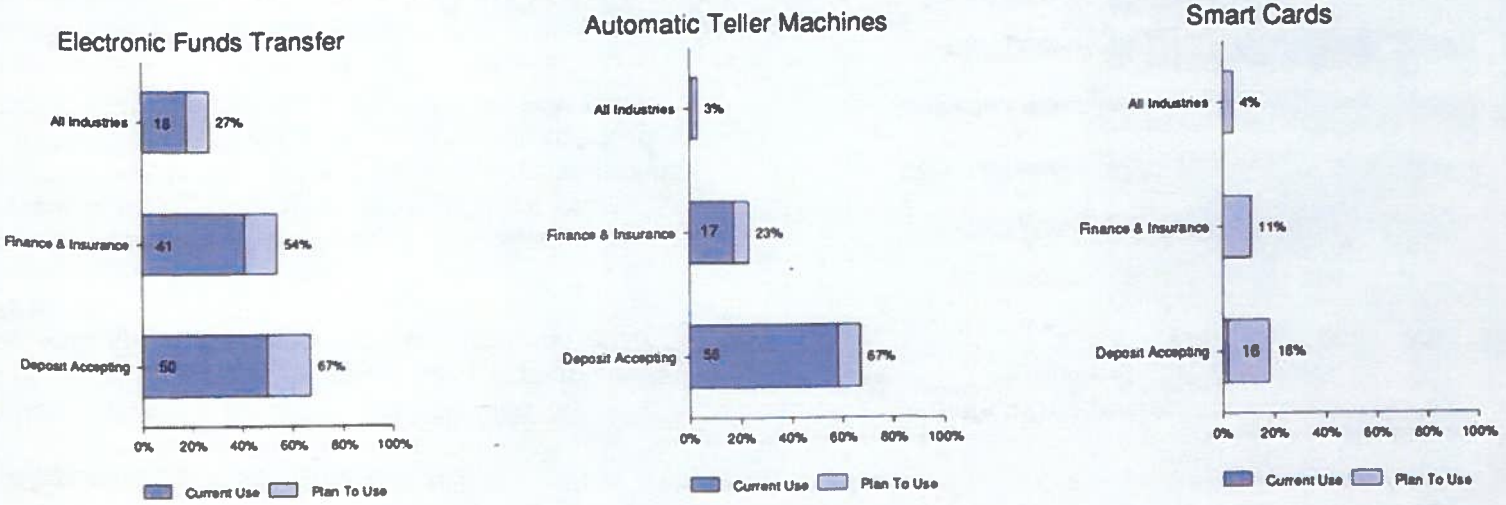
5.6 Industry-Specific Applications

5.6.1 Financial Systems

Electronic funds transfer (EFT) is a cashless method of paying for goods and services. Electronic signals between computers are used to adjust the accounts of the parties involved in the transaction. EFT enjoys a variety of specialized uses. For example, it forms the communications system through which automatic teller machines (ATMs) and credit card authorization systems operate. With the introduction of debit cards and smart cards, the potential uses for EFT have been greatly expanded. In addition there is a very strong and natural linkage between EFT and electronic data interchange (EDI).

Use of EFT is 18% overall and is expected to increase to 27% within the next three years. Finance and insurance industries are clearly the dominant users of EFT, reporting 41% usage. Within this sector, the deposit accepting industries indicate 50% use, which is expected to grow to almost 70% within the next three years. As the deposit accepting industries must have the capability to perform electronic funds transfer in order for other industries to adopt it, use in these industries may set the pace at which other industries may employ EFT. ATM use is strongest in deposit accepting industries, 58% of which use them.

Use of Financial Systems - All Industries and within the Finance & Insurance Industry



A smart card is a credit-card-sized device that contains computer memory chips capable of storing and manipulating information. For example smart cards are presently used by the medical profession to store patient health information and X-rays. Smart cards have the potential to be used in a broad range of applications, such as debit cards, and in conjunction with EDI. Consequently their use is expected to grow rapidly in the future.

Current use of smart cards is minimal, but in three years use within finance and insurance is expected to be 11%. Given the current limited use by other industries, only responses from finance and insurance industries have been tabulated in this survey.

