*Lorraine Eden*
*Norman Paterson School of International Affairs*
*Carleton University*

6

# *Multinational Responses to Trade and Technology Changes: Implications for Canada*

## INTRODUCTION

THE 1980S HAVE BEEN CHARACTERIZED by enormous changes in the economic, social and political environments, both national and international, facing multinational enterprises (MNEs) in North America. How have MNEs responded, and how are they likely to respond in the 1990s?

This paper focusses on four major changes in the business environment — two in technology and two related to trade policy — that are, in turn, changing the way MNEs make their organizational and location decisions. The technological changes are in information technology (IT) and process technology, specifically, the development of just-in-time (JIT) manufacturing. The changes in the trade policy environment derive from the 1989 Canada-U.S. Free Trade Agreement (FTA), and the prospect of a North American Free Trade Agreement (NAFTA) among Mexico, Canada and the United States.[1]

Technology is changing the playing field on which firms compete; trade policy is changing the rules of the game.[2] In examining the effects of these changes we are interested in the likely responses of American multinationals with Canadian subsidiaries, given current MNE locational patterns and organizational structures. The changing locational and organizational structures of Canadian manufacturing affiliates are of particular interest in manufacturing since this is where the technological changes are advancing most rapidly. Much has been written on the subject of strategic management of multinationals, technological change, globalization, and economic integration, yet few researchers have considered these together with a view to analyzing the likely impacts of technological and economic integration changes on MNE locational and organizational decisions within North America.[3] This paper is intended to provide such a conceptual framework and offer some predictions based on that framework concerning multinational responses to change.

The paper has four parts. Following the introduction, above, I develop a framework for the discussion based on the value chain, which determines the

organizational and locational patterns of MNEs. This framework is then applied to American multinationals operating in North America in the 1970s. I then outline four changes — two in technology and two in trade policy — currently affecting MNEs. There follows an analysis of the organizational and locational responses of American MNEs in the 1980s and their likely responses in the 1990s, focussing particularly on the implications of these responses for their Canadian affiliates. Finally, I offer my conclusions.

## MNE Organizational And Locational Patterns

### A Framework for Understanding MNE Responses to Change

MULTINATIONAL ENTERPRISES are firms that control and organize production establishments (plants) located in two or more countries. For over a century the basic method of MNE expansion into overseas markets has been through foreign direct investment (FDI).[4] In order to explain the organizational structure of MNEs and the locational patterns of MNE production and intra-firm trade flows, it is necessary to have a conceptual framework that explains the existence and growth of multinationals. Dunning's (1981, 1988) eclectic or Ownership-Location-Internalization (OLI) model of FDI is appropriate in this connection. I also assume that MNEs form and grow because of three factors; each involves simultaneous decisions for the parent firm.[5]

**1) Ownership advantages:** MNEs have intangible ownership or firm-specific advantages (FSAs) from which they can earn rents in foreign locations and which allow them to overcome the cost disadvantage of producing in foreign markets. Such ownership advantages or core competencies are usually knowledge- or oligopoly-based, and can be transferred within the MNE at relatively little cost. Knowledge-based advantages include product and process innovations; oligopoly-based advantages include economies of scale and scope, and privileged access to raw materials or financing. FSAs are not fixed for the firm; core competencies require identification and continuous investment to prevent their dissipation and/or obsolescence.[6]

**2) Internalization advantages:** These depend on the relative costs and benefits of alternative contractual methods for supplying foreign markets. It is normally more profitable for MNEs to earn rents on their FSAs and to service foreign markets through subsidiaries than by exporting or by other contractual arrangements because of exogenous market imperfections confronting these MNEs along with the oligopolistic motives MNEs have for internalizing external markets. Exogenous market imperfections include both natural imperfections, such as transactions costs which impede trade, and government-imposed imperfections, such as tariffs, exchange controls, and subsidies. Endogenous or oligopolistic imperfections include exertion of monopoly power, cross-subsidization

of markets and opportunistic exploitation of suppliers or buyers. Internalization helps prevent the dissipation of, and increases the rents from, the core competencies of the MNE.

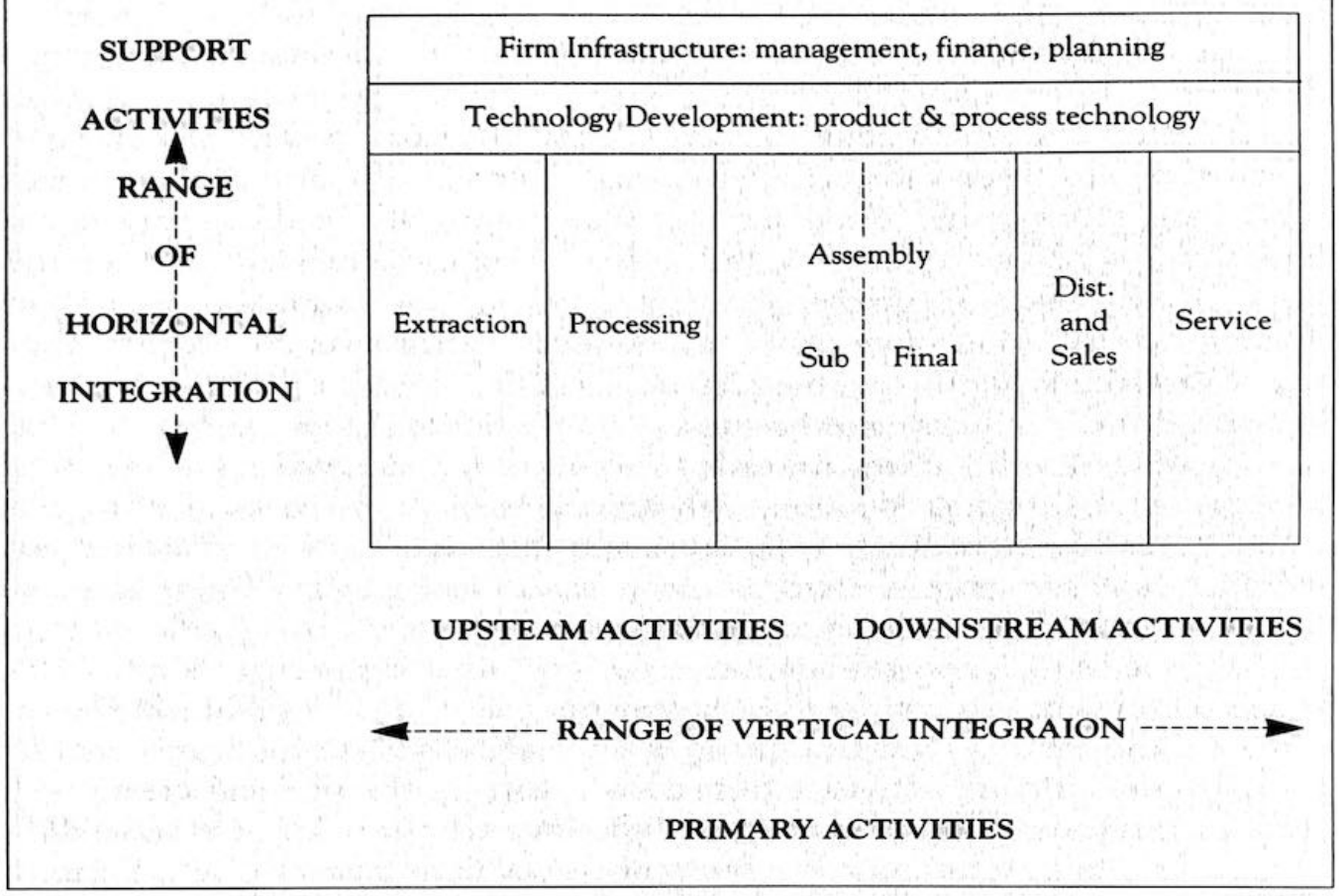
**3) Locational advantages:** FSAs must be used in combination with immobile factors in foreign countries to induce FDI. Country-specific advantages (CSAs) determine which countries will host MNE foreign production. CSAs can be broken into three categories: economic, social and political (the ESP factors), which change over time. Economic CSAs are based on a country's factor endowments of labour, capital, technology, management skills and natural resources. In addition, market size, transportation and communications can make a host location more or less economically attractive. Noneconomic or social CSAs include the psychic distance between countries in terms of language, culture, ethnicity, and business customs. Political CSAs include general host-government attitudes towards foreign MNEs and specific policies that affect FDI and foreign production, such as trade barriers and investment regulations. FDI is therefore likely to be attracted to those countries that are geographically close and have similar incomes and tastes to the home country, and have good factor endowments and low factor costs.

These OLI advantages determine the organizational structure and locational patterns of MNEs in the following manner. As in Porter (1986, 1987), we assume multinationals are engaged in a range of activities, the "value chain", consisting of primary activities (functions involving the physical creation of the product) and support activities (functions that provide the intangible assets and infrastructure necessary to support the primary activities).[7] Figure 1 shows a hypothetical value chain of a manufacturing MNE. Six primary activities are identified which are part of the firm's value chain: upstream activities including extraction of raw materials, processing, and sub-assembly, and downstream activities including final assembly, distribution and sales, and service. We focus on two support activities: firm infrastructure, and product and process technology development.

The MNE's range of activities determines its competitive scope. Competitive scope is important because it determines the degree of horizontal and vertical integration practised by the MNE, and these influence the MNE's organizational and locational structures. Porter (1986, p.22) defines four types of competitive scope: segment scope (number of product varieties, customer types), industry scope (range of industries in which the MNE competes), vertical scope (which primary activities are part of the firm's value chain as opposed to being produced by other firms), and geographic scope (number and types of countries in which the MNE is active).

A horizontally integrated MNE produces the same product in two or more plants located in different countries; i.e. one of the primary activities, such as the processing of raw materials, occurs in two or more locations. The degree of horizontal integration is roughly represented in Figure 1 by the number of

FIGURE 1
THE VALUE CHAIN




countries in which the MNE is active in any one primary activity. The motivation for horizontal integration is the additional rents in the foreign location that can be earned by the MNE's firm-specific assets (Caves, 1982; Eden, 1989b, Grimwade, 1989). Assuming that a technology, once produced, can be transferred at minimal cost within an MNE, that MNE can increase its global profitability by applying technological advantages with respect to its products and processes in new locations. Horizontal integration usually occurs at the final assembly and sales stages with market-driven manufacturing MNEs because governments encourage foreign firms to produce locally and to be nationally responsive. However, resource-based multinationals may have one or several raw material plants depending on plant economies of scale relative to the size of the MNE's global market. (For example, one chemicals plant can supply the world market for a drug MNE, whereas an aluminum firm is likely to have several bauxite plants).

A vertically integrated MNE controls and coordinates two or more primary activities. The degree of vertical integration is determined by the number of primary activities in the firm's value chain in Figure 1. The motivation for vertical integration is to avoid transactions and governmental costs associated

with external markets. Uncertainty and incomplete futures markets combine to raise barriers to contract-making between unrelated firms, particularly in natural resource industries and industries where quality control is essential (Casson, 1982, 1986; Porter, 1986; Grimwade, 1989). Government barriers can be avoided through techniques such as transfer pricing of intra-firm trade, and leading and lagging financial flows (Eden, 1990b, 1985).

## MNE Locational Strategies

In the general OLI framework, the FSAs of a multinational enterprise give the MNE advantages over domestic firms when it goes abroad. The advantages of internalization imply that the MNE can best profit from its FSAs through a hierarchy of vertical and horizontal intra-firm linkages. However, neither of these factors determines where the MNE invests.

Location tends to follow strategy; i.e. the particular location selected by an MNE depends on the strategic role its affiliate is expected to play within the value chain. MNEs go abroad to access low-cost foreign inputs (including natural resources and technology), to be close to foreign markets, to earn rents on their technological FSAs, and to pre-empt competition. Of these, the most important reasons for FDI probably are sourcing natural resources, reducing costs, and accessing foreign markets. Thus the primary purpose of FDI is foreign production, and the locational decisions about production will determine FDI flows (Cantwell, 1988). Both horizontal and vertical FDI have generated substantial growth in intra-firm trade flows in the post-war period (Grimwade, 1989, pp. 143-215; McCulloch, 1985; Rugman, 1985).

Locational or country-specific advantages (CSAs) are the key to determining which countries will become host countries for an MNE, depending on whether the motivation behind its investment is resource seeking, cost reduction, or market access. In the light of these three locational strategies for FDI, I contend that multinationals build their overall production structure by choosing from among the following factory types for their foreign affiliates:[8]

### 1) Resource-based FDI

*Extractors* access natural resources that are essential to the production process. The key factor driving location with respect to such activity is the need to be close to the source of raw materials. Depending on resource stocks and economies of scale, one extractor plant may or may not be sufficient to supply the entire MNE.

