

**Interdepartmental Task Force  
on Transborder Data Flows  
: background papers**

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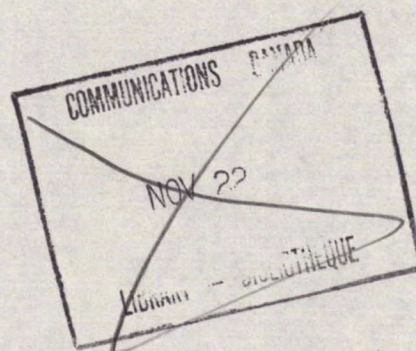
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DISCUSSION PAPER

1. [Background papers]

SURVEY OF TRANSBORDER DATA FLOWS IN  
CANADIAN-BASED MULTINATIONAL ENTERPRISES



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Policy and Analysis Division

Electrical and Electronics Branch

Department of Industry, Trade and Commerce

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## 1. INTRODUCTION

### 1.1 Purpose of the Report

It has been argued that the development and use by MNE's of international computer communications systems to facilitate the international movement of data and information is significantly altering the organization and management structure of multinational firms, the conduct of international commerce and possibly the distribution of economic activity between nations. Consequently, the purpose of this study is to provide government with a better understanding of the nature of and reasons for trans border data flows (TBDF) within multinational corporations, the role of computer communications technologies in this process and the implications for domestic industry and for the Canadian economy of trends in the use of these technologies.

This report is based on an examination of the international flows of data associated with computer communications in 12 of the largest multinational firms operating in Canada (7 Canadian and 5 foreign-controlled). The companies were selected from the financial, mining and mineral processing, manufacturing, chemicals, and retail sectors.

The small number of firms included in the survey, together with the diversity of sectors covered means the results are highly qualitative in nature. It is a preliminary review of TBDF issues as they relate to the activities of multinationals in Canada. A thoroughly scientific, definitive analysis of TBDF in multinational corporations would require a much more extensive survey sample. However, from comments received from companies concerned and from several industry associations representing a wide range of firms both large and small, there is no reason to believe that the findings and conclusions would not be more generally applicable.

### 1.2 Identification of Issues

Efforts to understand the nature and impact of transborder data flows have tended to focus on transnational corporations because they are among the most sophisticated users of computer communications technologies and in terms of sheer volume, are assumed to account for a high proportion of the flows of information transmitted across borders.

Data have, of course, always moved across national boundaries. But traditional methods of transferring data are being increasingly replaced by new information technologies which combine advanced computer processing capabilities with modern telecommunications services. Data and information can now be transmitted electronically, with ease, at speeds, over distances, and in volumes never before possible. Thus, computer communications have given a new importance to transborder data flows as they remove many previous technological, cost or time constraints to the flow

of information and data. As well, these technologies have enabled corporations to manipulate or manage larger volumes of information more effectively.

These advances in the international movement of data and information have raised a number of issues of concern to governments; many countries, including Canada, are examining the implications of increases in transborder data flows for the economy, for personal privacy, national sovereignty, and national security/vulnerability.

For the purposes of this study, the core issues to be dealt with are largely economic ones, focussing primarily on questions of the impact of the technology on corporate organization and behaviour and the implications of this for employment, balance of payments, and Canadian subsidiary decision-making autonomy. In order to clarify the discussion of issues, it is helpful to keep in mind the distinction between information or data flows that support internal corporate management and decision-making, and flows in support of normal, everyday commercial activity. Of the two types of flow, governments are mainly concerned about the former.

- (a) Flows in support of internal management and decision-making. From a government perspective, the fact that computer communications technologies allow fast and convenient access to large volumes of data from anywhere within the corporate global information network has led to fears that multinational companies may centralize decision-making and management control functions in corporate head offices located abroad. The potential negative impacts here are twofold: loss of highly skilled management employment opportunities from Canadian operations and reduction of responsibility and autonomy of Canadian managers of foreign subsidiaries.

In addition, the technological ability to more effectively manage and coordinate global operations from one location may enable corporations to further centralize corporate service functions and optimize corporate location of production and other value-added activity (including engineering and research operations), not necessarily to the advantage of the host country.

Data processing activities are a particularly important aspect of the question of centralization of services. From an economic point of view, the most immediate impacts of transborder data flows are felt to be associated with the provision of data processing and other computer based services. It is thought that MNE's are becoming increasingly reliant on foreign data processing services and software, either purchased directly from the parent firm or from commercial suppliers located abroad. As a result, it has been suggested that the Canadian operations of multi-nationals may

be contributing to balance of payments problems by acting as a conduit for the importation of software and computer related services and the export of job opportunities in the burgeoning information industry.

Such fears have provoked discussions about the need for measures which would require corporations to maintain computer service activities in Canada and to repatriate such activities if they have been transferred abroad. The primary concern expressed is that Canada be given the opportunity to participate fully in the growing information industry, both by promoting the domestic computer services sector and encouraging the development of computer related functions in the Canadian operations of multi-national firms.

Finally an issue related to the loss of decision-making autonomy is the deeper concern that the "migration of key decision-making functions" to foreign locations and storage of Canadian data abroad may threaten national security and contribute to loss of political, economic, and possibly cultural sovereignty.

- (b) Flows in support of normal commercial activity. Balanced against these "flow" issues is the very real concern of the business community about their ability to freely move data and information across borders in support of commercial and investment activities. Use of the new computer communications technologies impacts directly on corporate productivity/efficiency, and on a company's ability to compete successfully in international markets. Thus restrictions on access to, or on flows of data and information have critical implications for business performance and the conduct of international commerce.

### 1.3 Organization of the Report

In order to address these issues, this study attempts first to understand the corporate rationale for the organization and management of business information systems. Thus, Chapter 2 explains transborder data flows within a Canadian business context: what kind of data and information flow across national borders, why does it flow, and how.

Chapter 3 then attempts to make some assessment of the impact of TBDF and the new information technologies on corporate organization and performance and the broader implications for the domestic economy. It addresses each of the issues outlined above. This chapter also touches on the implications of all this for national vulnerability/sovereignty/privacy concerns. Chapter 4 summarizes industry views on difficulties with or constraints to transborder data flows. Finally, Chapter 5 presents the main findings and

conclusions reached with respect to the nature and impact of ISOP that result from the activities of MNE's.



## 2. INFORMATION NEEDS, TECHNOLOGIES AND TBDF IN MULTINATIONAL ENTERPRISE

Information is essential to the conduct of business. In the simplest barter arrangements in primitive societies information had to flow between the parties exchanging goods. In today's sophisticated business environments information plays a key role in all functions carried out by a corporation, from the analysis of investment opportunities, through R&D, production, marketing and the provision of customer services.