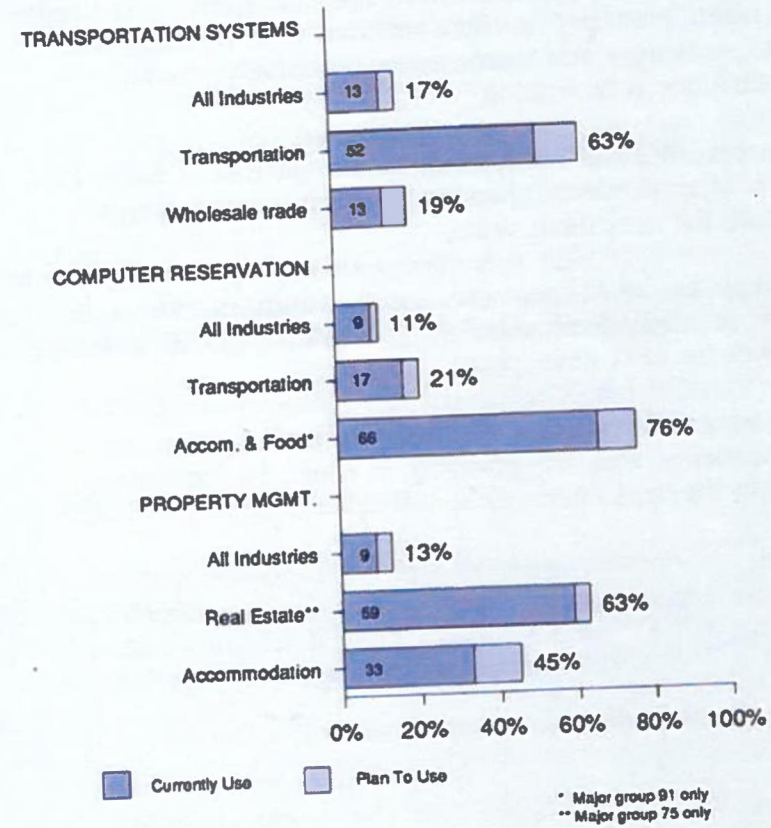
5.6.2 Management Systems

Technologies such as transportation systems, computer reservation systems and property management systems are used primarily by a few industries. Transportation systems performing functions such as fleet management and freight rate analysis are currently used by 52% of transportation establishments and 13% of companies in wholesale trade.

Computer reservation systems are used by 66% of accommodation service companies and by 17% of transportation establishments.

Property management systems are used both by real estate operators to oversee their rentals and by the accommodation sector to maintain room/guest information. Some 59% of real estate operators and 33% of accommodation service businesses have such systems in place.

Use of Industry-Specific Management Systems, All Industries



5.6.3 Accommodation Systems

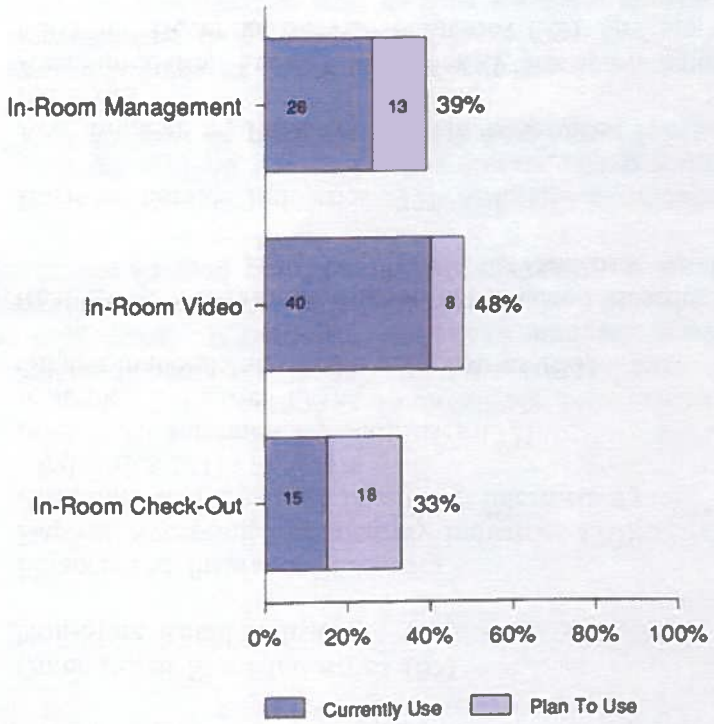
Use of in-room video, in-room check-out and in-room management systems has only been considered for the accommodation service industry, which is a subset of accommodation, food and beverage industries. The number of hotels providing in-room services such as electronic mail, messages and databases on room status and availability is increasing.