*Processors* process raw materials and turn them into fabricated materials. The processing stage can in turn be further divided into refineries, smelters and fabricators. Extracting and processing may occur in the same plant when the weight-value ratio is high, economies of scale at the two stages are similar, and foreign tariffs on processed imports are not high.

## 2) Cost-reducing FDI

*Offshore factories* tend to use cheap local inputs, particularly labour, to produce components or to assemble products for the parent company. Many American MNE investments in the newly industrializing economies (NIEs) in Asia and the Mexican maquiladoras are of this type. As wage rates rise in the NIEs, such offshore factories move from country to country in search of sites with low wage rates,

*Source factories* are a step up from offshore factories. Source plants provide access to low-cost inputs, but they also carry responsibility for the development and production of specific components for the MNE. Source factories are globally rationalized plants where the rationalization is vertical; i.e. the factory produces one segment of the value chain. Source factories contribute to the MNEs by producing subcomponents for final assembly and sale elsewhere. Depending on economies of scale, there may be one or several plants producing the same components. The source factory is tightly integrated into the MNE network since its production is intended wholly for intra-firm sale.[9]

## 3) Market-driven FDI

*Importers* or distributors provide marketing, sales, service and warehousing facilities. Usually, when a firm establishes a subsidiary abroad, its first step is to set up as an importer plant to facilitate exports from the parent firm.

*Local Servers* are import-competing factories designed to service local markets. They often assemble subcomponents for domestic sale (e.g. bottling plants, drug packaging). Such assembly is often driven by government regulations requiring a local presence; local production may also increase domestic sales.

*Focussed factories* are globally rationalized subsidiaries in a horizontal sense: i.e. they produce one or two product lines in mass production runs for final sale in both local and foreign markets; the remaining product lines are supplied from other affiliates. Thus, within the final assembly and sales stage of the value chain, the MNE may rationalize production by allocating product lines to specific affiliates and encouraging horizontal intra-firm trade of these product lines. Such affiliates are relatively autonomous and are often nationally responsive units with some R&D facility, mostly in process technology.

*Miniature replicas* are plants, protected by high tariff barriers, that assemble and sell a full line of products, similar to that of the parent, in the local market. Such affiliates are likely to be high cost if domestic markets are small. In such circumstances it is difficult for them to exploit economies of scale. Miniature replicas were the most common form of market-driven affiliate in the Canadian manufacturing sector prior to the reduction of tariff barriers under the Tokyo Round and the introduction of the Auto Pact in 1965.

*World product mandates (WPMs)* are plants with full responsibility for the technological development, production and global sales of a single product line within the MNE. The WPM represents a specific strategy quite distinct from the focussed factory. Although both manufacture product lines for global sale, the WPM is responsible for product design/redesign for its own output. In the case of the focussed factory, comparable responsibility rests with the parent. WPMs entail close cooperation between parent and affiliate, and require larger product innovation capabilities than focussed factories.[10]

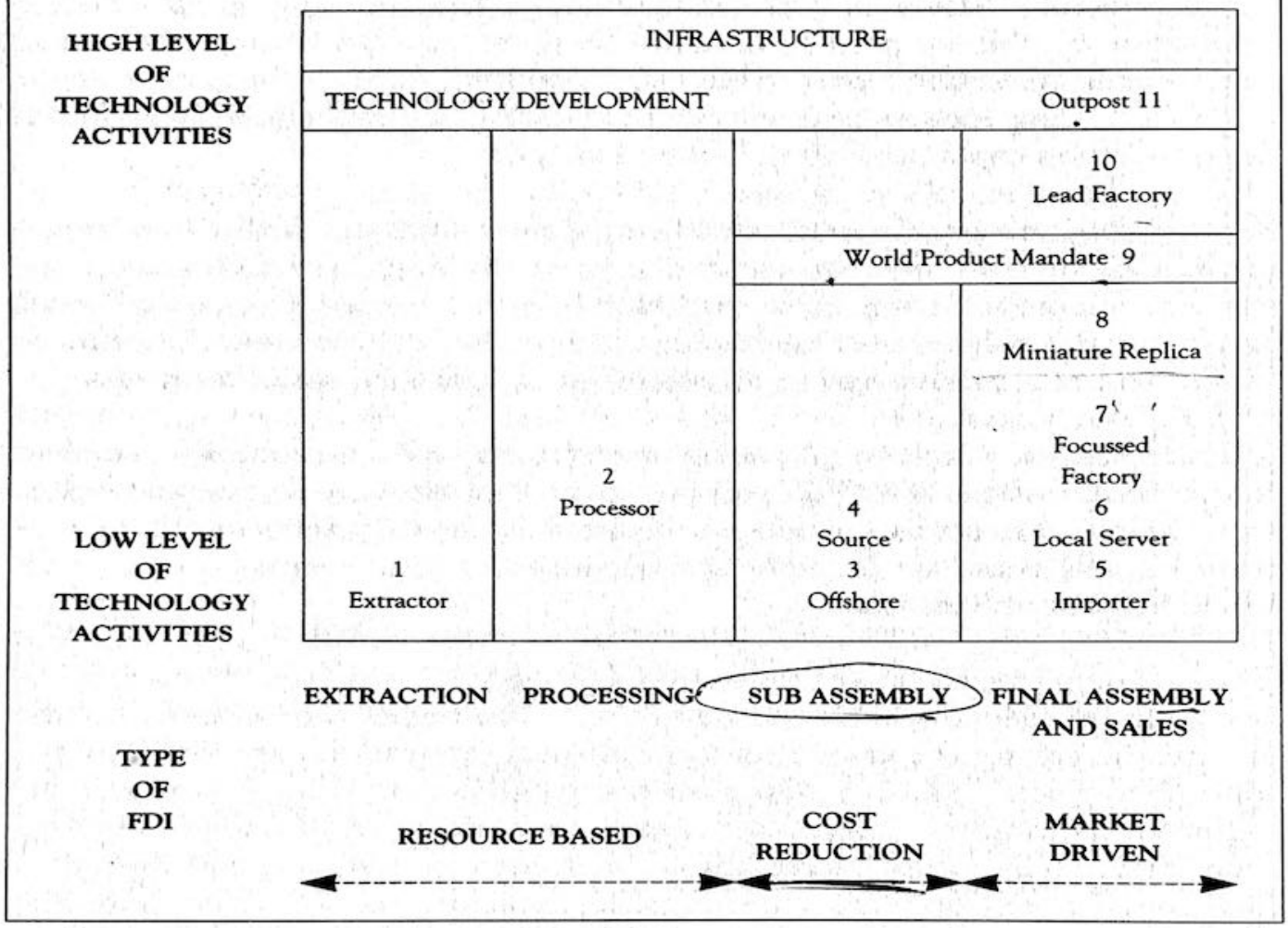
*Lead factories* are equal partners with the parent firm and within the framework of an MNE are often treated as a separate division. Lead factories occupy strategic locations within each Triad bloc (North America, Europe and Asia) and are responsible for both technology and product creation and distribution. Lead factories also have true insider status in each of their major locations.

*Outposts* are R&D-intensive plants set up in foreign markets primarily to collect information for the MNE. The purpose of these plants is to source knowledge worldwide and to act as a window on technology developments in other countries. Usually these are brownfield acquisitions or joint ventures with established firms or universities.[11]

The taxonomy for the above is illustrated in Figure 2, which shows each factory type in its relevant part of the value chain. The higher the placement of the factory, the greater the amount of technological innovation expected from the subsidiary. Each MNE, depending on the length of its value chain and the nature of its industry, consists of a head office and a set of foreign affiliates, each strategically located according to its underlying resource, cost or market function. For example, automotive MNEs typically consist of offshore and source factories in the NIEs (which produce parts and component assemblies), local servers (which assemble completely knocked down kits in LDCs), and focussed factories in OECD countries (which assemble and distribute certain product lines while importing others).

Figure 2 implies that every subsidiary has a primary role. It should also be clear, however, that an affiliate can occupy more than one strategic position within an MNE at the same time (e.g. a world product mandate along with a contributor role). Depending on the nature of the industry (globalized, government-controlled or mixed-structure) MNEs are more-or-less likely to choose particular locational strategies. As Doz (1986) shows, in mature, global industries such as automobile manufacturing, multinationals tend to use integrative, cost-driven strategies using offshores and local server factories to divide the production process among their affiliates and subcontractors, then assemble locally to meet domestic content requirements. Conversely, government-controlled industries such as telecommunications and aircraft manufacturing tend to adopt more nationally responsive strategies such as miniature replicas and focussed factories.

FIGURE 2
AFFILIATE ROLES WITHIN THE MNE




The strategy adopted in choosing a new location also depends on the age of the affiliate. I contend, following Ferdows (1989), that new factories are usually extractors, offshores or importers, depending on their strategic function within the MNE (resource-, cost-, or market-based). The strategic function of a plant may change over time; as it grows and matures it may develop the capabilities to undertake new functions. If the subsidiary is allowed relative autonomy to develop within the MNE, such growth in function(s) is more likely. Therefore, as the foreign affiliates mature, extractors may take on processing functions, offshores may become source factories, and importers may become local servers.

Whether such upgrading of affiliates occurs depends on the economic, social and political factors outlined earlier. For example, a high effective rate of protection in the home country deters local processing and encourages exports to the parent firm for processing (e.g. Canadian logs exported to the United States for processing into lumber). As wage rates rise over time in the NIEs there may be an incentive to shut down offshore plants and move the footloose production to

cheaper labour sites rather than upgrade the plant to a source factory. The growth pattern of demand-driven factories may be the most interesting, in view of the number of opportunities that are open to them (e.g. importer, focussed factory, world product mandate, lead factory). Clearly, the relative size and strength of the local market, the level of trade barriers, capital and labour costs, and government regulations and incentives for R&D can all affect the choice made by the MNE. Given the simple cost-reduction function of offshores and sources, I suggest that these types of factories are unlikely to become lead factories. Processors and focussed factories, however, may take on the functions of full lead factories if they occupy a strategic location within one of the Triads.

## MNE Organizational Strategies

The organizational structure of MNEs encompasses two components: legal organization and managerial organization (Robock and Simmonds, 1989, p. 253). The legal organization defines the ownership arrangements between the parent company and its affiliates (e.g. branch, subsidiary, joint venture, strategic partnership, etc.). The traditional foreign affiliate is a wholly-owned subsidiary within which contractual and other trading arrangements are carried out at *non*-arm's-length. However, MNEs also use other devices, such as subcontracting, joint ventures and licensing arrangements, to organize production, particularly if host country regulations require local participation. The wholly-owned subsidiary is generally preferred as an organizational form in order to protect the MNE's firm-specific advantages (Eden, 1989b).

The managerial organization determines executive lines of authority and responsibility, lines of communication, information flows and how they are channelled and processed. *Business International* (1988, pp. 113-19) identifies seven types of MNE international managerial structures: international, regional, national subsidiary, product, functional, matrix and mixed. Each is described briefly below:

1) *International Division* One unit within an MNE with responsibility for all international operations. This is a common structure for new MNEs, and is used widely by Japanese and Asian multinationals.

2) *Worldwide Regional* Each affiliate is responsible for a specific territory or regional division; the home market may be a division like the others. This structure is used by American MNEs with mature, standardized products where marketing and service are important; e.g. beverages, cosmetics, petroleum, with the affiliate being responsible for a region such as South America or Asia.

3) *National Subsidiary* This format is similar to the regional structure but is more decentralized since each country constitutes a division. European MNEs typically used this structure, the so-called "mother-daughter" structure.

4) *Worldwide Product* The MNE is organized into several domestic businesses each of which is responsible for its own worldwide operations. This structure is used by MNEs that need to coordinate upstream activities centrally and to integrate technological development, production and markets for each product horizontally.

5) *Worldwide Functional* Divisions are determined by the MNE's major functions, e.g. administration, manufacturing, R&D. This structure is not employed as much as others, but can be found in mining and steel and in small, international companies with an integrated product line.

6) *Matrix and Matrix Overlay* In a matrix structure, the MNE focusses on two characteristics (product, function, region), giving a dual chain of command and encouraging cooperation across characteristics. The most common is dual reporting to the head office by the product and regional divisions. Given the complexity of managing a matrix structure, most MNEs have moved to a Matrix Overlay structure where one element (e.g. region) is emphasized and the other two are monitored.