Thus, information exchange has always been and continues to be the underpinning of business activity. Equally, the task of acquiring information and using it effectively has always been a central business challenge.

The manner in which companies organize to access and use information will reflect the nature of their operations, their geographic dispersion, the types of interactions they have with both their suppliers and customers, and the character of the competitive environment and markets within which they function. Clearly, all of these factors are subject to change. Thus, it is to be expected that the information systems and technologies that business uses to meet its information needs will also change over time. Baron de Rothschild may well have been able to make a fortune by using carrier pigeons to bring advance news of Napoleon's defeat at Waterloo but his descendants must rely on more modern communication facilities.

This suggests that the discussion on TBDF within MNE's must be set within a twofold context of change - on the one hand, change with respect to corporate requirements for business information; on the other, change in the organization and use of information technologies.

### 2.1 The Growing Complexity of Information Needs

In the last two decades, the global extension of MNE activity has multiplied market diversity, technological advance has resulted in an explosion of products and services, and the variety of customer and supplier interactions MNE's must cope with have significantly expanded. In like manner, the character of the international marketplace has altered. Competition has intensified and the general business environment has become more internationalized and thus more unpredictable.

The result of all of these pressures is that the ability of corporations to organize and use information is steadily becoming more important in responding to market demand and in determining corporate performance. At the same time, in order to satisfy these growing information requirements, the volume of information and data flowing across borders has increased.

## 2.2 Evolution of Communications and Information Processing Technology

Information needs have been met through the development and application of new technologies and more sophisticated systems for managing, utilizing and transferring information. In a Canadian context, the role of computer communications technologies in this process tends to vary widely among the companies interviewed for this study, mainly because of differing information needs, but also because of differences in their level of sophistication in the use of these technologies.

The extent of application and the rate at which computer information systems are introduced by firms are determined largely by the cost effectiveness of advanced information systems within particular business environments. Factors such as those listed above (i.e. types of products, market competitiveness, interaction with suppliers and customers) are the most important determinants of the need for computer communications. For example, the Canadian operations of a large chemicals/pharmaceutical house have only the most rudimentary international computer linkages in place. Because their markets and production characteristics tend to be unique to particular geographic areas, there is little need for them to be plugged in to extensive international communications networks. Computer links are maintained between Canadian and U.S. offices, but information is still sent abroad to headquarters in hard copy form. At the same time, firms in the banking, insurance and automotive sectors are highly sophisticated in their development and use of computer communications and rely heavily on sophisticated international information systems.

Given this broad continuum in the organization of management information systems, the following description does not pretend to be a realistic picture of how computer communications are currently utilized by large multinationals in general. Rather, it attempts to capture the main steps in the evolution of information technologies from initial application by firms to the development of mature information systems.

Corporations first used unit record equipment or mechanical processors for sorting through information stored on cards. Information was transferred between points using paper and telephone. These methods were supplemented by telegraph and then telex. The telex continues to be the work horse in many corporations today.

Concurrent with the introduction of the telex, local level automated management information systems (MIS) such as financial reporting, personnel record keeping and inventory control were developed. These systems were computerized individually and continue to exist as distinct systems in many companies.

The next step saw the teletype terminal (telex) being connected directly to a computer so that the data which previously came out of the machine in hardcopy form is now automatically stored in the computer as input into basic management information systems. The telex machine may then be "upgraded" to a computer terminal (at the same or lower cost as a telex) which now does the job the old telex did but much quicker. This also provides more sophisticated ways of selectively retrieving and manipulating information because the power of the computer is now brought to bear on the data in the machine.

The next evolutionary step sees local MIS systems being extended or "rationalized" into company-wide systems. Finally, in some companies MIS systems are becoming more integrated and conversant with one another, automatically sharing much of the same data. The systems have also become much larger and more complex because more data is being handled and more demands are being placed upon them by users. The combinations in these advanced systems are synergistic.

With decreasing costs in telecommunications and computer hardware it is also now possible for corporations to locate their systems and portions of their databases on several computers in different geographic locations. The systems, however, although geographically dispersed, remain integrated.

### 2.3 The Volume of Electronic TBDF

This study is essentially a qualitative analysis of electronic data flows in multinationals. However, some attempt was made to quantify volumes of intracorporate flows of information across Canadian borders to allow a better perspective on the dimensions of the various problems attributed to use of computer communications. The 12 companies participating in this study were requested to use their "best efforts" to estimate what proportion of total information flow is due to computer linkages between Canadian operations and corporate headquarters and affiliates located abroad. The estimates provided were of necessity very imprecise, but the general conclusion drawn is that electronic data flows are currently a relatively minor component of total observed information flows. Other forms of communication (such as hard copy, telephone and personal contact) are still the most common methods of exchanging data and information in the majority of companies interviewed.

More than half of the companies estimated that, at present, less than 15% of all intracorporate information flowing across borders is transmitted electronically. Those companies generating the largest volumes of computer-based TBDF (90-99% of total corporate TBDF) were found in service intensive sectors. Efficient and reliable information networks are indispensable to the operations of international banks and insurance companies (and other types of



companies heavily involved in the provision of services to customers). As a result, service companies use the new information technologies most extensively for transferring information internationally.

At present, therefore, there is considerable variation in the extent to which companies are using new information technologies. There is reason to believe that their application is still relatively undeveloped in many firms.

#### 2.4 Categories of TBDF in MNE's

Practically all electronic TBDF resulting from MNE activities moves across borders within the framework of basic management information systems. Consequently, understanding the significance of TBDF requires an understanding of what these systems are, the types of information flowing within them and the reasons for the flows.

Management information systems within most companies are essentially of two types: operational control systems, and strategic decision making or planning systems. The operational control systems support the day-to-day operations of the company. The strategic decision making and planning systems support corporate level decisions, policy making and long range planning.

##### Classification of TBDF

###### Operational Control Systems

Order entry  
Inventory Control  
Transportation Control  
Purchasing  
Marketing  
Customer Support  
Manufacturing & Production  
R&D and Engineering

###### Corporate Planning and Control Systems

Financial Management/  
Control  
  
Corporate Planning

The table above sets out the main categories of TBDF (or information systems) currently in place within the companies surveyed. It should be noted that this breakdown does not capture all the variations in functional categories of TBDF used by individual companies, particularly on the operations side, nor did all companies generate transborder flows of information in all of the categories identified.

The financial management/corporate planning functions accounted for a relatively modest volume of total electronic TBDF in most companies (less than 20%). Among companies which generate a large volume of TBDF, this proportion fell, while it rose among firms whose information systems are less well developed and whose

total TBDF is comparatively smaller. This suggests that, although reporting relationships always occur, they are not responsible for the rapidly increasing growth in electronic TBDF. The major portion of TBDF is due to exchanges of information which are required to support the ongoing day-to-day operations of companies. Where information systems serving operational needs were well developed, they accounted for practically all intracorporate flows of computerized information.