Current use of in-room management systems is 26%, with 13% of respondents planning to adopt the technology within the next three years.

Current use of in-room check-out services is 15%, with 18% of respondents planning to begin using the technology within the next three years.

In-room video services are currently used by 40% of respondents, with 8% planning to adopt the technology within the next three years.

Use of Accommodation Systems for the Accommodation Service Industry



Appendix 1

Service Industries Included in Survey

and Standard Industrial Classification (1980)

Transportation Industries (45)

- Communications Industries (48)

- Wholesale Trade
  Farm Products Industries, Wholesale (50)
  Petroleum Products Industries, Wholesale (51)
  Food, Beverage, Drug and Tobacco industries, Wholesale (52)
  Apparel and Dry Goods Industries, Wholesale (53)
  Household Goods Industries, Wholesale (54)
  Motor Vehicle, Parts and Accessories Industries, Wholesale (55)
  Metals, Hardware, Plumbing, Heating and Building Materials Industries, Wholesale (56)
  Machinery, Equipment and Supplies Industries, Wholesale (57)
  Other Products Industries, Wholesale (58)

- Retail Trade
  Food, Beverage and Drug Industries, Retail (60)
  Shoe, Apparel, Fabric and Yarn Industries, Retail (61)
  Household Furniture, Appliances and Furnishings Industries, Retail (62)
  Automotive Vehicles, Parts and Accessories Industries, Sales and Service (63)
  General Retail Merchandising Industries (64)
  Other Retail Store Industries (65)
  Non-Store Retail Industries

- Finance and Insurance Industries
  Deposit Accepting Intermediary Industries (70)
  Consumer and Business Financing Intermediary Industries (71)
  Investment Intermediary Industries (72)
  Insurance Industries (73)
  Other Financial Intermediary Industries (74)

- Real Estate Operator and Insurance Agent Industries (75&76)

- Business Service Industries (77)

- Accommodation, Food and Beverage Service Industries
  Accommodation Service Industries (91)
  Food and Beverage Service Industries (92)

Statistics Canada / Statistique Canada

Canada

DIFFUSION OF TECHNOLOGY SURVEY IN THE SERVICE INDUSTRIES

Si vous préférez recevoir ce questionnaire en français, veuillez cocher la case ou téléphoner à frais virés ☐

Collected under Authority of Statistics Act, Revised Statutes of Canada, 1985, Chapter S19.

IMPORTANT

Please complete and return within 10 days of receipt.

Please correct mailing address if required

PURPOSE OF THE SURVEY

Studies have indicated that Canada lags behind most other advanced economies in the use of computer–based technologies. The purpose of this survey is to provide up–to–date information on the current and planned internal use of computer–based technologies and applications within establishments in Canada's service sector. This data, along with similar information from the survey of Manufacturing Technologies, will be critical to the federal government in policy formulation and program planning to promote the diffusion of computer–based technologies.

SPONSOR

This survey is conducted by Statistics Canada on behalf of Industry, Science and Technology Canada, Department of Communications and Employment and Immigration Canada.

PARTICIPATION

Participation in this survey is voluntary. Your cooperation in completing the questionnaire, however, is vital for the statistical information to be useful and valuable.

SCOPE

Because this survey covers a variety of service industries, not all the technologies listed in the questionnaire will necessarily be relevant to your establishment. Please respond for the address printed above if a single establishment or for all associated branches if a multi–unit establishment; and only for the industry printed below the address.