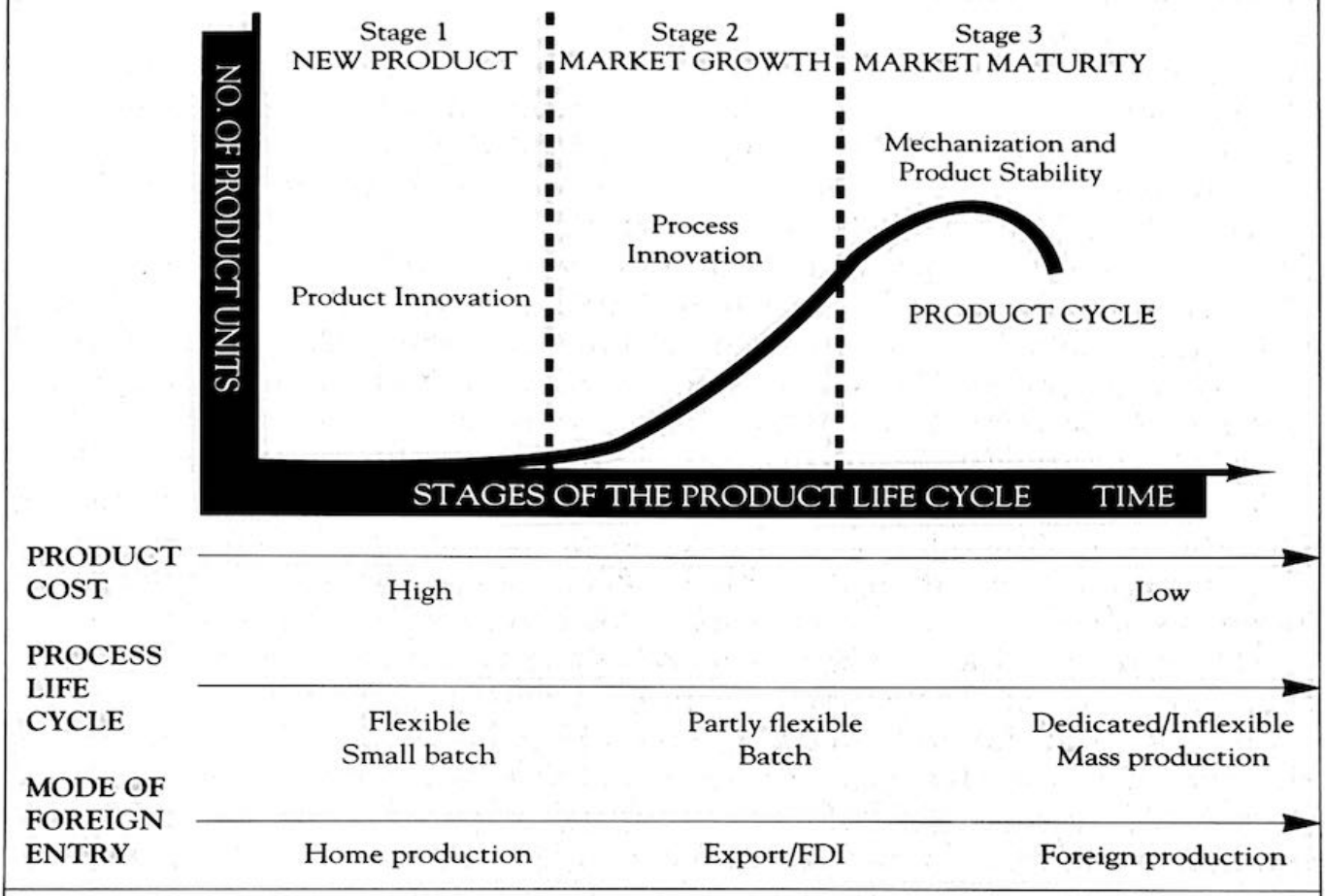
7) *Mixed* This organizational structure combines two or more of the above structures (e.g. an international division, a few worldwide product divisions and some national subsidiaries). This structure is useful for large MNEs where individual affiliates require different structures.

The choice among these managerial structures depends partly on corporate strategy. As the need for global strategic planning increases, MNEs adopt more global organizational structures to facilitate the integration of national and international planning. The more integrated the structure, the less the local autonomy of the affiliate and the greater the centralization and coordination functions of the parent firm.

Managerial structure also reflects the degree of internalization of the MNE; i.e. the MNE's relative shares of international versus domestic sales (Robock and Simmonds, 1989, p. 255; OECD, 1987, pp. 43-6). Assuming that the purpose of moving outside the domestic situation is market-driven, a firm may first set up an importer unit abroad; as exports increase, it may then set up a managerial export department within the head office to organize international sales. Sales, service and warehousing operations go abroad next. Once foreign production has been established, the MNE may set up largely autonomous miniature replicas. An international division within the hierarchy is usually established once the degree of internationalization reaches some acceptable minimum. At the global stage, the organizational structure is usually re-defined along functional, regional or product lines.

These organizational stages can be grouped into two basic groups: domestic structures (organized along functional or divisional lines) and international structures (e.g. autonomous subsidiary, international division); these corre-

FIGURE 3
PRODUCT AND PROCESS LIFE CYCLES




Source: adapted from Goldhar (1989, p. 260)

spond roughly to the degree of maturity of the multinational. Firms generally progress from domestic to global structures as the percentage of foreign sales in relation to total sales rises.[12]

In the following section, I briefly review the history of American MNE development and identify the changing strategic functions of American affiliates, using the locational and organizational frameworks developed above.

## A Brief History of MNE Locational and Organizational Strategies

Production processes in manufacturing firms can be classified under four headings: continuous flow, assembly line, batch, and jobbing to project. According to this progression, jobbing to project is the most flexible, and continuous flow is the least flexible (Easton and Rothschild, 1987, p. 303). The choice of production process is determined partly by the product life cycle. The traditional manufacturing process is based on the concept of products moving from introduction to maturity to obsolescence. New products require frequent design and

process changes, the production process is unstandardized and most likely to be project- or job-based. As products become more mature the increase in volume requires a standardization of product design and a shift from labour-intensive to capital-intensive operations. Eventually, assembly lines and continuous flows generate significant economies of scale (EOS) from the mass production of standardized products. Flexibility is, consequently, reduced and response time is slowed but the average cost per unit falls.

As Figure 3 shows, when a new product is introduced it is normally produced in small batches with flexible technologies. As the product moves through its life cycle, product innovation is replaced by process innovation. Once economies of scale have been exploited domestically, the product is normally moved abroad to be produced by affiliates of the MNE. Cost competition through mass production becomes increasingly important such that mature products are often produced in low-wage countries.

In the early 1900s manufacturing firms in the United States began to mass produce consumer durables for their domestic markets. MNEs expanded by exploiting economies of scale and scope in extraction, production and distribution first at home and then abroad (Chandler, 1986, 1990a,b). Mass production industries developed which were capital-intensive, permitting large economies of scale at the plant level. Capital-intensive plants normally used either continuous-flow or assembly-line technologies, allowing production at substantially lower cost than labour-intensive, batch or job processes in small plants. However, the cost advantage of mass production, as Chandler (1986, 1990a,b) stresses, depended on throughput. Throughput required coordination of inputs and outputs and thus a managerial hierarchy. Economies of scale at the plant level, therefore, depended on both technological and organizational inputs.

In the post-1945 period, globalization, defined as high interdependence between national markets, proceeded rapidly with domestic firms facing new competitors at home and abroad. American multinationals set up miniature replicas in Canada and in Europe, designed to supply local markets behind relatively high tariff walls. New products were produced first in the United States, then moved abroad as the American market became saturated and international demand increased. Major natural-resource-seeking investments were made to set up extraction plants, particularly in Canada in the mining and petroleum sectors. Some of these plants did their own refining (e.g. petroleum); others exported raw materials for processing in the United States (iron ore to steel plants).

Post-war expansion, based on global investments by MNEs in the automotive and petrochemical sectors and government investments in infrastructure, had run its course by the late 1960s (Van Tulder and Junne, 1988). Globalization was encouraged by technological advances in transportation and communications, liberalization of exchange rate and credit policies, tariff reductions under GATT rounds, and the increasing integration of capital markets. By 1970, western European firms had emerged as strong competitors and Japanese firms

were starting to export high-tech manufactured goods. During the 1970s, European MNEs began to invest in the United States and intra-industry FDI began to replace the inter-industry FDI characteristic of the pre-1970 period. Intra-industry trade and horizontally integrated intra-firm trade between OECD countries increased rapidly (Grimwade, 1989). The 1970s energy squeeze, lagging productivity, stagflation, and the rise of the newly industrialized economies increased the competitive pressures placed on American firms.

From the late 1960s through the 1980s, American multinationals responded to this new competition with four organizational and locational strategies. The first strategy was to extend the value chain through mergers and acquisitions. A wave of mergers forming conglomerates able to control forward and backward linkages, reduce risk and cartelize local markets occurred during the late 1960s (many of which subsequently collapsed, see Chandler 1990a).

The second strategy was to automate production, increase plant size and rationalize plants (creating focussed factories under horizontal rationalization, and source factories under vertical rationalization) to achieve greater economies of scale. The automotive industry is a good example of an industry that globalized and rationalized during this period. Specifically, the signing of the 1965 Auto Pact encouraged the phasing out of miniature replicas in the auto industry and their replacement by focussed factories. In the late 1970s the Ford Motor Company attempted to build a world car, locating world-scale source plants in low-cost locations. However, the necessary economies of scale were not achieved and the attempt was aborted.

The third strategy was to move production offshore to the NIEs and to the Mexican maquiladoras. These offshore plants were designed to lower overall costs to the MNEs by shifting production and subassembly to developing countries with lower unit labour costs. U.S. tariff legislation (sections 806 and 807) encouraged the move to offshore assembly factories by making the relevant U.S. tariffs applicable only to the foreign value added. Intra-industry trade in intermediate products between affiliates of vertically integrated multinationals became a major part of world trade flows (Casson, 1986; Grimwade 1989).[13] MNE total costs were reduced by shifting labour-intensive stages of production to countries with low unit labour costs. Two kinds of manufacturing production were pulled offshore. The first consisted of light, labour-intensive assembly operations, such as in the textiles and electronics industries. The second was basic industrial manufacturing of standardized mass-production products, such as stages in the automotive and steel manufacturing industries (UNCTC, 1988). These two moves in the 1970s introduced the so-called "new international division of labour" (NIDL) based on worldwide sourcing of cheap components and assembly (Mytelka, 1987).

In the fourth strategy, as firms increased global operations as a percentage of total operations, most American MNEs tightened their organizational structures to assert more control over their affiliates. Structures changed from simple international divisions and autonomous profit centres in the 1950s and 1960s

to either functional divisions (where product diversity was low) or product divisions (where product diversity was high) in the 1970s (OECD, 1987, pp. 44-5). American MNEs now tend to adopt more globalized structures and exercise tighter control over their subsidiaries than European MNEs (OECD, 1987).

By the early 1980s the problems inherent in a strategy of plant rationalization and worldwide sourcing had become apparent. The distribution network was complex, flexibility of response to customer demands was low, and the link between innovation and production was stretched (Goldhar, 1989). These problems were aggravated by two technological developments (information technology and just-in-time manufacturing) and two major trade policy changes (the Canada-U.S. Free Trade Agreement and the prospect of a North American Free Trade Arrangement). I now turn to an analysis of these four changes, following which, I address the question of how the current technology and trade policy changes are likely to affect MNE organizational and locational structures in the 1990s.

## Technology and Trade Policy Changes in the 1980s

### Technology Changes

#### The Information Technology Revolution

Van Tulder and Junne (1988, p. 6) define a core technology as one that leads to many products, has a strong impact on production processes, is applicable in many sectors of the economy, and eases obstacles to further investment. They identify two core technology clusters, which developed during the 1980s: information technology (IT), and biotechnology.

A recent study of MNEs by the United Nations Centre for Transnational Corporations (UNCTC) states that the "rapid spread of micro-electronics-based information technologies into production processes for goods and services has been one of the outstanding features of world development in the 1980s" (UNCTC, 1988, p. 42). Semiconductors, robots, computers, telecommunications hardware and software, and Computer Aided Design (CAD) equipment are the largest sectors in the IT cluster (Van Tulder and Junne, 1988, p. 8). Semiconductors are the basic component (the so-called "crude oil of the 1980s") of all microelectronic products; they raise product reliability and lower energy and materials requirements. IT is a generic or core technology in that it is highly flexible and can be introduced almost anywhere in the value chain. Within the manufacturing stage, four key ITs are: computer numerically controlled (CNC) tools, industrial robots, automated transfer systems and process-control systems (UNCTC, 1988, p. 42). These new ITs are linked in computer integrated manufacturing (CIM). CIM factories are "smarter, faster, close-coupled, integrated, optimized and flexible" (Goldhar, 1989, p. 261).