#### 2.4.1 Operational Control Systems

Operational control systems provide the information required to support and carry out the primary functions of a company. The nature of these systems and the role of information technologies are described briefly for each of the operational and planning functions listed above.

- a) Order entry/processing - Orders from sales offices may be entered by telex directly into a central computer which automatically schedules and processes orders. In several of the companies interviewed this type of system is evolving into a multinational terminal network which will include automatic invoicing at point of source, up-to-date information on the status of orders, and other information needs related to filling customer orders.
- b) Inventory Control - An on-going and critical requirement of a corporation is to know what their inventories are at any one time and to keep these inventories to a minimum. Actual materials and goods may be dispersed in a large number of warehouses and stores scattered over a country, a continent or even several continents. A corporation must not only know what it has on hand but also where it is so that a supply request can be met in the shortest possible time and at lowest cost. In the past, separate systems were maintained for each warehouse. These were computerized, linked via telecommunications facilities and eventually integrated into one corporate system. Now, in the most well developed inventory control systems, information on a customer or supplier transaction may be caught in an electronic form at the point of transaction. For example, when a sale is made it can be keyed into a cash register which doubles as a computer terminal. The transaction is entered as a code for the item and this data code is automatically transmitted through a telecommunications link to a computer facility where an inventory database is located. The database may be located centrally for a country or located in several regions but each segment is linked to the other through a telecommunications link and thereby still appears to a user as one large central inventory database. The system can not only keep track of what is on hand is able to maintain files on past sales and, when interconnected with marketing information, can project future

needs and thereby automatically reorder material with enough lead time to ensure stocks are not depleted. The system may also have goods moved from one warehouse where sales are slow to another where sales are good.

- c) **Transportation Control** - This management function is concerned with getting goods and materials from one point to another at minimum costs in minimum time. For example, materials from a large number of locations may have to be brought together to a central assembly plant. Each item must be at a specified location on the assembly line at a specific time. As products are purchased stocks must be replenished from the closest source. Complex scheduling and control systems are therefore required which are best handled through the use of computers. As a result transportation information may now be kept in an electronic form in systems that keep detailed accounts of all transportation movements. Since it is estimated that for some companies up to one third of its inventory is in transit at any one time, the transportation systems are becoming more integrated with the inventory systems. Because goods are continuously moving over borders (both provincial and national) the information which supports the movement of these goods is also constantly moving across borders.
- d) **Purchasing** - This function is concerned with buying the best materials available at the cheapest price possible from the most dependable supplier in the required time. To carry this operation out most effectively management requires detailed information on what materials are needed where and when. It must also have detailed records on suppliers, prices, availability and past performance. Minimizing costs for purchasing is best realized for bulk orders. This leads to the requirement for having all purchasing information brought together to a central point for consolidation. Again this is best done electronically through the use of telecommunication and computer facilities. A company is now able to consolidate small orders from its many outlets or manufacturing plants into one major purchase and thereby minimize costs. Because of the need for pre-purchasing, the systems supporting the purchasing function are becoming more integrated with the inventory control and transportation systems. Because suppliers, distributors and buyers are scattered geographically, purchasing information is continuously flowing over borders.
- e) **Marketing Functions** - Effective marketing requires a solid information base. The information recorded includes detailed descriptions of the goods and services available through the company, historical performance data, information on competitors, demographic data, and consumer preferences. Because of the quantity of information required for accurate forecasting, the database is best handled electronically by computer. Because of the many interconnections with other



business functions, marketing data is continuously moving throughout the company.

- f) Customer Support - Companies must provide support services to marketing and sales personnel and a wide range of product services for customers. Because of the quantity of information available, continually changing products and the need to have the information immediately accessible, it is best handled electronically. For example, in one company a large central database of information describing all company products is made accessible through telecommunication links to anyone in the corporation to obtain up-to-date and accurate descriptions of products. The database also permits sales staff to automatically package product descriptions tailored to meet a particular client need. Upon recording the sale, a detailed invoice or contract (e.g. life insurance policy) is then automatically generated in the local office again through the terminal (which might be a word processor). It is also relatively simple to permit the sales person to track where in the production or transportation system his order is at any time thus providing instant response capability to customer queries.

Repair and maintenance services may also be improved through computer/communications technologies. For example one company maintained a central diagnostic database directly accessible to field personnel which is used to quickly identify solutions to technical problems encountered by customers using their products.

- g) Manufacturing and Production - The task of getting all of the raw materials or parts together at the right time so that they may be assembled into products is becoming more complex. The information needed to carry out this function includes sales order data, assembly line data, inventory control data and purchasing data all of which may originate from anywhere in the corporation or one of its affiliates. Because of the data required and its timeliness, the use of telecommunication facilities is critical to this operation.
- h) Research, Development and Engineering - These operations are concerned with the development of new products, the improvement of existing products and the reduction of production costs. Because of the broad range of research and engineering data that is constantly being generated and analyzed, computers are becoming an indispensable research tool.

These functions are carried out within a corporation by a closely knit community of specialists who may be scattered geographically. Increasing volumes of information and working files are being exchanged between individuals and labs through

telecommunications links as more and more research and engineering data is maintained in computerized form.

#### 2.4.2 Corporate Planning and Control Systems

Whereas the operational functions described above are concerned with the routine business activities of the company, complementary information systems provide support to corporate head office for longer term planning and control purposes. Decisions at the corporate level may involve major investments, the design and redesign of the entire corporate system, or forecasting and modelling of future developments. The corporate centre must also have an information and control system for keeping abreast of the performance of its subsidiaries and for taking effective remedial action when necessary.

Two categories of data flow used for planning and control purposes were listed by the companies surveyed - Financial Management/Control and Corporate Planning Systems.

Flows of financial information from subsidiary to parent are usually provided in summary form. Data on assets, liabilities, revenues and expenses are collected from each of the subsidiary's operating units, consolidated at the subsidiary head office, and forwarded to the parent company for management review. It appears that most companies have simply replaced financial reporting formerly provided in hard copy form with electronic transmissions of data.

One consequence of this mode of reporting is that, in many instances, the format of reporting for financial purposes has been standardized across all corporate affiliates. This allows corporate head office to consolidate corporate information much more quickly and accurately, and obtain a much better view of overall corporate performance as well as of the relative financial position of its separate parts.

Most multinationals require corporate entities to submit monthly (or more frequent) reports on sales and certain financial items. Other types of reports may only be required quarterly or semi-annually.

It should be noted that much information for control and planning purposes still flows in hard copy form or through personal contact. Formal review meetings to facilitate co-ordination between subsidiaries are also an important element in reporting relationships. In future, information technology may have a substantial impact in the latter area, as corporations introduce advanced teleconferencing facilities to link international offices and recover substantial travelling costs.