CONFIDENTIALITY

Statistics Canada is prohibited by law from publishing or releasing outside Statistics Canada, in any manner, any statistics which would divulge information obtained from this survey relating to any identifiable business. The data reported on the survey questionnaire will be treated in strict confidence, used for statistical purposes and released in aggregate form only. The confidentiality provisions of the Statistics Act are not affected by either the Access to Information Act or any other legislation.

CORRESPONDENCE

If you require assistance in the completion of the questionnaire or have any questions regarding the survey, please contact one of the offices below:

St. John's
1-800-563-4255
(709) 772-4048

Halifax
1-800-565-1685
(902) 426-8100

Edmonton
1-800-661-9884
(403) 495-4627

Calgary
(403) 292-4907

Montreal
1-800-363-6720
(514) 283-5724

Sturgeon Falls
1-800-461-1662
(705) 753-4888

Regina
1-800-667-7164
(306) 780-7445

Toronto
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(416) 973-6598

Winnipeg
1-800-665-3393
(204) 983-2773

Vancouver
1-800-663-0172
(604) 666-2649

NAME OF PERSON FILLING OUT QUESTIONNAIRE: _____ Telephone number: _____

STC/IND–310–02761

DO YOU USE ANY OF THE TECHNOLOGIES BELOW?	IF YES					IF NO	
For each of the technologies listed below, mark x in the appropriate column.	Currently used in operations	Plan to increase current usage in next 3 years	Have your expectations of these technologies been: (check one)			Plan to use in next 3 years	
			met	not met	exceeded	Yes	No
1. OFFICE EQUIPMENT TECHNOLOGIES							
1.01 Personal computers							
1.02 Online terminals							
1.03 Mainframe computer							
1.04 Mini–computers							
1.05 Electronic mail – private							
1.06 Electronic mail – public							
1.07 Voice mail							
1.08 Video conferencing							
1.09 Facsimile							
1.10 Desktop publishing							
1.11 External Databases							
1.12 Telex							
2. TELECOMMUNICATIONS TECHNOLOGIES							
2.01 Local area networks							
2.02 Wide area networks							
2.03 Electronic data interchange (EDI)							
2.04 Mobile data communications							
2.05 Satellite Data Distribution							
3. APPLICATIONS TECHNOLOGIES							
3.01 Human Resource Management System							
3.02 Computerized order entry							
3.03 Computerized inventory control							
3.04 Expert systems as decision support tool							
3.05 Computerized financial system (acct./payroll)							
3.06 Electronic Scanning Systems							
3.07 Computer assisted education and training							
3.08 Electronic funds transfer							
3.09 Automatic teller machines							
3.10 Transportation Systems							
3.11 Computer reservation systems							
3.12 Automated storage and retrieval system							
3.13 Point of sale terminals							
3.14 Smart cards							
3.15 Computer–aided design (CAD)							
3.16 Computer–aided engineering (CAE)							
3.17 Computer–aided software engineering (CASE)							
3.18 In–room management systems							
3.19 In–room video systems							
3.20 In–room check out systems							
3.21 Property management systems							

What percentage of your total number of personal computers are networked ? _____% | OFFICE USE ONLY

Guide To Technological Terminology

1. OFFICE EQUIPMENT TECHNOLOGIES

1.01 **Personal computers:** a desktop or portable computer used for data analysis, manipulation and storage, graphics, word processing.

1.02 **Online terminals:** any dumb terminal used to interact with a host computer.

1.03 **Mainframe Computer**: the largest type of computer.

1.04 **Mini–computers:** a mid sized computer, smaller than a mainframe, which can usually execute several programs concurrently.

1.05 **Electronic mail — private:** permits the electronic transmission and storage of text messages, using own private facilities.

1.06 **Electronic mail – public:** permits the electronic transmission and storage of text messages, using public facilities.

1.07 **Voice mail:** an electronic system for transmitting and storing voice messages, which can be accessed later by the recipient.

1.08 **Video conferencing:** a meeting of geographically separated participants who can simultaneously see and hear each other via a telecommunications system.

1.09 **Facsimile**: a system for transmitting and receiving pages (text, diagrams, pictures) over telecommunications links.

1.10 **Desktop publishing:** a personal computer/laser printer system which allows production of high–quality printing from a desktop.