The key features of IT are integration and flexibility, both of which reduce average costs and generate system-wide gains in efficiency. IT lowers

costs of labour, capital, energy and raw materials, reduces pollution, and increases the flexibility of production processes (Van Tulder and Junne, 1988, 19-27). IT is labour-saving, both as a product (substituting a single chip for number of moving parts) and as a means of production (e.g. word processors, robots). Labour productivity is increased through faster communications, shorter waiting and transport time, and higher quality control. IT saves on capital by making capital equipment reprogrammable, promoting the development and introduction of lights-out factories, reducing factory space, and cutting downtime. Raw material and energy needs are reduced by miniaturization and the use of telecommunications to adjust production to demand fluctuations. Pollution is reduced through waste reduction.

Flexibility of production processes is increased through the combination of microelectronics and reprogrammable machine equipment. Easton and Rothschild (1987) identify five areas in which flexibility can be improved through the use of IT: product, product mix, quality level, output volume and delivery time. Computer assisted design (CAD) equipment and computer numerically controlled (CNC) tools can reduce development and production time. Flexible automation together with computer-directed machining operations (CAD/CAM) allow firms to offer a broader range of products in small batches at low cost. Economies of scale at the plant level can be offset by increased economies of scope. It becomes easier to reconfigure products according to post-purchase customer requirements thus increasing product flexibility.

## Just-In-Time (JIT) Manufacturing

The UNCTC (1988, pp. 42-7) claims that the second major force affecting MNEs in the 1980s is organizational innovation based on the concept of just-in-time (JIT) manufacturing. These new organizational innovations were developed in three areas: management of materials, human resources, and supplier relations. The main elements of JIT manufacturing are demand-driven production, minimization of downtime, pull-through work flow, inventory reduction, zero defect components, and total quality control. First adopted in Japan (where it is called the Toyota Production System), JIT manufacturing has spread in North America as American multinationals have been forced to adopt these techniques in order to compete with the more efficient Japanese multinationals, and as Japanese MNEs have adopted these process technologies in their new North American plants.[14] This is well documented in the new Womack et al (1990) study of the automotive industry.

Two key components of JIT manufacturing are reduced inventory and machine set-up time at each step in the production process. Both types of reduction can expose defects, which encourages the firm to introduce quality control systems designed to eliminate downtime which, in turn, reduces transaction costs in the form of manufacturing overheads within the firm. The

multi-skilling and multi-tasking of workers necessary in JIT manufacturing encourage learning-by-doing and process innovations. JIT manufacturing is especially suited to complex, high-volume fabrication and assembly activities such as occur in the automobile, electronics and machinery industries (Lieberman, 1989, p. 221; Hoffman and Kaplinsky, 1988).

However, the JIT system also imposes certain requirements on supplier-MNE linkages. Proximity is very important, in order to maintain tight inventory schedules. MNEs must also collaborate with suppliers in order to schedule production. Components must be zero defective, which means that stringent quality controls also apply to suppliers. The expanding science base of manufacturing, because of its more specialized and complicated components, also requires closer coordination with suppliers. The result is that firms are signing longer run contracts with single contractors and many of those contractors are adopting JIT methods themselves.[15]

## FMS: Linking IT and JIT Manufacturing

The JIT and IT revolutions together are creating a flexible manufacturing system (FMS). Hoffman and Kaplinsky (1988, p. 49) refer to the shift from traditional mass-production methods to a FMS as the shift from "machinofacture to systemofacture". This reflects the systemic integration necessary in FMS. Womack et al (1990, p. 13) call the new system "lean production" because a FMS uses less of everything: manufacturing space, inventories, labour hours, investment in tools, etc. Both teams of authors agree that the move toward flexible manufacturing systems will revolutionize manufacturing on a global basis.

The new factory of the future will be characterized by "decentralization, disaggregation, flexibility, rapid conversion of product lines, . . . surge and ramp-up and 'turnaroundability', responsiveness to innovation, production tied to demand, multiple functions, and close-coupled systems" (Goldhar, 1989, p. 262). This changes the definition of productivity from a cost base to a profitability base. It also shifts the focus of the core business from manufacturing to service. FMS reduces the economic advantages of large-scale factories, allowing a greater variety of low-volume, low-cost manufacturing to be concentrated in one location.[16] Goldhar notes, however, that since FMS is characterized by almost 100 percent fixed cost, the firm must increase its competitive segment scope and keep the factory working continually to reap the benefits from JIT manufacturing.[17]

The introduction of FMS affects the economies of location through its impact on economies of scale at the levels of the product, the plant and the firm (Hoffman and Kaplinsky, 1988, p. 346). During this century, there has been a tendency for all three types of scale economies to increase in the manufacturing sector. For example, in the automobile industry during the 1970s and '80s, product economies of scale provided an incentive for the world car, plant economies contributed to the emergence of the world factory, and firm economies generated

MNEs. Hoffman and Kaplinsky argue that new developments are still affecting scale economies through: the increasing importance of product innovation and quality relative to price; changing managerial perspectives in response to more discriminating consumers; and the use of FMS to reduce downtime and improve accuracy. On the other hand, the economies of massed resources, growth in indirect costs such as R&D, and the scale economies inherent in process industries all remain. In mass production industries, the net impact of these developments may well be to reduce plant and product scale economies; while scale economies rise in traditional small-batch sectors (Hoffman and Kaplinsky, 1988, p. 66, pp.347-53, p.362). For example, in core manufacturing industries such as automobiles, new engine and assembly plants are smaller size and designed to produce fewer units per year (1988, pp. 104-106). Thus, in Figure 3 both Hoffman and Kaplinsky and Womack et al (1990) predict that increasingly, the mature product stage will be characterized by flexible manufacturing systems. When coupled with the major trade policy changes outlined below, North American multinationals now face an environment far different from that of the 1970s.

## Trade Policy Changes

By the end of 1989 almost all major industries were operating in the context of global markets, competition, customers and suppliers (Hax, 1989). Ohmae (1985, 1989) argues that the Triad is the critical framework for MNEs engaged in global competition. To be a "true insider" in the world market, each multinational should occupy a position as a lead factory in each of the three leading blocs (North America, Europe, Asia). At the same time, each firm should develop "lead country models" (i.e. products tailored to the dominant markets) which can be minimally tailored for smaller markets. Globalization of markets is forcing multinationals to juggle simultaneously their goals of economic efficiency, national responsiveness and world-wide learning (Bartlett and Ghoshal, 1987a, b, 1989; Doz, 1986).

Globalization of markets was encouraged during the 1980s by state policies such as deregulation, the liberalization of trade and the integration of financial and capital markets through the G-7 and the European Monetary System (Investment Canada, 1990b). The perception that technology is the key to good trade performance and economic competitiveness has led governments to subsidize and protect their high-tech industries, and to encourage the production of highly-skilled labour (Van Tulder and Junne, 1989). These neo-protectionist policies are driving MNEs to make defensive intra-industry foreign direct investments in each Triadic bloc in order to protect their long-run market shares (Ostry, 1990).

The perception of trading blocs has mobilized governments in two ways. First, states are trying to slow down the breakup of the world trading system into blocs through the multilateral approach of the GATT Uruguay Round

which is supposed to reduce tariffs, agricultural subsidies and textile restraints. It is also intended to contain non-tariff barriers (NTBs), and extend the umbrella of the GATT to include services, trade-related investment measures and intellectual property rights (UNCTAD, 1989, 1990). Second, states are simultaneously moving to position themselves within these blocs through regional treaties: the United States by signing a Free Trade Agreement (FTA) with Canada and by moving toward a North American Free Trade Agreement with Canada and Mexico; Europe by reducing its border controls and harmonizing national legislation(s); Japan by setting up subsidiaries in the Asian NIEs and within the other two blocs to protect its exports.

## The Canada-US Free Trade Agreement

The 1989 Canada-U.S. Free Trade Agreement (FTA) is a preferential trading arrangement between Canada and the United States that is being phased in over a ten-year period. The FTA is broader than a simple preferential arrangement because it not only eliminates tariffs and sets up a framework for identifying and reducing NTBs between the two countries, but also liberalizes investment and professional labour flows between the two countries and promotes harmonization in certain areas.[18]

According to standard international trade theory, Canada, as the smaller country going into a free trade agreement, is expected to bear a larger share of the adjustment burden and reap a larger share of the trade gains. Adjustment pressures are created by static and dynamic effects. The static effects are of two types: trade creation and trade diversion (Hefferman and Sinclair, 1990, pp. 134-45). Trade creation occurs when high cost trade before the union is replaced by lower cost trade with a member country after the union. Trade diversion occurs when low cost trade before the union is replaced by higher cost trade with a member after the union. Dynamic effects include FDI flows in response to the trade creation and diversion effects, economies of scale and scope from the larger market, and terms of trade effects.

Several econometric studies have been undertaken that estimate the impact of the FTA on the Canadian economy.[19] The general conclusion drawn from these studies is that Canada would bear most of the adjustment pressures, facing relatively large employment losses in sectors including: textiles, paper products, petroleum products, glass products and electrical machinery. Sectors with relatively large projected employment gains are chemicals, iron and steel and nonferrous metals. On an overall basis, total employment should grow slightly and real income should increase. Both losses and gains are small for the United States, basically because the American market is expanded by only ten percent whereas the potential Canadian market is enlarged by ten times its original size.

The investment changes introduced in the FTA are also important for this analysis of MNE locational strategies. The Agreement puts an asymmetrical investment regime in place since the United States is bound to exempt Canada

from any future inward FDI screening, while Canada retains the right to screen acquisitions of its financial intermediaries and largest corporations. Performance requirements are prohibited. Each country gives the industrial and service firms from the other country the right of establishment and national treatment, except in a few sensitive sectors. National treatment means that foreign firms must be treated no less favourably than domestic firms within a country's borders (i.e. the host country's rules apply).[20]

## A North American Free Trade Arrangement?

Given the moves towards the development of a Triadic market consisting of three relatively autonomous trading blocs, it is perhaps not surprising that countries are positioning themselves to protect their export markets. Mexico, as one example, has served as a host country for U.S. multinationals since the 1800s. In the early 1900s the Mexican government restricted foreign ownership of many of its industrial sectors and has remained suspicious of American multinationals ever since (Weintraub, 1990). For many years the Mexican government followed an import substitution strategy designed to encourage domestic manufacturing and the growth of local capital. Foreign MNEs were forced to enter into joint ventures with Mexican partners and the percentage of foreign ownership was restricted. Non-tariff barriers (such as import licenses) were extremely high.

The one form of opening to the global economy occurred when the maquiladoras or in-bond plants were set up in 1965 (the same year Canada and the United States signed the Auto Pact). The maquiladoras constitute an export processing zone set up to attract FDI and encourage local assembly by taking advantage of low Mexican wage rates and reduced taxes (Dillman, 1983). With the American 806 and 807 tariff regulations levying duties only on the difference between the value of goods imported from Mexico net of American inputs, American MNEs were directly encouraged to set up offshore factories in Mexico and shift sub-assembly functions to these Mexican offshores. In the face of increasing competition from European and Japanese MNEs, American multinationals have made heavy use of maquiladora factories as a cost-driven method of responding to foreign competition (Dillman, 1983; Weintraub, 1987, 1990).[21]

During the 1970s, Mexico was an oil exporter and a heavy borrower. With the drop in world oil prices in 1981, Mexico suddenly found itself with a severe debt crisis by 1982. As a result, President de la Madrid began opening the general Mexican economy to international trade and foreign investment in the mid-1980s. Foreign investment rules were relaxed and Mexico joined the GATT in 1986. By 1987, 64 percent of all Mexican exports and 80 percent of manufactured exports were going to the United States (Weintraub, 1990, p. 106).

The signing of the FTA, however, meant that Mexican exporters (other than maquiladora exports) would be at a disadvantage, relative to Canada, once

the FTA was completely phased in, in accessing their major market, the United States. Canada went into the FTA to protect its access to its largest market; however, Canada's entry diverted trade from Mexico. This trade diversion effect is particularly noticeable in those sectors where both Mexico and Canada export similar products to the United States and Mexico had been the more efficient supplier. Weintraub (1990, p. 111) suggests that trade diversion is likely in the following product lines: automobiles, petrochemicals, iron and steel and other metals, paper products, textiles and apparel, and machinery. Since exports of Mexican manufactured goods to the United States have been growing faster than other exports, Weintraub argues that this list probably understates the trade diversion in the manufacturing sector.

The triangular trade between the three North American countries is noticeably unbalanced. In 1987, the United States sold 18 percent of its total exports to Canada and six percent to Mexico; it imported 18 percent of its total imports from Canada and five percent from Mexico. Canada sold 76 percent of its exports to the United States but negligible amounts to Mexico, and imported 66 percent of its imports from the United States with similar negligible imports from Mexico. The U.S.-Canada trade link is therefore much larger and stronger than either of the two other sides of the triangle (Hart, 1990).