Though EDP has not substantially changed basic reporting requirements for financial planning and control purposes, it appears that in recent years there has been a trend toward increased demand from head office for more detailed data in other functional areas. In some firms, requests for data are moving beyond simple accounting figures to provision of additional data on markets and the local business and economic environment. In many companies the desire for further business and environmental data was met through open market purchases from information retrieval services.

As corporate executives involved in computer communications become more "numerate", they perceive more possibilities for reducing uncertainty and improving corporate performance by manipulating more data in increasingly sophisticated ways.

## 2.5 The Integration of Information Systems

At present, very few corporations have put in place fully integrated, computerized information systems. Discussions with corporate executives of MIS elicited the fact that such systems are still very difficult and expensive to establish because of their extreme complexity. One executive compared the process of organizing a standardized, corporate-wide management information system to the construction of a pyramid: the basic building blocks consist of detailed operational data which then undergo increasing levels of aggregation enroute to the top of the corporate pyramid.

In most firms, however, the pyramidal structure has never been fully developed because available resources are continuously occupied with modifying and expanding the basic building blocks essential for support of daily operational activities. Therefore it should be noted that the description of a highly advanced computer information network which is presented here is not typical of all multinational corporations. It illustrates the development of MIS in one of the most sophisticated users in the automotive sector. For this automotive company, satisfying orders for "customized" automobiles now involves the transmission of countless bits of data through a sophisticated web of computer communications links spread over hundreds of miles and across borders.

At the retail level, a customer has the opportunity of choosing from many optional components to produce a "customized" vehicle. When the sale is made, the dealer enters the information into a terminal located in his office. The order is then transmitted electronically to a central computer node for automatic rerouting to the particular plant producing the make of car requested. The production control computer in the plant "explodes" the order into a parts list which is electronically coded for automatic ordering of auto parts, via a link to the inventory control system. Inventory control ensures that parts are provided from the nearest warehouse (lowest cost supplier), and that reduction in inventory



is noted for production purposes. The transportation control system, which is linked to inventory control, ensures that parts are picked up and delivered to the plant assembly line at the required time.

During assembly of the final product, a tracking control system monitors production for control and coordination purposes and can inform the dealer of the precise location of the customer's vehicle on the assembly line. On completion, delivery to the customer is recorded as input into the front end of the inventory control system for spare parts.

The order information is also linked to the marketing system. At regular intervals, data documenting all orders are rolled up and automatically consolidated into a performance report where sales forecasts are measured against actual performance. Advertising and promotion can then be reallocated to different locations as required. Finally, the overall sales and production figures are automatically aggregated into company wide performance appraisals.

## 2.6 The Unfolding Future

As noted above, on the basis of information gathered for this survey, it appears that most electronic TBDF takes place within the framework of basic management information systems. With several notable exceptions, particularly where service activities predominate, these flows are a relatively small portion of the total volume of information crossing borders within the companies interviewed. Within ten years, however, almost all companies predicted a minimum of 50% of total information flows would be in electronic form.

There are two overlapping reasons for this. The first is the universal expectation that existing information systems will undergo further extension and refinement. The second anticipates the effects of office automation.

With respect to the evolution of automated MIS systems it is important to realize that these have been in place in most companies for at least a decade. During this period they have undergone a continual process of polishing and improvement. This type of incremental change will continue with a probable emphasis on the introduction of company-wide systems and, more importantly, the integration of systems along the lines of the automotive example cited above. Nevertheless, it is somewhat difficult to predict how quickly such changes will take place. As noted above, business systems managers stressed the costliness of establishing highly complex information systems, and the current scarcity of software and systems development staff equal to the task. The more common situation is for integration to take place at any one discrete functional level (e.g. accounting, inventory control, etc.) because it is most cost effective and more easily

accomplished. Thus, although the evolution of fully integrated, corporate-wide information systems is technologically possible, the rate at which this occurs will probably vary widely across companies in different industry sectors.

The more substantive changes in transborder data flows will be due to office automation and the introduction of point-to-point word processors and electronic mail boxes. More information will be handled in electronic form, with rapidly decreasing use of hard copy. Consequently, the major proportion of increases in TBDF may involve continuous, but random transfers of data from person to person for a variety of reasons (e.g., messages, working files, discussion papers) rather than flows of management information within the formalized operational and planning systems.

While trends in TBDF and information movement in general are predictable, the implications for the art and practice of information management in multinationals are less clear. About all one can say with certainty is that more information will flow overall and that the same pieces of information will be available to more responsibility centres within the corporation and thus used in more diverse ways. Technological advances will enable all data to eventually become part of a large, complex information base which can be accessed for any purpose. Both head office and local centres would then have access to the same, diversified data base. Flows of data for routine operational purposes will be indistinguishable from information supporting the planning and control functions.

The key point that emerges is that innovations in information technology are providing decision-makers throughout all types of corporations with greater flexibility and choice with respect to organizing systems operations.

These rather hesitant conclusions are supported by the fact that business decisions which require investments in information technology are generally being made in a two to three year time frame because it is felt that new technological developments cannot be predicted on the basis of present knowledge. Thus, in the longer term, past experience provides no real guide to the future.

### 3. ECONOMIC IMPACTS OF TRANSBORDER DATA FLOWS

Chapter 1 discussed how the growing ease with which multinationals can transfer data across borders has led to increasing concern with the economic impact of TBDF on multinationals and on the domestic economy. The purpose of this chapter is to analyze these concerns separately and attempt some assessment of the different dimensions of the problem, based on the experiences of the companies interviewed. Because of the lack of indepth, historical and/or hard data, this is a difficult task and can only be approached at a very general level of analysis. Nevertheless, it is possible to identify apparent trends in corporate behavior and offer some substantive comments on the economic implications of transborder flows of data in multinational firms.

As outlined above the impact of TBDF relates essentially to the question of MNE performance and behavior in host countries. To measure its impact it is necessary to deal with the issues of company productivity/efficiency/competitiveness, management structure, and the organization of production and other functional activities. The implications for the organization of data processing and related activity are treated as a separate topic because this is primarily an industrial development question, and thus may require a different policy approach on the part of governments.

#### 3.1 Impact on Company Productivity/Efficiency/Competitiveness

There is much evidence to show that use of computer/communications and the ability to transmit data quickly and easily has resulted in substantial gains in the production and market performance of multinational corporations. In the continuous drive for improved efficiency and effectiveness to meet competitive pressures and promote growth, use of the new information technologies has become a critical element in maintaining a corporate market presence.