1.11 **External Databases**: access to commercially available on–line database services.

1.12 **Telex**: a world–wide automatic teletype exchange where subscribers can dial each other for direct two–way communications.

2. TELECOMMUNICATIONS TECHNOLOGIES

2.01 **Local area networks:** a network linking together communicating devices such as computers, word processors and other electronic office machines over limited distances (i.e. an inter–office).

2.02 **Wide area networks:** a network linking together communicating devices such as computers, word processors and other electronic office machines over long distances.

2.03 **Electronic Data Interchange (EDI):** Electronic transfer of standard business transaction information, for example computer linkages of suppliers and customers.

2.04 **Mobile Data Communications**: transmission of data via radio from a base station to a mobile unit.

2.05 **Satellite Data Distribution**: communications of data via satellites.

3. APPLICATIONS TECHNOLOGIES

3.01 **Human Resource Management System**: a computer application that maintains Personnel Management information such as employee personal data, career planning, absenteeism, training and skills data.

3.02 **Computerized Order Entry**: a system that computerized the order process.

3.03 **Computerized Inventory Control**: a computer application used to manage and maintain a record of inventory.

3.04 **Expert Systems as decision support tool**: use of Expert Systems (or Artificial Intelligence) as an input to the decision process.

3.05 **Computerized financial system (acct./payroll)**: a computer application which maintains information related to the business' finances (e.g. accounting and payroll).

3.06 **Electronic Scanning Systems**: use of machine readable markings on products/packages (e.g. Universal Product Codes, Bar Coding and Optical Character Readers).

3.07 **Computer assisted education and training**: use of computer system to augment, or supplement, a more conventional instructional system, (e.g. computer–assistance instruction (CAI), computer–augmented learning (CAL)).

3.08 **Electronic Funds Transfer (EFT)**: A cashless method of paying for goods or services. Electronic signals between computers are used to adjust the accounts of the parties involved in a transaction.

3.09 **Automatic teller machines**: a device for providing an automated banking service (e.g. cash dispensers)

3.10 **Transportation Systems**: a computer application that maintains information related to transportation (e.g. fleet management, freight rate analysis, logistics analysis).

3.11 **Computer reservation systems**: access to computer reservation systems (e.g. airline flight information systems or room reservation systems.)

3.12 **Automated storage and retrieval system**: form of automated materials/products/parcel handling, especially comprising an automated warehouse, where parts are stored in racks and retrieved on computerized carts and lift trucks.

3.13 **Point of sale terminals**: a device used in retail establishments to record sales information in a form that can be inputted directly into a computer, as distinguished from an electronic cash register.

3.14 **Smart Cards**: a credit card with a built–in computer.

3.15 **Computer–aided design (CAD)**: use of computers to aid the designer from product conception to execution of engineering drawings.

3.16 **Computer–aided engineering (CAE)**: use of computer–based tools to help solve engineering problems (e.g. concept design and performance analysis).

3.17 **Computer–aided software engineering (CASE)**: Combination of techniques and tools aimed at building and maintaining software systems. CASE products enable faster and improved coding and testing during system development with features such as automatic code generation, information engineering, and enhanced techniques.

3.18 **In–room management systems**: provision of in–room services such as video breakfast selection, access to electronic mail, messages or databases, TV advertising (on in–house channels), or room status and availability.

3.19 **In–room video systems**: provision of in–room video movies.

3.20 **In–room check out systems**: provision of in–room video bill review and check–out.

3.21 **Property management systems**: a computer application that supports financial and management control of buildings. In the real estate sector PMS are typically used to list building/tenant information, leasing recoveries and rents receivables. In the Travel Industry PMS systems maintains room/guest information.