In 1988, 68 percent of Mexico's total exports were to the United States. Considering this, the trade diversionary impact of the FTA on Mexico is clear. This effect might be offset if Canada and the United States buy more Mexican products because of high income gains produced by the FTA. However, the effect on income in the United States is expected to be small (since the United States is the larger partner) and Canada buys very little from Mexico. In addition, Canadian exporters are to some extent now sheltered under the FTA from future U.S. protectionist legislation. If Canada, but not Mexico, were to be exempted from the American NTBs (such as countervailing duties), an additional trade diversion effect would occur.

As a result of both the realities of a Triadic global economy and the trade diversion effects of the FTA, when Salinas succeeded de la Madrid as president of Mexico in December 1988, he approached the U.S. government about negotiating a U.S.-Mexico free trade agreement. The U.S. government and Mexico have now agreed to start joint talks on such an agreement.

Canadians are now debating whether to join the talks as an observer or as a full participant in the spring of 1991 (see Molot, 1990). Two separate trade agreements — one with Canada, the other with Mexico — would put the United States into a hub-and-spoke arrangement (with the U.S. as the hub and Canada and Mexico as spokes) which would give relatively more benefit to the United States (Lipsey, 1989).[22] A separate U.S.-Mexico agreement would also adversely affect Canadian trade preferences negotiated under the FTA. However, a full triangular arrangement with all three countries as equal partners will clearly be difficult to negotiate given the substantially lower level of economic development and wages, the much more rural and agricultural

nature of the Mexican economy, and the traditional Mexican suspicion of American multinationals (Hart, 1990).

## Organizational and Locational Responses of Multinationals

### MNE Locational Responses

**Responses to Technology Changes** Many economists and scientists are now suggesting that the global economy is going through a third technological revolution, based on the new core technologies — information technology (IT) and biotechnology (Van Tulder and Junne, 1988).[23] Information technology is revolutionizing the world economy through a closer linking between buyers and sellers. IT is also changing the concept of a "market" — from a geographic location to a network of computers linked by telephone lines. As the railroad revolutionized transportation of goods within and between national markets by lowering transportation costs to its downstream industries, IT is revolutionizing access to services by making them available virtually anywhere in the world by telephone or computer hook-up. Just as lower transport costs overcame tariff barriers, brought markets closer together and increased trade generally, so also are lower communications costs overcoming non-tariff barriers, thereby making previously untraded goods and services tradeable.[24]

The technological revolution is transforming society; new technologies are replacing traditional methods and precipitating large structural changes in industries. In the industrialized countries production is splitting into three distinct types based on the combination of IT and just-in-time manufacturing: 1) materials-based, standardized, mass production, and low value-added operations where cost minimization is important; 2) flexible, specialized batch production operations that are customized and high value-added; and 3) the new information-based, high value-added industries such as engineering consulting, data processing, advertising and financial services.

Computer-integrated manufacturing (CIM) and flexible manufacturing systems (FMS) are "levelling the playing field" by virtually eliminating unskilled labour costs as a source of competitive advantage. However, the need for highly skilled workers such as systems and industrial engineers, product designers, scientists and technicians will increase. Given the global mobility of capital, the competitive edge shifts to areas suitable to knowledge-based production, i.e. cities in the industrialized countries close to universities and research institutes. The NIEs may therefore have difficulty retaining their current share of MNE manufacturing activity unless they increase their country-specific advantages as a location for knowledge-based manufacturing (Junne, 1987).

The worldwide sourcing strategy of using offshores to reduce MNE costs which was practiced widely during the '70s and '80s, may decline in the 1990s.

Markides and Berg (1988) argue that offshore manufacturing has harmful long-run effects on American multinationals. The practice may produce short-run cost savings, but it causes other problems for the firm. Although labour costs are reduced, other costs (inventories, transportation) go up. Low wages often mean low productivity, so unit labour costs may actually be close to home country levels. Also, rising wage rates in offshore locations may force exits and a continual search for lower cost sites — an activity that, in itself, is not without cost. The MNE may create a "hollow corporation" as it shifts key production processes outside the firm. This can happen if the product development and manufacturing components are separated with a resulting reduction of innovation rates. Collaborators and subcontractors may become competitors once the sharing of trade secrets, learning-by-doing and reverse engineering increase host country expertise. In addition (as the obsolescing bargain predicts) states may raise their expectations of plant contributions to the local economy, and so demand more nationally responsive foreign subsidiaries.

In view of the importance of the IT-JIT revolution to the global effectiveness of MNEs in the 1990s it is appropriate to ask to what extent American multinationals have already made this adjustment. According to Wheelwright (1987), the IT-JIT revolution is making its way into the American manufacturing environment only slowly. Wheelwright (1987, pp. 96-8) notes that a 1984 McKinsey and Company study found that most adopters of CAD/CAM were using it either as a productivity tool for existing workers (for cost reduction) or within a single department (cost reduction plus enhanced product features); few firms were using it in a systematic manner across multiple functions and levels (to realize the full CAD/CAM potential). Wheelwright contends that American manufacturing firms are stuck with a static optimization view of technology that emphasizes the vertical division of tasks in the value chain. Increased specialization of function, finer divisions of labour, and economies of scale through mass production are treated as key cost-reduction strategies. He argues that a dynamic evolution view of manufacturing is required to restore the competitiveness of American firms. This calls for ongoing training of lifetime employees, product development as a team effort, in-house technology capabilities, and horizontal integration across tasks.

Both the Canadian and American governments are now keeping statistics on the introduction of IT into manufacturing — the so-called advanced manufacturing technologies (see Statistics Canada, 1989; U.S. Department of Commerce, 1989). McFetridge (1990) analyzed recent data to determine the factors that affect relative adoption rates. He found that establishment scale, and the percentage of establishments in an industry already using IT are significant determinants of IT adoption rates. Proxies for domestic and international multiplant economies of scale were not significant, nor was establishment age. He concludes that most of these technologies are now available on an "off the shelf" basis to Canadian firms, and are being adopted in Canada as quickly as in the United States.

What does the IT-JIT revolution mean for possible locational decisions of U.S. multinationals in the 1990s? If knowledge is displacing labour and capital as the underlying factor determining the global allocation of production, new strategies are needed to cope with this change. As the knowledge-intensity requirements for production increase, firm-level scale economies should increase. Catalogue shopping and franchising, the two major ways that American multinationals accessed lower cost labour and materials in the 1980s, will increasingly be replaced by strategies based on the Triad and lead products, where innovators and producers work closely together in lead factories (Flarety, p. 1088). The need to access market information and achieve an insider status within at least two of the three Triad blocs is likely to mean (particularly in the light of the difficulty American multinationals are having trying to set up within Japan) that American multinationals will establish their lead factories in Europe, rather than in Canada. A key function of these lead subsidiaries will be to access new technology. Considering the short product life cycles that the IT revolution has partly generated, it may become increasingly important for MNEs to have access to the latest technology. Often that technology will not be in-house. Just as in the 1970s the MNEs set up offshore factories to source cheap labour worldwide, in the 1990s MNEs may set up outpost factories to access cheaper and newer knowledge (Chesnais, 1988). Instead of the parent firm exporting technology to its subsidiaries, the subsidiaries may be expected to play a new role — to access and export the newest technology to the parent and other technologically advanced affiliates of the MNE. Outpost factories, both as 'windows on foreign science' and as strategic partnering initiatives (where two or more MNEs pool highly skilled and financial resources to perform basic research, then develop their own independent product lines based on that research) may become even more common in the 1990s. Outposts, however, may be located near demand-driven factories such as contributors or lead plants in order to link research more closely with production. In a knowledge-intensive production system, worldwide access to knowledge is expected to replace the search for cheap labour sites as the driving force behind FDI in the 1990s.

One important issue is whether R&D will be decentralized. Kay (1988) argues that R&D activity is characterized by non-specificities, lags, uncertainty and high cost, with the first three falling and the fourth rising as a new project moves downstream towards "final launch". Centralization of R&D activity is encouraged by all four factors. However, there are good reasons to devolve some R&D to subsidiaries: the allocation of R&D costs across divisions is difficult, and the need to understand users requires close contact between researchers, producers and sellers. Kay argues that organic structures with lateral relations, which encourage networking, are more likely to encourage innovation than traditional hierarchical control models. Such lateral relationships are normally part of flexible manufacturing systems (Masahiko, 1990).

In the 1980s flexible manufacturing systems were used by Japanese auto firms to capture economies of scope that could offset the economies of plant

scale available to auto MNEs engaged in traditional mass production. Now, American auto MNEs are increasingly adopting FMS techniques, with varying results (see Womack et al, 1990, Chs. 9 and 10). The IT-JIT revolution is expected to spread throughout the industrial and service sectors during the 1990s. FMS factories are smaller, utilize floor space more effectively, and have fewer inventories on hand. Economies of scope are also easier to achieve since downtime required to switch product lines is substantially reduced. In effect, the long-run average cost curve may flatten, so that firms of different sizes can operate with comparable efficiency.

In Canada, the introduction of flexible manufacturing systems is likely to have mixed effects. Canadian affiliates of American multinationals traditionally have performed both resource-based and demand-driven strategic functions (see Figure 2). So far, the IT-JIT revolution has had its strongest influence on manufacturing firms, although it is also reducing resource-intensity at all production stages. IT-JIT may mean that our small market can eventually be served as efficiently by a small flexible manufacturing system as by a large rationalized factory.[25]

However, economies of scale at the level of the firm are likely to become more important as FMS spreads throughout the manufacturing sector. As primary activities become a smaller and smaller part of total costs, the need to spread support activities (see Figure 1) over larger markets increases. Thus, the demand-driven plants such as servers can more easily upgrade to higher technological levels. In industries with a stock of well-trained scientists and technicians, Canadian subsidiaries may well be able to convince their American parents that they have the capability to become focussed factories and/or achieve world product mandate status, perhaps in certain regional or global product niches. However, because of the relative homogeneity of the American and Canadian markets, it is unlikely that Canadian affiliates will be given the opportunity to become lead factories.

In addition, the IT-JIT revolution requires close proximity and contact between MNEs and their suppliers; this is essential in order to run a smooth flexible manufacturing and/or assembly system. Thus, many manufacturing firms are adopting sole-source supplier linkages (in effect, creating "satellite" plants), requiring suppliers to be located close to the final assembly stage plants. Offshore plants in the NIEs may well become more footloose and relocate back to the OECD countries (see Figure 3). Canada may be able to capture some of this production, depending on its domestic adoption rates of the new technologies. (Mexico in particular is likely to benefit from this trend, especially if a North American Free Trade Agreement [NAFTA] is negotiated.) However, as Milne (1990) notes, not all industries will have this distance-reducing effect — depending on the relative sizes of the subcontractors and buyer firms, and the ability and willingness of all firms in the vertical chain to adopt JIT methods. If the manufacturing buyer is smaller than the supplier and cannot absorb all of the subcontractor's output, then the supplier must be

responsive to the demands of two or more manufacturers.[26] Where distances are not too large, MNEs may well locate new but separate in-house upstream plants (to manufacture components) close to assembly plants. This means that rapid adoption and diffusion of IT-JIT methods may be essential for Canadian firms in the 1990s if they expect to retain their share of American operations and upgrade their technological functions.

## Responses to Trade Policy Changes

The signing of the FTA marks a new relationship between American multinationals and their Canadian affiliates. With the eventual elimination of tariffs in both countries, one of the key factors of Canadian economic life since 1897 will disappear (or will be at least reduced, depending on NTBs). Most of the miniature replica plants of the 1960s and 1970s are already gone largely because of the influence of tariff reductions under the Tokyo Round (Bishop and Crookell, 1985). To the extent that inefficient plants still remain, these subsidiaries must find new functions in the 1990s. They must upgrade, rationalize or exit. MNEs are likely to be better placed than domestic firms to make these adjustments due to their larger size, the oligopolistic market structures in which they operate, and the volume of intra-firm linkages they can use to cushion change (Bishop and Crookell, 1985; Grimwade, 1989, pp. 384-91; Richardson, 1990).

Rugman (1990, pp. 118-46) argues that there are three categories of American branch plants: (1) tariff factories that cannot survive after the FTA; (2) branches that can survive after the FTA due either to their parent's FSAs or to high Canadian exit barriers; and (3) branches set up for reasons other than tariffs and NTBs and which keep their competitive advantages after the FTA. He contends that most of the larger Canadian subsidiaries are in category 3 and are already internationally competitive. The other affiliates may need either to exit or be integrated into a global network. He therefore expects globally rationalized plants to substitute for miniature replicas, particularly in the long run, although some miniature replicas will persist in industries where scale economies are small and entry barriers high.