This can be demonstrated by reference to the type of efficiency gains and cost reductions made possible through the use of computer communications management systems in the examples cited in part 2 above, such as:

- ° Cost of inventories may be reduced.
- ° The speed of market transactions is improved, resulting in better customer service and further reductions in working capital requirements.
- ° Scale economies can be achieved in procurement, sales, advertising and distribution.



- ° Response to customer problems and equipment repairs are simpler and faster through access to a central store of information.
- ° Companies can achieve financial gains through improved central planning and management.
- ° More accurate forecasts and more sophisticated modelling is now possible, thus reducing uncertainty and improving a firm's decision making ability.

### 3.2 Impact on Corporate Management and Decision-Making (Centralization)

In a Canadian context, concern over patterns of corporate decision-making tend to concentrate on the relationships between a foreign parent and Canadian subsidiaries. It is generally assumed that corporate headquarters has overall responsibility for strategic planning, the establishment of performance targets, monitoring and control; subsidiary corporations are responsible for operational planning and implementation within the framework of targets set by headquarters. Theoretically, greater automation or computerization leads to standardization and thus facilitates centralized control at the expense of the autonomy of subsidiaries.

The survey of companies provided little evidence to suggest that this tendency is increasing because of the use of computer communications technologies.

The dynamics of the interrelationships between parent and sub are far more complex and varied than this simple discussion suggests and the more widespread use of these technologies adds a confusing dimension to the issue. The net effect is probably better described in terms of greater interdependence rather than in terms of centralization or decentralization.

There is no question that computer communications technologies and the better management and use of business information allow central planners to set more aggressive performance targets. Centralized monitoring and control functions may also be enhanced. However, what is true for the parent is equally true for subsidiaries. Their planning capabilities are also strengthened. The result appears to be that subsidiaries are able to provide more definitive input into the central planning process. Thus, rather than conferring greater authority on the central planners, the growing sophistication of planning at the subsidiary level, aided by distributed data processing networks, may well place distinct limitations on the ability of headquarters to "second guess" their operational planners. The use of advanced computer communications facilities may ensure that the corporate planning process is a two-way street.

This observation appears to be particularly relevant in companies where subsidiaries (or smaller entities) operate as independent profit centres or where subsidiaries have clear product mandates. In these situations the central planning function appears to be little more than an aggregating or coordinating activity.

It is obviously difficult to reach firm conclusions regarding the effects of TBDF on corporate decision-making at this rather theoretical level particularly given the small number and diversity of companies interviewed. The only thing that seems clear is that the overall planning process is becoming more complex and the interrelationships between corporate parts is becoming more interdependent. Yet greater interdependence does not necessarily lead to greater centralization. The use of computer communications technologies can facilitate integrated planning and management in a centralized or decentralized mode.

### 3.3 Impact on Organization of Production, Provision of Corporate Services and R&D (Specialization)

#### a) Rationalization of Production

Theoretically, the relationship between corporate organization and the use of computer communications technologies could alter the structure of firms and the way that functions are organized, leading to increasing specialization of functional activities among corporate affiliates and across national boundaries.

The general conclusion derived from the corporate interviews is that, to this point, computer communications and the use of TBDF have allowed firms to improve existing operations and expand into new activities but they have not impacted significantly on the essential structure and organization of these firms insofar as the location of production facilities are concerned.

The earlier discussion noted the growing complexity of business information needs and the resulting upgrading and adjustment in their capacity to manage information. Examples of the introduction of new services were identified, particularly in the banking sector, that were clearly reliant on the capacity of computer/communications facilities. The "world car" concept and the resulting diversity of parts suppliers and specialized assembly operations also rely heavily on these technologies to be effective. Over time, the cumulative effect of incremental changes has significantly altered the way companies conduct their business. As one corporate executive remarked: "We couldn't have a business that looks like the one today without the technology to administer it."

However, little evidence emerged to support the notion that information technologies are a conscious driving force in corporate decisions to restructure or to rationalize operations. With

respect to the Canadian operations of the companies interviewed, the foreign-owned multinationals have, over time, assumed more economic activity in Canada as well as considerable management autonomy. Many of these companies have progressed through the traditional growth stages associated with multinationals operating in foreign markets: importing through local distributors, establishing sales outlets, producing for domestic markets, exporting and, in some instances, gaining a corporate world product mandate. Clearly, in these instances, the application of computer management information systems has not inhibited corporate evolution to the disadvantage of Canada. To the contrary, the subsidiaries believe that computer communications have contributed to their ability to obtain corporate manufacturing and R&D missions.

In regards to the role of the technology in this process all of the firms interviewed insisted that other factors played a much more strategically important role in their decisions to organize production and marketing activity: e.g. changing patterns of competition, product and industrial process innovations, economies of scale, manpower availability, government incentives, historical accident, and basic corporate goals and philosophy.

It may be that a broader survey or a more systematic analysis would increase our understanding of these issues. However, even if these patterns of reorganization are eventually encouraged by the use of computer communications technologies, the net benefits or loss to an economy cannot be estimated ahead of actual events.

#### b) Provision of Central Services

Because information technology improves communications networks in multinationals, it provides an opportunity for greater centralization of control in certain areas of administration and coordination. In particular, finance and accounting, including the management of currencies and taxation, are becoming more centralized. To assist financial coordination, most multinationals are using a standard form of planning or budgeting, specifying a standard presentation of data in subsidiaries. Centralized coordination of other internal functions also occurs in some firms. For example, at the factory level, central coordination of purchasing and related activities can result in inventory cost savings of semi-processed and finished goods, and permits the sales department to be more closely integrated with procurement and manufacturing. Since the source of the savings lies in the coordination of decisions, centralization is unavoidable if the savings are to be realized.

A classic example of greater centralization of purchasing occurs in the retail sector. Computerized cash registers record data on sales of each item at the time of purchase. This data allows head office to know what merchandise is turning over in each store, and

provides an accurate estimate of current inventory levels. Stock can then be purchased centrally and allocated wherever necessary. As a result, the company has more timely marketing information, can take advantage of volume purchases, and can reduce capital requirements for maintaining high inventory levels.

Thus, new information technologies have enhanced the coordinating power available to firms. However, in a Canadian context, with the exception of financial coordination, centralization of services appears to be taking place at the national rather than international level for the firms interviewed. At this point in time, the apparent advantages of internationally centralized coordination still seem to be offset by the costs and administrative problems associated with widespread coordination of corporate services.

c) Research and Development/Engineering

With respect to research and engineering, there has been some concern expressed that through TBDF, parent companies can exercise a tighter control over research and development at the expense of the technological capability in factories located abroad. Without TBDF, the parent would have to transfer know-how and technical information so that corporate affiliates would develop total expertise to implement and solve problems connected with the use of new capital goods, production processes or organisational structures. Through superior information facilities offered by direct computer communications, it is suggested that parent companies will be able to limit the transfer of technology to methodologies for solving specific problems. In particular, this may have negative implications for technology-intensive industries, where affiliates simply access remote engineering know-how through direct computer to computer communications and avoid the expense of developing indigenous research and engineering expertise.