Percentage of Establishments Currently Using Technologies by Industry Group

	All Industries	Transportation	Communication	Wholesale Trade	Retail Trade	Finance & Insurance	Real Estate	Business Services	Accommodation Food & Bev.
	%	%	%	%	%	%	%	%	%
Personal computers	89.1	91.2	100.0	91.6	83.5	95.2	91.9	92.5	80.1
Online terminals	75.6	79.8	91.1	85.7	66.7	93.1	85.2	71.2	52.5
Mainframe computer	41.0	45.9	49.4	44.8	38.3	66.7	34.8	35.3	23.5
Mini-computer	54.3	58.6	67.1	62.3	46.9	52.8	53.3	58.8	40.2
Electronic mail - private	30.1	37.8	44.3	31.9	22.4	51.9	31.9	31.3	11.5
Electronic mail - public	10.0	7.2	36.7	12.3	6.3	13.9	5.9	14.6	2.7
Voice mail	5.6	4.4	17.7	4.9	4.6	9.1	5.2	7.3	3.3
Video conferencing	2.1	0.6	12.7	2.0	1.7	3.0	0.7	3.5	0.3
Facsimile	88.9	93.4	98.7	95.6	80.7	94.4	94.1	89.5	76.5
Desktop publishing	30.1	32.3	50.6	30.7	18.6	50.2	34.1	36.9	18.0
External databases	22.4	24.6	43.0	17.0	9.4	48.1	28.9	38.3	9.6
Telex	35.7	34.5	49.4	49.1	18.2	44.6	25.2	39.4	29.8
Local area networks	40.0	39.0	60.8	40.3	32.6	55.4	43.7	51.2	24.0
Wide area networks	28.9	29.6	39.2	34.7	22.2	48.5	25.9	29.9	12.8
Electronic data interchange	19.2	19.6	20.3	24.8	15.5	29.9	14.8	18.9	8.7
Mobile data communications	10.9	21.3	31.6	12.0	6.7	6.5	8.9	8.4	6.0
Satellite data distribution	3.3	3.9	15.2	4.0	1.9	4.8	0.7	2.7	1.6
Human resource management systems	33.4	43.1	59.5	30.4	23.2	53.2	33.3	38.5	20.5
Computerized order entry	50.0	43.1	65.8	84.7	61.5	28.6	23.7	26.4	22.4
Computerized inventory control	56.3	52.2	69.6	85.4	66.3	35.1	28.1	28.3	43.7
Expert systems for decision support tool	12.2	12.4	10.1	14.7	10.9	10.8	15.6	12.7	8.7
Computerized financial systems	87.8	90.3	93.7	91.4	83.5	90.5	90.4	89.5	79.2
Electronic scanning systems	14.5	17.1	24.1	14.6	22.4	14.7	5.9	13.7	1.9
Computer assisted education and training	22.0	26.2	31.6	22.1	14.2	36.8	20.0	27.5	12.8
Electronic funds transfer	17.7	14.1	21.5	16.0	17.4	41.1	23.0	15.4	9.8
Automatic teller machines	1.4	.	.	.	.	16.5	.	.	.
Transportation systems	12.5	51.7	5.1	12.7	5.4	3.5	0.7	5.4	2.2
Computer reservation systems	9.1	16.6	3.8	2.5	3.1	2.6	8.1	3.2	33.6
Automated storage and retrieval systems	9.6	12.7	10.1	10.4	7.3	12.1	9.6	10.5	5.7
Point of sale terminals	22.4	9.9	13.9	19.2	46.9	6.9	6.7	2.2	43.4
Smart cards	0.0	.	.	.	.	0.4	.	.	.
Computer-aided design (CAD)	14.1	19.6	55.7	14.6	6.7	10.0	10.4	22.6	4.4
Computer-aided engineering (CAE)	6.3	9.7	21.5	6.4	1.9	2.6	3.0	14.0	1.1
Computer-aided software engineering (CASE)	6.4	7.7	11.4	6.6	2.1	12.1	2.2	11.9	2.5
In-room management systems	1.7	.	.	.	.	.	.	.	12.6
In-room video systems	2.5	.	.	.	.	.	.	.	18.9
In-room check out systems	1.0	.	.	.	.	.	.	.	7.1
Property management systems	9.3	9.4	7.6	4.1	3.3	10.4	43.0	4.3	19.1

Percentage of Establishments Planning to Begin Using Technologies During the Next 3 Years by Industry Group