Given the IT-JIT changes discussed earlier, I contend that it may be easier in the 1990s for the remaining miniature replica plants to choose a strategic direction that increases their technological contribution and divisional autonomy within the MNE. These factories can either move downward (see Figure 2) to become focussed factories or upward to become world product mandates. They may even move backward to become source factories by taking on subassembly functions if the MNEs bring offshores back from the Asian NIEs. Bishop and Crookell (1985) expect that the choice will lie between global rationalization along product lines or world product mandating (strategies 7 or 9 in Figure 2). They conclude that both strategies integrate the subsidiary more closely into the MNE's overall organizational and location structures. They argue that

without Canadian inducements by both the state and the subsidiary, the MNE is more likely to respond by rationalization than world product mandates.

However, economic integration via trade policy changes is unlikely to encourage Canadian affiliates to become lead factories or major innovation centres. Cantwell (1988, this volume) argues that preferential trading blocs encourage a regionally integrated strategy by multinationals that, in turn, encourages a virtuous-vicious circle outcome. Centres of technological innovation tend to become more so, promoting a virtuous circle; however, stagnant sectors tend to atrophy more quickly, generating a vicious circle. To the extent that this occurs under the FTA, areas such as Southern Ontario, California and parts of Texas should benefit most in innovative activity, while peripheral areas should grow more slowly.

The impact of the FTA on Canadian subsidiaries cannot be considered alone however. I have argued in this paper that the essence of multinationality is foreign production and that FDI and intra-firm trade are joint manifestations of the MNE's globalized demand-cost-supply perspective. Most analyses of free trade focus specifically on trade without incorporating the key factor that most of it is intra-firm and related to FDI and foreign production decisions.[27]

American multinationals are already integrating Mexico into their value chains (see the Automotive Parts Manufacturers' Association, 1990) and can be expected to increase this integration if a NAFTA is negotiated. These Mexican affiliates may be complementary factories to Canadian ones (i.e. if they produce at different stages in the value chain) or they may be competitive (i.e. if they produce at the same stage). The impact of a NAFTA on the Canadian affiliates is likely to be very different, depending on this relationship.

When Mexico and Canada can perform similar stages of production within the MNE, they act as competitors. Thus, the FTA now protects the Canadian affiliate at the expense of the Mexican affiliate since U.S. tariffs have been lowered for Canadian exports but not for Mexican exports. Conversely, should a NAFTA be introduced, the Canadian affiliate would suffer unless it could become more competitive through restructuring. Note that the difference between the FTA and NAFTA here assumes that transfer price manipulation is not used to offset the U.S. tariff; Sections 806 and 807 do not apply (otherwise the tariff would be minimal); and that government taxes and subsidies do not offset the tariffs.[28]

In the case where Canada and Mexico perform different stages in the value chain, the comparison of a NAFTA with the FTA leads to quite different results. Here, the two affiliates should be complementary, and a tariff at one stage hurts all stages of the MNE. Thus, the introduction of the FTA benefits both the Canadian and Mexican affiliates through increased American demand for their intra-firm products; a NAFTA would have a similar effect.

It is therefore crucial to know the respective roles of the two subsidiaries before predicting that Canadian jobs will be lost to Mexican workers after the introduction of a NAFTA. There has been little research to date on this question. This is not just a simple matter of examining the current locational roles

of Canadian and Mexican affiliates within American multinationals. The reduction of tariff and non-tariff barriers should force MNEs to re-evaluate their locational strategies. As we saw in Figure 2, depending on the primary motivation for the FDI (resource, cost or market), free trade could cause either an upscaling or downscaling of foreign factories. Some argue that the natural response will be a cascade effect, shifting low-wage activities to Mexico, and knowledge-intensive activities to the United States and Europe (Fleck and D'Cruz, 1987). Canadian subsidiaries may therefore be left with either globally rationalized plants or a more innovative but narrower role based on world product mandates. Alternatively, Canadian affiliates may be reduced to servers and importers. A move backward in the value chain whereby Canadian affiliates act as source factories is unlikely if a NAFTA were negotiated, since cost-driven source factories are more likely to be located in Mexico than in Canada.

Also key in this regard is the impact of the IT-JIT changes on firm cost structures. Flexible manufacturing systems may reduce economies of scale at the plant and product level for mass production industries. It may therefore be possible for Canadian branch plants to offset the attraction of low unit labour costs in Mexico (and other NIEs) if automation proceeds rapidly enough. The net result could be fewer but more highly skilled jobs in manufacturing, resource industries and business services, and would likely depend on the core competencies of the Canadian affiliates and their ability to identify and use these FSAs in a Canadian context (see also Crookell, 1990a, pp. 22-30; Johnston, 1990).[29]

## MNE Organizational Responses

As discussed earlier, several organizational structures are available to MNEs, ranging from the simple international division to complicated matrix structures. *Business International* (1988, pp.6-7) argues that three of the current structures contain flaws which may make these structures obsolete in the 1990s. The global product structure is expensive and does not encourage sharing resources across divisions or transferring resources or products internationally. The matrix structure is too complicated. The international division structure is designed for MNEs with a small international business, not for today's global players. *Business International* concludes that the mixed and matrix overlay structures, due to their synergistic properties, are likely to predominate among MNEs in the 1990s. We can explain this argument by examining the impact that technology and trade policy changes are likely to have on MNE organizational structures.

In the 1970s MNEs had to choose between a centralized and decentralized organizational structure. Centralized structures allowed for high control but had high (organizational) cost structures; decentralized structures were low control but had low organizational cost. Most MNEs adopted "command-and-control" systems that emphasized decentralized subsidiaries, central service

staffs, personnel management, and the separation of policy making from operations (Drucker, 1988).

The IT revolution, however, means that telecommunications networks can be used world-wide to link MNE affiliates and provide centralized corporate data bases for use by both headquarters and affiliates. This improves centralized control by the parent firm and creates new information channels within the organization. Information technology allows the parent firm to monitor and control large operations more effectively with fewer middle managers to analyze and relay information. IT can therefore create an information-based organizational structure that is downsized and flattened compared to 1970s corporations, by providing diagnostic tools for capital budgeting decisions, reducing the need for service staff, and substituting horizontal task forces for the vertical sequencing of value activities. IT has already been used in the 1980s to downsize and restructure the MNE. American organizations have shed more than one million managers and staff professionals since 1979 (Applegate et al, 1988, p. 128), substituting expert and executive information systems.[30]

The JIT manufacturing revolution is also affecting the organizational structure of multinationals in other ways. First, the adoption of JIT process technologies requires the introduction of new labour management techniques with less hierarchical control (Womack et al, 1990). Thus, more control over production is ceded to the plant floor in order to ensure overall quality control.

Second, previously loose relationships with supplier firms are changing as JIT induces MNEs to adopt tighter supplier-buyer linkages, in effect extending the value chain by bringing suppliers into the chain as satellites. Individual suppliers are given more responsibility for research and product development, but are also drawn more closely into the control structure of their downstream MNE buyer.

Third, the wholly owned subsidiary has been the dominant mode of entry into foreign markets for decades. Recently, however, MNEs have been engaged in minority equity ventures, subcontracting arrangements, and strategic partnerships. The variety of legal contractual arrangements is significantly higher now than it was 10 years ago (Eden, 1989c). MNEs are turning to partnerships, joint ventures and other co-operative arrangements as a way of spreading the high overhead costs of technological innovation, linking with firms of complementary skills and resources, and achieving "insider" status (UNCTC, 1988). Firm-level economies can be captured either through the value chain, continuing to make global MNEs the dominant organizational firm structure in the 1990s, or through technology-sharing joint ventures, spreading high R&D costs over several firms (Hoffman and Kaplinsky, 1988). Whether strategic alliances will come to dominate global industries in the 1990s is not yet clear. Mytelka (1987) believes that such alliances are the "wave of the future" arguing that new MNE strategies will involve decentralizing R&D operations from the home country to OECD host countries, engaging in strategic partnerships to share R&D costs, and sharing knowledge production with universities and research institutes.

From this I conclude that Canadian affiliates are likely to be more closely integrated into their parent's organizational structures in the 1990s, and that subcontracting firms are likely to face similar pressures. Such organizational integration is already being encouraged by both technological and trade policy changes that are creating new information channels within the MNE. These integrative pressures should be strongest for globally rationalized subsidiaries where nationally responsive strategies have a low priority. Even if Canadian affiliates are successful in obtaining world product mandates, as Bishop and Crookell (1985) have shown, such WPMs also involve tighter links with the parent firm. Thus, I believe that Canadian affiliates are likely to be drawn more closely into the global locational and organizational structures of their American multinational parents in the 1990s.

## CONCLUSIONS

THE PURPOSE OF THIS PAPER was to show how changing technological and trade policies affect multinational organizational and locational strategies, and in particular how Canadian affiliates of American multinationals are likely to be affected by these changes. I contend that both MNE organizational and locational changes can be expected as a result of information technology and just-in-time manufacturing and as a result of the introduction of the Canada-U.S. Free Trade Agreement and a possible North American Free Trade Agreement. Technological changes have altered the playing field on which MNEs compete; simultaneously, trade policy changes have altered the rules of the game.

I have argued here that both technological and trade policy changes are likely to increase the economic integration between American multinationals and their Canadian affiliates. Technology changes reduce transportation and communications costs, allowing closer monitoring of distant affiliates, and encouraging global strategic planning and production. Trade policy changes encourage MNEs to gear up for global competition by rationalizing production within the North American bloc. MNEs are likely to replace their old locational strategies (searching for natural resource sites in the 1950s and for low-cost labour sites in the 1970s and 1980s) with a new strategy in the 1990s of worldwide sourcing of new product and process technologies. The competitive edge should go to MNEs that source technology, rather than labour or resources, on a worldwide basis.

Canada is in a mixed position with respect to these changes. With the exception of automobiles, its major exports are still resource-based. Its domestic firms are not major producers of technology; rather, they are "fast followers" (Niosi, 1985) that rely on marketing advantages (Rugman, 1990). Many Canadian foreign-owned subsidiaries are either resource-based, designed to service the local (and small) market, or already integrated into North American production and assembly (e.g. the Auto Pact). These affiliates face opportunities for new strategic roles within their MNEs; however, these roles

may contribute less to the Canadian economy in terms of skilled jobs and technology transfer. Much depends on the abilities of individual affiliates to identify and exploit their core competencies, based on their Canadian locational advantages, within their parent's organizational and locational structures. The identification of and investment in these FSAs are crucial steps in maintaining Canada's share of high-tech factories with lead products. Canadian affiliates will have more freedom to define their strategic roles within MNEs in the 1990s; however, they will have to plan their moves strategically, based on rational assessments of their core competencies and how they can be exploited in a world of global competition.

## ENDNOTES

1. Eden (1990) looks at the implications of other political and market forces that affect Canadian firms, including the international diffusion of economic power, globalization, 1992, the Uruguay Round and the rise of U.S. protectionism. For a review of the 1980-89 period see Eden (1989a).
2. I am indebted to Maureen Molot for this analogy.
3. Most authors have focussed on American multinationals and their responses to either technological change and/or globalization. See Porter (1986), Doz (1986), Ohmae (1985, 1989, 1990) and Barlett and Ghoshal (1987a,b, 1989). On the strategic management of MNEs in Canada in response to globalization and the FTA see Rugman (1988, 1990), Rugman and D'Cruz (1990) and Investment Canada (1990). For an earlier view see Bishop and Crookell (1985).
4. In 1983 Canada was a home country for 4.9 percent and a host country for 11.1 percent of the world FDI stock. Between 1975 and 1983 the outward stock of FDI grew at an average annual rate of 13.6 percent, while the inward Canadian stock grew at an average annual rate of 6.3 percent. Clearly, the traditional picture of Canada as a host country is changing as the net stock position appears to be reversing. Statistics are from Dunning and Pearce (1988).
5. See Eden (1989b) for an application of this model to the international pharmaceutical industry.
6. For a more detailed discussion of core competencies see Prahalad and Hamel (1990) who argue that core competencies (1) provide potential access to a wide variety of markets, (2) contribute significantly to customer satisfaction, and (3) are difficult to imitate. They argue that core competencies can be lost if firms do not understand and invest sufficiently and effectively in their areas of competency. This is an interesting and important argument since most work on the firm-specific advantages of MNEs assumes that firms know what their competencies are, how to exploit them and that the FSAs are fixed. See also Cantwell (1987), who takes a dynamic approach, allowing for investment in FSAs.