Only a few examples of the use of computer communications technologies in support of R&D and engineering activities were identified during the interviews. However, where this did take place, the intracorporate information system played an essential role in the development and application of new technology. In these examples, it is clear that TBDF facilitated rather than hindered technology transfers.

One company described use of TBDF in the development of a massive engineering project in Canada. This particular type of project involved use of highly specialized technology which is provided by only a few international firms. Normally, one of these firms would be contracted to design and engineer the entire project. In this instance, the Canadian firm was able to purchase the design and engineer the project themselves, using Canadian labour and expertise to complete the job. This was achieved through point to



point communications between Canada and Germany which allowed rapid and accurate flow of the necessary specifications and drawings.

In another example, a Canadian firm wished to apply a very costly, special purpose CAM system (i.e., computer aided manufacturing) used elsewhere in the corporation. Through international computer communications, the firm was able to reduce its risk and costs by conducting preliminary testing of the system and applying it as a small, pilot project prior to undertaking a large scale capital and human resource investment. This approach involved suitability testing and considerable interaction between the project team and the original system design team. When the pilot proved successful, the system was purchased and the technology transferred to the Canadian operation via computer communications. This type of activity will likely increase as CAD/CAM systems become more widespread.

A high technology Canadian company provided an example of how computer technology can promote the close integration of R&D, engineering and production functions on an international basis. The firm made extensive use of CAD (computer aided design) to interpret technological innovations into production form. The first step involved the design and specifications of new products through use of CAD, this was then stored on computer and eventually transferred directly via computer to a number of manufacturing plants located around the world. The manufacturer received both product design and production process information as a package through direct computer connections to the R&D center. It was then his responsibility to apply local cost data to this information and arrange for production. As one executive of the firm remarked, "The whole system is impervious to national boundaries and geography."

### 3.4 Data Processing Services and Software

One of the key economic concerns related to use of computer communications is the impact of TBDF on the corporate organization of electronic data processing (EDP) activity and on corporate policy with respect to purchase of EDP services and software packages. It is feared that Canadian affiliates of multinationals are importing services and exporting employment opportunities in data processing and software development. Estimates derived four years ago suggested that by 1985 some \$1.5 billion worth of computing services might be obtained from foreign locations—resulting in the loss of around 25,000 data processing jobs.<sup>1</sup> The great proportion of these imported services, it was held, would be brought into the country by affiliates of foreign

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<sup>1</sup> The Growth of Computer/Communications in Canada. Computer Communications Secretariat. Department of Communications, March, 1978.

corporations. The evidence gained in this survey casts doubt on the accuracy of these earlier forecasts. A brief analyses of patterns in computer service expenditures in the Canadian operations of the 12 companies surveyed is presented below.

#### 3.4.1 Survey Data on EDP Expenditures

The 12 companies were requested to submit data which quantified proportions of EDP and software and systems development done in-house or purchased commercially, and to estimate percentage expenditures of EDP and related work done in Canada in support of Canadian operations. Analysis of this data gave little reason to believe that large multinational corporations are, at present, significant importers of computer related services.

With respect to data processing, 7 of the 12 companies met 95% to 100% of their Canadian data processing needs from within their Canadian operations. In the remaining companies, the extent of EDP done in Canada displayed greater variation. In one subsidiary (British-owned), 20% of data processing for Canadian operations was done in the United States, using the specialized software and technical information available in an American affiliate. In three other multinationals (two Canadian-owned) there was extensive use of computer facilities in offshore facilities: in one case, because of the availability of excess computer capacity in an American affiliate, and in the others, because the corporate computer function had first been introduced in an offshore location and continued to supply a large part of corporate computer service needs from that location. The twelfth company supplied trend data indicating growth from a negative to a positive balance of trade in data processing services with its American parent.

The corporations interviewed are largely closed markets to commercial suppliers of data processing services. At present, almost all data processing is done in-house; expenditures on offshore data processing services from non-affiliated companies were insignificant.

All companies provided estimates showing that the EDP budget was growing rapidly and that they were assuming more of their own domestic data processing needs. The significant growth in the computer services function in the Canadian operations of MNE's, combined with the rise in corporate status of the Canadian managers of business information and systems, are clear indications that this trend will probably continue.

A slightly different pattern of activity was reflected in software and systems development. Although the majority of companies now meet their own Canadian operating requirements for systems development and software applications in Canada, all companies make greater use of commercial services in this area than in the area of data processing.

With respect to in-house software and applications development, nine companies estimated that from 90% to 100% of Canadian requirements were met domestically. One American-owned subsidiary did somewhat less (only 70%) of its software work in Canada. For the two other multinationals (both Canadian-owned), a large part of software and systems development work was provided by affiliates located outside Canada.

With respect to corporate purchases of software packages, all companies, except one, made use of commercial software houses. In some instances, this meant offshore purchases of standardized software packages developed for a specialized market and not available in Canada. The limited Canadian capability in pre-packaged applications, together with an increasing preference on the part of corporations to buy "off the shelf" whenever possible, suggests that multinationals may become a growing source of imported software in future.

#### 3.4.2 Future Trends in Organization of Data Processing Activities

With respect to the future organization of EDP and related activities, the only clear trend is towards the centralized control of systems planning. This may manifest itself on a national basis or internationally through consolidation of responsibility in corporate headquarters. However, while control is being centralized, the actual development work may not be.

The reasons for this are clear. It was observed earlier that there is a growing trend towards integration of data processing systems, databases and telecommunications, paralleled by a need for central control of system operations and standards to ensure compatibility and comparability of data. Thus, standards and protocols must be developed and adhered to on a corporate wide basis to ensure complementarity of equipment, data and systems. As a result, overall control of systems activity tends to be centralized in one location.

Several companies interviewed still managed systems planning in a highly decentralized fashion. The systems managed in this way were not integrated and were acknowledged by the individuals interviewed as being behind the times. Significant changes were generally anticipated.

Evidence of this trend is found in a steady augmentation in the status of the systems function within the corporate hierarchy. As companies become more sophisticated in their systems integration and computer operations there is an obvious rise of importance at

the center of the organization of the system's function. This rise sees the function evolve from one of perhaps Manager of Data Processing reporting through the finance chain to one of Corporate Vice President, Business Systems. The new position has responsibility for corporate planning of systems development and network integration and for approving all significant purchases of equipment and software. Functionally all other systems managers in the corporation may report to this Vice President although their line responsibility is within their own company.