	All Industries	Transportation	Communication	Wholesale Trade	Retail Trade	Finance & Insurance	Real Estate	Business Services	Accommodation Food & Bev.
	%	%	%	%	%	%	%	%	%
Personal computers	3.4	3.3	0.0	2.9	4.4	1.3	2.2	1.9	6.8
Online terminals	4.0	6.4	0.0	2.9	4.2	0.4	0.7	6.2	5.7
Mainframe computer	2.2	3.3	1.3	1.8	1.7	1.7	0.7	2.4	3.3
Mini-computer	4.4	6.6	2.5	2.6	4.6	5.6	5.9	4.3	4.1
Electronic mail - private	13.7	16.9	26.6	12.3	8.0	18.6	17.0	19.1	8.5
Electronic mail - public	8.6	10.2	7.6	8.3	5.0	12.6	9.6	13.2	5.2
Voice mail	7.2	8.0	12.7	6.0	2.5	15.6	10.4	11.6	3.0
Video conferencing	4.9	3.6	16.5	4.6	1.9	8.7	3.7	8.1	3.0
Facsimile	3.4	4.1	0.0	0.8	6.1	1.7	0.7	2.4	7.1
Desktop publishing	15.2	19.1	20.3	16.0	9.6	19.5	20.0	15.6	11.7
External databases	8.2	11.6	10.1	9.2	8.2	8.2	5.9	6.7	4.9
Telex	0.4	0.3	3.8	0.0	0.2	0.4	0.0	0.8	0.3
Local area networks	16.6	21.5	19.0	16.0	13.2	22.5	14.8	16.4	14.2
Wide area networks	10.0	11.6	16.5	8.7	6.7	15.2	7.4	12.9	9.0
Electronic data interchange	15.9	22.4	19.0	23.2	12.3	13.9	11.1	13.5	6.6
Mobile data communications	5.0	8.6	13.9	6.6	1.9	4.3	5.2	6.2	0.5
Satellite data distribution	4.6	5.8	16.5	5.2	3.6	4.3	2.2	5.4	1.4
Human resource management systems	15.7	16.6	20.3	15.8	12.5	16.5	16.3	18.1	15.0
Computerized order entry	9.0	12.4	8.9	5.8	9.2	6.5	8.9	9.4	12.3
Computerized inventory control	11.9	16.3	8.9	7.5	11.7	12.1	14.1	10.0	17.2
Expert systems for decision support tool	12.7	14.4	15.2	10.7	7.7	29.4	9.6	18.1	6.3
Computerized financial systems	3.7	4.4	0.0	2.8	3.8	3.0	2.2	3.8	6.0
Electronic scanning systems	14.4	16.3	21.5	18.9	14.6	13.0	11.1	14.3	4.9
Computer assisted education and training	11.2	11.0	21.5	10.3	6.9	18.6	16.3	13.2	8.5
Electronic funds transfer	8.9	11.0	6.3	8.4	9.2	12.6	7.4	7.0	8.2
Automatic teller machines	1.6	.	.	.	.	5.6	.	.	.
Transportation systems	4.0	11.0	0.9	5.8	1.9	1.3	0.7	3.2	1.1
Computer reservation systems	2.3	3.6	2.5	1.2	0.8	1.3	0.7	2.2	6.3
Automated storage and retrieval systems	4.4	4.4	7.6	5.8	2.7	6.5	5.2	3.8	2.7
Point of sale terminals	8.2	5.0	8.9	8.9	12.5	12.1	3.7	3.2	8.5
Smart cards	3.7	.	.	.	.	10.8	.	.	.
Computer-aided design (CAD)	4.5	8.8	3.8	5.4	2.1	5.2	8.1	2.4	2.7
Computer-aided engineering (CAE)	3.5	9.1	11.4	3.5	1.0	1.7	5.2	3.0	1.1
Computer-aided software engineering (CASE)	8.3	14.1	12.7	8.1	2.7	19.9	9.6	8.9	1.4
In-room management systems	1.8	.	.	.	.	.	.	.	7.1
In-room video systems	1.4	.	.	.	.	.	.	.	5.2
In-room check out systems	1.7	.	.	.	.	.	.	.	10.4
Property management systems	4.2	5.8	5.1	2.0	3.3	5.6	3.7	2.7	8.2