7. One factor that is important in our analysis is the growing tendency to source technology worldwide; i.e. rather than the MNE using FDI to earn rents on its own technology, multinationals are now moving abroad to access technology and share R&D costs with strategic partners — such as universities, governments and rival firms.
8. This list has been developed from the following taxonomies. Ferdows (1989) identified six generic strategic roles for foreign factories: offshore, source, server, contributor, outpost, and lead. D'Cruz (1986) provided a list of six strategic types which he calls "the subsidiary mission grid": importer, satellite, globally rationalized, local service, branch plant, and world product mandate. D'Cruz argues that the first three have little decision-making autonomy and are progressively more globalized; the second three have high autonomy and are also progressively more globalized. Bishop and Crookell (1985) compare three strategies: miniature replicas, rationalized factories and world product mandates, and argue that the FTA is eliminating the miniature replica as a viable long run strategy in Canada. See also Crookell (1990, pp. 15-22). The Premier's Council report, *Competing in the Global Economy, Vol. 1* (1988), distinguishes between resource-based, low-wage and high-wage businesses where the third category includes mature, high-growth and emerging businesses. My taxonomy builds on and extends this list to encompass the three types of factories: resource-based, cost-driven and market-seeking, and to distinguish among these by their level of technological sophistication.
9. Rising wage rates in the NIEs are now forcing countries such as South Korea and Taiwan to upgrade the technical and educational skills of their labour force in order to encourage existing foreign investors from turning their plants from offshores into source factories.
10. See Etemad and Dulude (1986) and Pearce (1988) for further analyses of world product mandating in Canada. The definition of a WPM used here is broad and includes all production, design and marketing functions.
11. Ferdows (1989) found no stand-alone R&D outposts; information collection was usually assigned to a lead factory. However, I argue that strategic partnering between high-tech firms in Europe under the ESPRIT program can be considered as outposts. Recent FDI by European and Japanese firms into Silicon Valley also appears to be partly driven by outpost considerations. (See the Teece paper in this volume.)
12. Not all firms pass through all stages. Ninety percent of American MNEs passed through the international division phase while most European MNEs skipped it entirely (OECD, 1987, p. 46). Japanese *sogo shosha* or trading companies have assumed the export department role for many Japanese MNEs.
13. This type of intra-industry trade should more properly be considered as inter-industry trade since it takes place at different stages of production. Trade statistics normally include semifinished and finished goods in the same category. However, the offshore processing and final assembly package

typical of, for example, the auto industry, is not the same type of intra-industry, two-way trade in finished goods, and does not have the same effects.

14. The key components of JIT manufacturing are (1) Demand-Driven Production: the philosophy of shifts from producing to stock to producing to order so that production is in smaller batches with greater variety. (2) Minimization of Downtime: quick changeovers and setups are essential and production workers must be trained to work on a variety of machines. (3) Pull-Through Work Flow: factory layouts must be changed to encourage smooth flow-through of batch production. (4) Inventory Reduction: firms must switch from "just-in-case" storage of inventories to "just-in-time" inventory control. (5) Zero Defect Components: components must be perfect quality in order to maintain pull-through work flow. (6) Total Quality Control (TQC): preventive maintenance and quality control responsibility shift to production workers. TQC includes prevention costs (including quality circles), appraisal or monitoring costs, costs of internal failure (costs of fixing bad quality before it leaves the factory), and costs of external failure (warranty claims, customer illwill, etc). See Shank (1990) for a discussion of the impact of JIT on cost management techniques. (7) Knowledge-Intensive Production: workers are multi-skilled and are paid according to skill level and output quality. See UNCTC (1988, pp. 42-7).
15. Milne (1990) notes that all links in the contracting chain must adopt JIT methods if the strategy is to produce inventory and cost savings. If the secondary manufacturers adopt JIT but the subcontractors do not, then inventory holdings are merely shifted upstream to the subcontractors. These inventory costs will be passed on to manufactures.
16. See also Drucker (1990) on the postmodern factory.
17. Detailed studies of the introduction of flexible manufacturing systems can be found in Schonberger (1986, 1987). See also Wolf and Taylor in this volume on employee and supplier learning in the Canadian automotive industry.
18. Good studies of the FTA include Lipsey and York (1988), McRae and Steger (1988), Dearden, Hart and Steger (1989) and Morici (1990, forthcoming).
19. The best known of these studies are Harris and Cox (1983), Brown and Stern (1988) and the Economic Council of Canada (1988). See Morici (1990, forthcoming) for reviews.
20. Rugman and Verbeke (1990) have argued that the national treatment principle embedded in the FTA is a significant gain for Canada. This principle allows the host country's tax and FDI rules to be the standard for both domestic and foreign firms operating within domestic borders. Thus American rules apply to firms working in the United States and Canadian rules to firms working in Canada. Europe under 1992, on the other hand, is moving to mutual recognition of each other EC member's rules so that home country rules apply. This forced harmonization — either indirectly through mutual recognition or directly through the many harmonization

directives with respect to standards currently being made by the EC Commission — means that the relative strength of home countries within the European Community will lead to the strongest home country's rules predominating in the long run (e.g. German banking rules). No such forced harmonization of investment rules occurs under the FTA (although there is provision for future harmonization of some standards and social areas). Rugman and Verbeke therefore conclude that Canada is better protected under national treatment than under the mutual recognition approach.

21. Weintraub (1990, p. 107) notes that the figures are actually higher since maquiladora exports are not recorded in trade figures, but in "transformation services" (transforming goods into a more processed form).
22. However, I argue that in the automotive industry there already exists a hub-and-spoke model. The Canada-U.S. spoke is regulated by the 1965 Auto Pact and the 1989 FTA; the Mexico-U.S. spoke is regulated by the 1977, 1983 and 1989 Mexican directives to the auto industry, and the combined effects of the maquiladoras and 806/807 U.S. tariff rebate programs. In each case, the host country (Mexico or Canada) appears to have negotiated the spoke clauses without explicitly taking the other spoke agreements into account. To what extent this has benefited the hub — the United States (government, country or MNEs) — or the spokes has not been investigated. The various regulations are briefly outlined in Automotive Parts Manufacturers' Association (1990).
23. The first technological revolution occurred two hundred years ago with the advent of the steam engine and capital goods production in factories (Mytelka, 1987). What is now called the "old international division of labour" was created whereby European manufacturing countries bought raw materials and primary products from their colonies and other less developed economies. The second technological revolution began in the late 1880s with the appearance of cheap electrical power, synthetics and plastics.
24. Technology affects not only the globalization of trade in services, but also the overall volume of trade, since many goods have a high service content. GATT (1989, 3) concludes that "the greater the availability and the lower the costs of the needed services, the faster the pace of globalization of markets" and that access to competitively priced producer services is a key determinant of a firm's ability to compete. Rugman and D'Cruz (1990) have argued that services need to be increasingly competitive for manufacturing to compete in the Triad.
25. Thus, the plant economies of scale argument that drove economic predictions of the benefits from the FTA (see Harris and Cox, 1983) may become less important in the future.
26. Milne (1990) notes that in the United Kingdom the relatively small size of the electronics plants in the consumer electronics industry does not justify subcontractors moving closer to these buyers. In autos, however, large plants can gain control over suppliers because of their different relative sizes.

27. See, however, Yannopoulos (1987) on the investment impacts of trade diversion and trade creation on European MNEs in response to tariff preference schemes. He argues that the size and direction of FDI flows depend upon (1) the trade diversion and creation effects, (2) previous patterns of servicing donor markets, and (3) the relative FSAs of donor and beneficiary firms. My analysis follows the same pattern but for a free trade area (the FTA), rather than unilateral tariff reductions.
28. When tariffs are levied on an *ad valorem* basis, MNEs can underinvoice intra-firm trade flows to reduce the tariff. The impacts of changing Canadian and U.S. tariffs, corporate income tax and transfer pricing policies on horizontally integrated MNEs are analyzed in Eden (1990b). See also Eden, 1988a.
29. For industry-specific responses to trade and technological changes, a useful reference is the Ontario Premier's Council report and background studies (1988) which use the Porter value chain approach to examine selected Ontario industries in the resource, low-wage, and high-wage sectors. The studies argue that knowledge is replacing resources and labour as the key factor of production and that Ontario must introduce new policies to help firms introduce FMS.
30. For example, Applegate et al (1988, p. 132) argue that the IT revolution will affect MNEs in the 1990s in the following ways: both small and large scale MNEs will benefit simultaneously, and will adopt more flexible and dynamic organizational structures; the distinctions between centralized and decentralized control will blur; and the MNE focus will shift to projects and processes from tasks and standard procedures.

## Acknowledgement

I WISH TO THANK Judith van Walsum and Yuan Jing-dong for their research assistance; Ted English, Dick Lipsey, Christopher Maule, Don McFetridge, Maureen Molot, and Ted Moran for helpful comments on an earlier draft; and Investment Canada and the Centre for Trade Policy and Law for research support. The responsibility for any remaining errors is mine.

## Bibliography

Applegate, Lynda, James Cash and D. Quinn Mills. "Information Technology and Tomorrow's Manager". *Harvard Business Review*, November-December 1988, pp. 128-36.

Automotive Parts Manufacturers' Association. *The Mexican Auto Industry: A Competitor for the 1990s*. Toronto, Automotive Parts Manufacturers' Association, 1990.

Bartlett, Christopher and Sumantra Ghoshal. *Managing Across Borders*, Boston, Harvard Business School Press, 1989.

_____. "Managing Across Borders: New Strategic Requirements", *Sloan Management Review*, 28, Summer 1987a, pp. 7-17.

_____. "Managing Across Borders: New Organizational Responses", *Sloan Management*

*Review*, 29, Fall 1987b, pp. 43-53.

Bishop, Paul M. and Harold Crookell. "Specialization and Foreign Investment in Canada", in *Canadian Industry in Transition*, Donald McFetridge (ed), Toronto, University of Toronto Press, 1985.

Brown, Drusilla and Robert Stern. "Computable General Equilibrium Estimates of the Gains from US-Canadian Trade Liberalization", University of Michigan Research Seminar in International Economics Discussion Paper, No. 220, 1988.

Burgess, David F. "A Perspective on Foreign Direct Investment", in *Perspectives on a US-Canadian Free Trade Agreement*, Robert M. Stern, Philip H. Trezise and John Whalley (eds), Ottawa, Institute for Research on Public Policy, and Washington, The Brookings Institution, 1987.

Business International. *Organizing for International Competitiveness: How Successful Corporations Structure Their Worldwide Operations*, New York, Business International, 1988.

Cantwell, John. "The Reorganization of European Industries after Integration: Selected Evidence on the Role of Multinational Enterprise Activities", *University of Reading Discussion Paper Series*, No. 115, Reading, University of Reading Department of Economics, 1987.

Casson, Mark. *Multinationals and World Trade: Vertical Integration and the Division of Labour in World Industries*, London, Allen and Unwin, 1986.

_____. "Transactions Costs and the Theory of the Multinational Enterprise", in *New Theories of the Multinational Enterprise*, Alan Rugman (ed), London and Canberra, Croom Helm, 1982.

Casson, Mark and Robert Pearce. "The Welfare Effects of Foreign Enterprise: A Diagrammatic Analysis", *University of Reading Discussion Paper Series*. No. 98, Reading, University of Reading Department of Economics, 1985.

Caves, Richard. *Multinational Enterprises and Economic Analysis*, Cambridge, Cambridge University Press, 1982.

Chandler, Alfred. *Scale and Scope: The Dynamics of Industrial Capitalism*, Harvard, Belknap Press of Harvard University, 1990a.

_____. "The Enduring Logic of Industrial Success", *Harvard Business Review*, March-April 1990b, pp. 130-40.

_____. "Technological and Organizational Underpinnings of Modern Industrial Multinational Enterprise: The Dynamics of Competitive Advantage", in *Multinational Enterprise in Historical Perspective*, Alice Teihover, Maurice Levy-Leboyes and Helga Nussbaue (eds), Cambridge, Cambridge University Press, 1986.

Chesnais, Francois. "Multinational Enterprises and the International Diffusion of Technology", in *Technical Change and Economic Theory*, Giovanni Dosi et al (eds), London and New York, Pinter Publishers, 1988.

Crookell, Harold. "Subsidiary Strategy in a Free Trade Environment", *Investment Canada Working Paper Series*, No. 1990-II, Ottawa, Government of Canada.

Dearden, Richard G., Michael M. Hart and Debra P. Steger. *Living with Free Trade: Canada, the Free Trade Agreement and the GATT*, Ottawa, The Institute for Research on Public Policy and the Centre for Trade Policy and Law, 1989.

Dillman, Daniel. "Assembly Industries in Mexico", *Journal of Interamerican Studies and World Affairs*, 25:1, February 1983, pp. 31-58.

Doz, Yves. *Strategic Management in Multinational Enterprises*, Oxford, Pergamon Press, 1983.