The situation is far less clear when it comes to trends in the way companies organize to actually develop and implement systems. The companies surveyed presented a confusing jumble of approaches.

In some corporations an effort is made to have systems development and operations carried out as close as possible to the locale where the need is identified.

Other corporations have planning, control and data processing operations centralized with terminal links throughout a particular country, continent or even worldwide. One corporation recently made a specific decision to merge two data processing centers, geographically separated, into one center primarily to achieve standard systems and databases. In another, the decreasing costs of computer equipment and telecommunications were pushing a centralized system to become more distributed by bringing some services closer to the user.

The reasons for this diversity are not hard to identify. In part they relate to the growth in computing power which gives corporations greater flexibility in organizing their EDP activities. The more substantive driving force, however, appears to be the manner in which the information intensity of particular corporate activities interacts with the nature of particular information needs.

In simple terms the information intensity of different corporate activities either will or will not create a quantum volume of information that surpasses some vague threshold level where consideration might be given to setting up an independent data base. The nature of these information needs will then influence decisions on where and how this capacity is created. For example, in the banking sector, customers demand instant replies to queries regarding their accounts. Thus the bank's EDP systems must be immediately accessible so banks tend to keep their customer information close at hand. In contrast, an insurance company dealing in standard policies and on a yearly billing cycle may be more attracted to storing data in a central location.



In addition to considerations of this type, a wide range of non-technical issues were also identified as having an impact on the way EDP activities are organized. These included: management style, cost efficiency realized from computer equipment and telecommunications, availability of personnel, location of existing data processing services and location of operations being directly serviced.

### 3.5 Implications for National Vulnerability/Sovereignty /Privacy

Increasing flows of data across borders have raised a number of concerns that go beyond those directly related to economics. It is recognized that information is becoming an increasingly valuable resource and that flows of data across borders can have important implications for individual privacy and for national sovereignty and security/vulnerability.

Vulnerability-related concerns are focussed on the consequences of possible disruptions to transnational computer communications and the ability of the country to maintain essential flows of information in times of crisis. For example, essential data stored abroad may be destroyed or misused. Operationally, service to Canadian firms might be denied because of employee strikes, sabotage, power failures or natural catastrophes.

Concerns also exist about the possible impact of TBDF on national sovereignty-problems with maintaining or developing a cultural heritage in an electronic age, and the danger that industrial and social developments will largely be governed by the decisions of interest groups residing in another country. Other concerns are centred on personal privacy issues and problems associated with increasing quantities of often sensitive data about Canadians being stored in a foreign country.

What are the implications of intracorporate flows of information for national vulnerability/ sovereignty/privacy? On the basis of information gathered during the corporate interviews, there appears to be little evidence that transborder flows of commercial information are a serious source of concern in relation to these issues.

With respect to vulnerability concerns, it was observed that all of the firms interviewed were equally concerned about the consequences of disruptions to computer/communications systems and losing access to information stored abroad. As a result, for internal security reasons, most corporations follow a policy of maintaining in the country of origin a databank of all data acquired in that country. Thus, national requirements to locate data in the country of origin is not a major issue with the majority of firms, providing there is ready access to data and an

unrestricted flow of information to and from the databanks. As a further security measure, most firms have constructed reliable back-up systems for use in the event of computer failure. From a business perspective, interruptions in flows of business information and loss of proprietary data have more serious consequences for the firm than for national interests.

It is also difficult to pinpoint areas of business data that might have negative implications for national sovereignty. Aside from activities which involve remote sensing of natural resources, transborder data flows which take place in support of business operations tend to be proprietary to the firm rather than strategic from the point of view of national cultural or economic sovereignty.

With respect to confidential personnel data, the firms interviewed seem quite prepared and willing to accept responsibility for ensuring protection of privacy. There is little reason to believe that personal information about company employees is sent abroad. In fact, few companies transmit any quantity of personnel data outside of Canada via computer/ communications. Flows of personnel information which do take place are almost exclusively restricted to summary form such as reporting of work activity distributions and manpower analysis data.

The provision of domestic telecommunications facilities which encourage the free and easy flow of information within Canadian borders is a further issue which should be examined in relation to vulnerability and sovereignty concerns. A number of the firms felt that regulation of telecommunications facilities in Canada is too restrictive and an impediment to national information flows. Some complained that tariff costs for telecommunications services in Canada are at least twice the cost of an equivalent service in the United States. Problems of high costs are compounded by the practical difficulties of contracting telecommunications lines from a number of provincial telephone companies each with different rules and standards of use. The overall result is increasing frustration with moving data across provincial borders. To all intents and purposes, this combination of factors encourages movement of data across Canadian/U.S. borders rather than east-west within national boundaries. To the extent that vulnerability and sovereignty concerns are real, the lack of clear communications policy in Canada may exacerbate the issue.

4. CORPORATE EXPERIENCE AND CONCERNS WITH CONSTRAINTS ON  
TRANSBORDER DATA FLOWS

A small but growing number of countries have passed laws which restrict in some way the flow of electronic data across borders. The purpose of these laws is usually to protect personal privacy or domestic economic/sovereignty interests. Yet few of the firms interviewed indicated that they have experienced problems with respect to existing government regulation of TBDF.

Isolated, rather minor complaints have been related to the occasional hassle over customs valuation of information in electronic form when transporting computer tapes over borders. Customs officials have no rules to guide treatment of software, and hence are often uncertain as to how to deal with the import or export of computerized data. There appears to be a void in import-export policy in this area.

A number of firms singled out Brazil as a major regulator of TBDF. However, the specific problems mentioned arose not from TBDF legislation but from economic development policies that require companies to use domestic data processing service bureaus when these are available. The situation in Sweden was singled out by one corporate executive who remarked that legal provisions for the registration of data bases in that country were a "bureaucratic nightmare". Though a number of countries require government approval (or a licence) to export data, on the whole the firms interviewed were able to comply with government rules and regulations and simply build in the expense and time required for compliance into the costs of doing business in that country.

Potential government restrictions of TBDF are of far greater concern to industry than the existing regulatory environment. Companies which develop, manufacture, market and service products on a worldwide basis, are critically dependent on a free and continuous flow of information. From the business point of view, computer communications have an important function in improving the efficiency and productivity of the firm, and any attempt to place restrictions on a company's freedom to operate in the most efficient manner could negatively impact on its competitiveness, its ability to create new jobs through growth, and in the worst case, its ability to remain in the market.

In the view of the companies interviewed, constraints on the location of databanks and data processing activity are unwelcome, but of secondary importance to restrictions on the free flow of information. However, industry would prefer to have government work towards creating a more favourable environment for data processing in Canada and not place constraints on how and where data is stored, processed or communicated.