Drucker, Peter F. "The Coming of the New Organization", *Harvard Business Review*, January-February 1988, pp. 45-53.

Dunning, John. *Explaining International Production*, Boston and London, Unwin Hyman, 1988.

Dunning, John and Robert D. Pearce. "The Nature and Growth of MNEs", in *Issues in Multinational Accounting*, C.W. Nobes and R. H. Parker, (eds), London, Philip Allan and St. Martins Press, 1988.

Easton, G. and R. Rothschild. "The Influence of Product and Production Flexibility on Marketing Strategy", in *The Management of Strategic Change*, A. M. Perrigrew, (ed), Oxford and Cambridge, Basil Blackwell, 1987.

Eden, Lorraine. "Two Steps Forward, One Step Back: Into the 1990s", in *Canada Among Nations 1989: The Challenge of Change*, Maureen Appel Molot and Fen Hampson (eds), Ottawa, Carleton University Press, 1990a.

_____. "Free Trade, Tax Reform and Transfer Pricing", Presented at the Annual Meetings of the American Accounting Association, Toronto, August 8-11, 1990b. Forthcoming in the *Canadian Tax Journal*.

_____. "Choices for the Global Economy", in *The Tory Record/1988: Canada Among Nations*, Brian W. Tomlin and Maureen Appel Molot (eds), Toronto, James Lorimer and Company, 1989a, pp. 83-106.

_____. "Pharmaceuticals in Canada: An Analysis of the Compulsory Licensing Debate", in *International Business in Canada: Strategies for Management*, Alan M. Rugman (ed), Prentice-Hall, 1989b.

_____. "New Directions in International Business Research", in *Research in Global Strategic Management Volume 1: A Canadian Perspective*, Alan M. Rugman (ed), Greenwich, CT, JAI Press Inc.,1990c.

_____. "The Impacts of Tax and Tariff Reforms on U.S. Direct Investments in Canadian Manufacturing", in *Canada/U.S.A.: The Economic Relationship*, David McKee (ed), Praeger Publishers, 1988a.

_____. "Equity and Neutrality in the International Taxation of Capital", *Osgoode Hall Law Journal*, 26.2, Summer 1988b, pp. 367-408.

_____. "The Microeconomics of Transfer Pricing", in *Multinationals and Transfer Pricing*, Alan Rugman and Lorraine Eden (eds), London and New York, Croom Helm and St. Martins Press, 1987.

Etemad, Hamid and L. Seguin Dulude (eds). *Managing the Multinational Subsidiary*, London, Croom Helm, 1986.

Ferdows, Kasra. (ed), *Managing International Manufacturing*, Amsterdam, North Holland, 1989.

Flaherty, Therese, "International Sourcing: Beyond Catalog Shopping and Franchising", in *Managing International Manufacturing*, K. Ferdows (ed), Amsterdam, North Holland, 1989.

Fleck, James and Joseph D'Cruz. "The Globalization of Manufacturing", *Business Quarterly*, Winter 1987, pp. 42-51.

Goldhar, Joel. "Implications of CIM for International Manufacturing", in *Managing International Manufacturing*, K. Ferdows (ed), Amsterdam, North Holland, 1989.

Grimwade, Nigel. *International Trade: New Patterns of Trade, Production and Investment*, London and New York, Routledge, 1989.

Hamel, Gary and C.K. Prahalad. "Do You Really Have a Global Strategy?", *Harvard Business Review*, July/August 1985, pp. 139-48.

Hart, Michael. *A North American Free Trade Agreement: The Strategic Implications for Canada*, Ottawa, Centre for Trade Policy and Law and the Institute for Research on Public Policy, 1990.

Harris, Richard and David Cox. *Trade, Industrial Policy and Canadian Manufacturing*. Toronto, Ontario Economic Council, 1983.

Hax, Arnoldo C. "Building the Firm of the Future", *Sloan Management Review 30*, Spring

1989, pp. 75-82.
Hefferman, Shelagh and Peter Sinclair. *Modern International Economics*, Oxford and Cambridge, Basil Blackwell, 1990.
Hoffman, Kurt and Raphael Kaplinsky. *Driving Force: The Global Restructuring of Technology, Labour and Investment in the Automobile and Components Industries*, Boulder, Westview Press, 1988.
Investment Canada. "The Business Implications of Globalization", *Investment Canada Working Paper Series*. No. 1990-V, Ottawa, Government of Canada.
Johnson, Catharine G. *Globalization: Canadian Companies Compete*, Ottawa, The Conference Board, 1990.
Junne, Gerd. "Automation in the North: Consequences for Developing Countries Exports", in *A Changing International Division of Labour*, James Caporaso (ed), Boulder, Lynne Reiner Publishers, 1987, pp. 71-90.
Kay, Neil. "The R&D Function: Corporate Strategy and Structure", in *Technical Change and Economic Theory*, Giovanni Dosi et al (eds), London and New York, Pinter Publishers, 1988.
Leyton-Brown, David. "Implementing the Agreement", in *Making Free Trade Work: The Canada-US Agreement*, Peter Morici (ed), New York, Council on Foreign Relations.
Lieberman, Marvin B. "Learning, Productivity, and US-Japan Industrial 'Competitiveness'", in *Managing International Manufacturing*, K. Ferdows (ed), Amsterdam, North Holland, 1989.
Lipsey, Richard. "Growth, Erosion and Restructuring of the Multilateral Trading System", Presented at the Annual Meetings of the American Economic Association, Atlanta, GA, December 1989.
Lipsey, Richard and Robert York. *Evaluating the Free Trade Deal: A Guided Tour Through the Canada-US Agreement*, Toronto, C.D. Howe Institute, 1989.
Markides, Constantinos and Norman Berg. "Manufacturing Offshore Is Bad Business", *Harvard Business Review*, September/October 1988, pp. 113-20.
Masahiko, Aoki. "Frontiers in Corporate Globalization", *Japan Echo*, Vol. 17, Special Issue, 1990, pp. 26-32.
McCulloch, Rachel. "US Direct Foreign Investment and Trade: Theories, Trends and Public-policy Issues", in *Multinationals as Mutual Invaders: Intra-industry Direct Foreign Investment*, Asim Erdilek (ed), New York, St. Martin's Press, 1985.
McFetridge, Donald G. "Factors Associated with the Use of Advanced Manufacturing Technologies", Report prepared for the Economic Council of Canada, Carleton University, 1990.
McRae, Donald M. and Debra P. Steger. *Understanding the Free Trade Agreement*, Ottawa, The Institute for Research on Public Policy, 1988.
Milne, S. "New Forms of Manufacturing and Their Spatial Implications: The UK Electronic Consumer Goods Industry", *Environment and Planning A*, 22, 1990, pp. 211-32.
Molot, Maureen Appel. "Why a NAFTA and Why a NAFTA Now? What It Means for Canada", *Policy Options*, forthcoming, 1991.
Morici, Peter. *Life After Free Trade: US-Canadian Commercial Relations in the 1990s*, Ottawa, Institute for Research on Public Policy and the Centre for Trade Policy and Law, forthcoming, 1991.
_____. (ed), *Making Free Trade Work: The Canada-US Agreement*, New York, Council on Foreign Relations, 1990.
Mytelka, Lynn K. "Knowledge-Intensive Production and the Changing Internationalization

Strategies of Multinational Firms", in *A Changing International Division of Labour*, James Caporaso (ed), Boulder, Lynne Reiner Publishers, 1987, pp. 43-70.
Negandhi, Anant and Arun Savara. *International Strategic Management*, Lexington, Lexington Books, 1989.
Niosi, Jorge. *Canadian Multinationals*, Toronto, Between the Lines, 1985.
OECD. *Structure and Organization of Multinationals*, Geneva, OECD, 1987
Ohmae, Kenichi. "Managing in a Borderless World", *Harvard Business Review*, May-June 1989, pp. 152-61.
_____. *Triad Power: The Coming Shape of Global Competition*, New York, The Free Press, Macmillan, 1985.
Ostry, Sylvia. *Governments and Corporations in a Shrinking World: Trade and Innovation Policies in the United States, Europe, and Japan*, New York, Council on Foreign Relations, 1990.
Pearce, Robert D. "World Product Mandates and MNE Specialization", *University of Reading Discussion Paper Series*. No. 121, Reading, University of Reading Department of Economics, 1988.
Porter, Michael. "Changing Patterns of International Competition", in *The Competitive Challenge: Strategies for Industrial Innovation and Renewal*, David Teece (ed), Cambridge, MA, Ballinger Publishing Co., 1987.
_____. (ed). *Competition in Global Industries*, Cambridge, MA, Harvard Business School Press, 1986.
Prahalad, C.K. and Gary Hamel. "The Core Competence of the Corporation", *Harvard Business Review*. May-June 1990, pp. 78-91.
Report of the Premier's Council. *Competing in the New Global Economy*, three volumes, Toronto, Queen's Park, 1988.
Richardson, David. "Adjustments and Safeguards", in *Making Free Trade Work: The Canada-US Agreement*, Peter Morici (ed), New York, Council on Foreign Relations, 1990.
Robock, Stefan H. and Kenneth Simmonds. *International Business and Multinational Enterprises*, 4th edition, Homewood and Boston, Irwin, 1989.
Rugman, Alan. *Multinationals and Canada-United States Free Trade*, Columbia, SC, University of South Carolina Press, 1990.
_____. "Multinational Enterprises and Strategies for Management", *Advances in International Comparative Management*, 3, 1988, pp. 47-58.
_____, "The Determinants of Intra-industry Direct Foreign Investment", in *Multinationals as Mutual Invaders: Intra-industry Direct Foreign Investment*, Asim Erdilek (ed), New York, St. Martin's Press, 1985.
Rugman, Alan, and Joseph D'Cruz. *New Visions for Canadian Business - Strategies for Competing in the Global Economy*, Toronto, Kodak Canada Inc., 1990.
Rugman, Alan, and Alain Verbeke. "Corporate Strategy after the Free Trade Agreement and Europe 1992", presented at the Joint Canada-Germany Symposium on Regional Integration in the World Economy: Europe and North America, Kiel, March 1990.
Safarian, A. E. "Firm and Government Strategies in the Context of Economic Integration", University of Toronto, mimeo, 1989.
Schonberger, Richard J. *World Class Manufacturing Casebook: Implementing JIT and TQC*, New York and London, The Free Press, 1987.
_____. *World Class Manufacturing: The Lessons of Simplicity Applied*, New York and London, The Free Press, 1986.
Schott, Jeffrey J. "A North American Free Trade Area: Ideal or Viable Policy Option?",

paper prepared for an international symposium on "Region North America: Canada, the United States and Mexico" at Baylor University, Waco, TX, October 11-13, 1989.

Shank, John. "Strategic Cost Management: New Wine, or Just New Bottles?", *Journal of Management Accounting Research*. Vol. 1, Fall 1989, pp. 47-65.

Statistics Canada. *Survey of Manufacturing Technologies - 1989: Statistical Tables*, Cat. No. ST-89-10, Ottawa, Supply and Services Canada, 1989.

United Nations Centre for Transnational Corporations. *Transnational Corporations in World Development*, New York, United Nations, 1988.

United Nations Conference on Trade and Development. *Uruguay Round: Papers on Selected Issues*, New York, United Nations, 1989.

_____. *Uruguay Round: Further Papers on Selected Issues*, New York, United Nations, 1990.

United States Department of Commerce, Bureau of the Census. *Survey of Manufacturing Technology*, Cat. No. SMT(88)-1, Washington, US Printing Office, 1989.

Van Tulder, Rob, and Gerd Junne. *European Multinationals in Core Technologies*, New York, John Wiley, 1988.

Weintraub, Sidney. "The Impact of the Agreement on Mexico", in *Making Free Trade Work: The Canada-US Agreement*, Peter Morici (ed), New York, Council on Foreign Relations, 1990.

_____. *Mexican Trade Policy and the North American Community*, Washington, Center for International and Strategic Studies, 1988.

Wheelwright, Steven. "Restoring the Competitive Edge in US Manufacturing", in *The Competitive Challenge: Strategies for Industrial Innovation and Renewal*, David Teece (ed), Cambridge, MA, Ballinger Publishing Co, 1987.

Womack, James P., Daniel T. Jones, and Daniel Roos. *The Machine that Changed the World*, New York, Rawson Associates, 1990.

Yannopoulos, George N. "European Community Tariff Preferences and Foreign Direct Investment", *University of Reading Discussion Paper Series*, No. 103, Reading, University of Reading Department of Economics, 1987.

GENERAL EDITOR: D. McFETRIDGE

# Foreign Investment, Technology and Economic Growth

The Investment Canada Research Series

1991

The University of Calgary Press