In addition, companies expressed concern that government tends to develop regulations and policies around old technologies. For example, regulation of telecommunications services have caused some companies to adopt outdated technology in order to take advantage of preferred tariff structures and hence reduce costs. The results are less effective operations and poorer competitive position relative to companies not facing similar restrictions. High technology is a phenomenon unlike other areas of social and economic development. Business is concerned that existing government decision-making processes may move too slowly to keep pace with change, and thus government efforts to regulate transborder data flows may have the effect of locking industry into obsolete technology.



## 5. SUMMARY AND CONCLUSIONS

The purpose of this study was threefold: to determine the role of computer/communications technologies in the process of transborder data flow; to assess the impact of the use of these technologies on Canadian-based multinational companies; and to determine the implications of TBDF in MNE's for the Canadian economy. Conclusions derived from the previous analysis for each of these points are summarized below.

### 5.1 TBDF and the Role of Computer/Communications Technologies

On the basis of information gathered for this report, it appears that electronic transborder flows of data in MNE's take place almost exclusively within the framework of traditional management information systems. With the notable exception of a few firms heavily involved in trade in services, these flows appear to be a relatively small portion of total intra corporate flows of data crossing national borders. Most of the companies interviewed continue to transmit information largely in hard copy form, by telephone, or through personal contact.

The major portion of electronic data flowing across borders supports routine operational activities; substantially lower volumes of data are transmitted for purposes of corporate planning and strategic control.

The relatively small volume of total information being transferred through computer communications is not, however, indicative of its critical role within corporations. In recent years, the quality and quantity of information needed to carry out business functions, and the speed and sophistication of information requirements and use have changed markedly. It is clear that few companies could survive in the current highly competitive and volatile marketplace without having necessary information and the computer communications technology that facilitates its use and management.

All companies felt that volumes of information flow will increase and that the portion of TBDF handled by computer communications technologies will grow dramatically over the next ten years. Their estimates of future proportions of total information flows which will be electronic ranged upwards from 50% to almost 100%.

While trends in TBDF and information movement in general are predictable, the implications for the art and practice of information management in multinationals are less clear. About all one can say with certainty is that technological innovations will provide firms with greater flexibility and choice in organizing information systems. More information will flow overall and the same data will be available to more responsibility centres within the corporation and thus used in more diverse ways.

## 5.2 Implications for MNE's

The extent of use of computer communications technologies, and thus its impact, varies widely between companies. In general, however, for most companies surveyed, the necessary synergy between changes in information needs and the ability to manage this information has deepened corporate reliance on new information technologies. Visible testimony to corporate recognition of the growing importance of information management may be found in the rising status of systems groups within company hierarchies. Once limited to a localized, administrative support role, systems planners in many companies are now integral members of the most senior corporate elite.

Particularly in the last decade this process of incremental adjustment and change has begun to alter the face of business activity. Many companies or specific activities within companies would simply not exist in the current market environment if it were not for the ability of firms to use these technologies.

The evidence suggests that the main area of impact is on operational procedures. The technologies facilitate more effective operational planning, improve the efficiency of specific operational functions and contribute to overall cost savings and productivity gain. They have played a key role in the introduction of new customer services and contributed substantially to improving delivery of internal corporate administrative support systems.

In more general terms the technologies have improved the effectiveness of interactions between different functional or operational units within companies (e.g. R&D and manufacturing). In turn the interdependence of individual operational entities within the overall corporation appears to be increasing. This also seems to be the case with respect to both operational and strategic planning.

While intracorporate interactions have been enhanced, particularly in support of operational activities, little evidence was found to support the notion that the growing ease of moving data and information across borders is contributing directly to efforts by MNE's to rationalize their operations between countries.

With respect to the future, the process of incremental change will inevitably continue. Industry will likely evolve through a succession of measures to polish or improve existing activities. The changes attributable to information technologies over the next ten years will probably continue to be mainly in the realm of operating style rather than corporate structure.

Information seems destined to become a more valuable commodity. Business activities will become more information intensive and

more information flows will be handled electronically. Thus, computer-based management information systems will become more important operational and planning tools for more companies. These systems in turn will become more sophisticated. As this occurs it is likely that ever larger portions of Canadian industry will become "internationalized" in the sense that they will become more intimately linked through electronic ties to international business networks.

The precise nature of these electronic ties and business networks is difficult to predict. Anticipated technological evolution, including the prospect of enhanced distributed data processing capabilities, will increase the options open to companies. This will allow firms (and particularly operational entities) to organize specific activities as they feel market conditions and the nature of their business dictates. This flexibility and the greater capacity it provides for fine tuning at the operational level will be a key factor in future corporate performance.

### 5.3 Implications for the Canadian Economy

The implications of TBDF in MNE's for the Canadian economy must be judged in terms of its impact on industry in general as well as more narrowly on the EDP and related industries.

With respect to the implications for industry in general the previous discussion suggests that the major effect of computer communications technologies is to enhance operational efficiency. Indeed, in many instances, use of the technology is necessary simply to participate in the present international marketplace. As no direct evidence is available that these technologies are playing a causal role in moving non EDP related economic activity out of Canada, the overall impact of TBDF must be regarded as positive.

The question of the implications of TBDF for the EDP industry is more complicated. Despite the fact that some companies in this survey are net exporters of EDP services and the great majority meet well over 80% of their EDP and related needs from within Canada, in aggregate the trade balance for this group of MNE's still appears to be negative. However, if these companies are representative of the Canadian MNE community as a whole the trade imbalance attributable to MNE's may not be nearly as large as earlier estimates suggest. This is because in the companies surveyed, there is no clear trend towards the centralization of DP in offshore locations as previously assumed. Indeed, if any tendency predominated it is the reverse. Outside of the systems planning function, the companies in this survey generally seemed intent on building up their Canadian-based EDP activities.

The fact that MNE's meet practically all of their EDP needs in-house effectively eliminates the MNE market from the reach of independent service bureaus. This situation is unlikely to change in the future. On the other hand there may be scope for selling more software to MNE's. A general desire on the part of MNE's to buy "off the shelf" whenever possible suggests MNE's may become a significant market for imported software if Canadian capabilities in pre-packaged applications are not strengthened.

As well, the general tendency in MNE's to centralize systems planning may lead to the development of centralized standards for automated office equipment and communications hardware. If procurement is then also centralized, subsidiaries of foreign-owned companies may well be tied into offshore purchasing decisions.

In sum, the very substantial benefits to industry in general may be partially offset by a modest trade imbalance in the EDP sector. However, care must be taken to ensure that policy initiatives to encourage the domestic EDP and software industries do not restrict the ability of the Canadian-based operations of MNE's to access and use essential business information. Such an outcome would jeopardize the prospects for Canadian businesses to remain in the forefront of industrial advance.





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